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## The Journal of the American Diabetes Association

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# SUBJECT INDEX 1972

This index covers all reading matter in Volume 21 of DIABETES. Entries marked with an asterisk (\*) indicate material that appeared in the Abstracts only. The Author Index begins on page 44.

## A

### ABDOMEN

- insulin administration to, 204
- tumors
- and lipid mobilization and food uptake, \*774

### ABETALIPOPROTEINEMIA, \*60

### ACETATE I-C-14

- utilization for fat synthesis
- rat strain differences in, \*770

### ACETIC THIOKINASE

- and lipogenesis, \*982

### ACETOACETATE

- brain utilization of, \*247
- metabolism, \*343
- palmitate oxidation to
- and ketosis, 258, 259, 261

### N-ACETYL-GLUCOSAMINE

- and insulin release, 540, 543

### ACHLORHYDRIA, 646

### ACID ETHANOL

- and serum nonsuppressible insulin-like activity, 271, 272-278

### ACID MUCOPOLYSACCHARIDES

- skin assays, 735, 738-742

### ACIDOSIS

- ammonium chloride induced
- and glucose tolerance and insulin sensitivity in rats, 794-796

### ACIDOSIS, LACTIC

- and phenformin, \*1198

### ACIDOSIS, METABOLIC

- and carbohydrate tolerance, 1109-1114

### ACIDS

- alpha-ketomonocarboxylic, \*359
- $\alpha$ -amino-isobutyric
- and pancreas beta cell transport, \*181
- blood lactic and pyruvic

- and diabetic coma, \*350
- isovaleric and  $\alpha$ -methylbutyric and hypoglycin A., \*316
- lactic
- and Tolinase and phenformin therapy, \*351
- nicotinic
- and lipolysis, 427

### ACROMEGALY

- and blood proinsulin-like components, 664
- and insulin secretion
- and serotonin antagonists, \*352
- and secretin
- and insulin release, \*1118

### ACTH. See Adrenocorticotrophic hormone

### ACTINOMYCIN D

- and hexokinase, \*185
- and rat adipocyte fatty acid synthetase activity, \*914

### ADENOSINE 3', 5'-MONOPHOSPHATE. See also Cyclic adenosine 3',5'-monophosphate; Dibutyryl adenosine 3',5'-monophosphate

- and isolated fat cells, 1027-1034
- and potassium flux and glucose output, \*254
- rat liver and adipose tissue
- and glucagon, \*54
- and synaptic activity
- and dopamine-sensitive adenylyl cyclase, \*773

### ADENYL CYCLASE, 440

- dopamine-sensitive
- and nervous system, \*773
- epinephrine-responsive
- and insulin, \*1117-1118
- glucagon-responsive
- macromolecular inhibitor of, \*180
- and glucagon and tolbutamide
- and islet cell adenoma, \*912
- inhibition study, 289-293

- and insulin release, \*328-329

in islets of Langerhans

in obese and lean mice, \*179

localization in islets of Langerhans, \*328

response to glucagon, ACTH and epinephrine, \*772

### ADIPOSE TISSUE

- adenosine 3',5'-monophosphate and glucagon, \*54

cellularity

and growth hormone treatment in ateliotic dwarfs, \*366

epinephrine-stimulated lipolysis in siblings of diabetics, \*361

fat cell size

and obesity, \*54

fat cell size and number

assay, \*247

and metabolism in middle-aged men and women, \*180

fatty acid synthetase

and glucose and insulin, \*914

and insulin, 427

free fatty acids release, \*59-60

glucose metabolism

and response to bovine insulin, 1151-1161

and ventromedial hypothalamic nuclei destruction, \*1204-1205

and insulin sensitivity

and obesity, 6-11

isolated cells

and adenosine 3',5'-monophosphate and dibutyryl adenosine 3',5'-monophosphate, 1027-1034

and lipoatrophic diabetes, 827-830

lipolysis and cellularity

and weight reduction in obese adolescents and adults, 754-760

lipolysis and glycerol kinase

and body weight, \*911-912

lipoprotein lipase, \*344

metabolism

and glycerol kinase regulation by insulin, \*122

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64

Supplement 1, 321-384

August, 843-922

February, 65-128

Supplement 2, 385-714

September, 923-986

March, 129-192

June, 715-778

October, 987-1050

April, 193-256

July, 779-842

November, 1051-1130

May, 257-320

December, 1131-1210

## SUBJECT INDEX 1972

- monoglyceride hydrolase  
and obese hyperglycemic mice, \*186
- noncollagen protein and cell number,  
\*1201
- phosphofructokinase  
and cyclic AMP and dibutyryl cyclic  
AMP, \*363
- proinsulin activity, 485
- rat  
glucose transport in, \*1042  
and insulin, \*60
- resection  
and diabetes and hyperinsulinism,  
13-15
- and sepharose-bound insulin, \*335-336
- ADRENAL GLANDS**
- and catecholamine release
  - and phenothiazine-induced hyperglycemia, \*184
  - and glucagon secretion, \*375
  - insufficiency  
and hypoglycemia, \*248
  - and insulin response to hemorrhagic shock, \*364
  - isolated cells  
corticosterone production studies,  
\*983
  - and myocardial infarction, \*119
  - tumors  
and diabetes, \*838
- ADRENALECTOMY**
- and glucagon effect on adenosine 3'5'-monophosphate levels, \*54
  - and insulin response to hemorrhagic shock, \*364
  - and liver mitochondria structure, 259
  - and splanchnic nerve stimulation, \*770
- ADRENALINE**
- and adenyl cyclase activity, \*179
  - and amino acid metabolism, \*56
  - and blood glucose and free fatty acid responses to catecholamines,  
\*912
- ADRENOCORTICOTROPHIC HORMONE**
- action  
and cyclic AMP, \*251
  - adenyl cyclase response to, \*772
  - and diabetic ketosis, 946-954
  - and growth hormone assays, \*775-776
  - and insulin  
and adipose tissue lipolysis, 427
  - in isolated adrenal cells, \*983
  - and lipolysis  
and mercury, \*771
- ALANINE**
- and glucagon secretion, \*183
  - and gluconeogenesis  
in diabetics and normal patients,  
\*341-342
  - and ethanol, \*1202
  - induced hyperglucagonemia  
and alpha-adrenergic blockade,  
\*1043
  - and insulin activity, \*1122-1123
  - and liver metabolism, 51
  - metabolism, \*57  
and glucose, \*56
  - synthesis by muscle  
and exercise, \*770-771
  - uptake by pancreatic beta cells, \*772
- L-ALANINE**
- and pancreas  $\alpha$ -amino isobutyric acid transport, \*181
- L-ALANINE-C-14**  
metabolism  
and tissue injury, \*315
- ALBUMINURIA**  
and bacteriuria, \*118
- ALCOHOL**
- and glucose tolerance, \*247-248
  - and hypoglycemia  
and basal insulin secretion, 65-69
  - induced glucose intolerance, \*184
  - and ketoacidosis, \*56-57
  - sensitivity  
ethnic differences in, \*254
- ALCOHOLISM**  
and fatty liver  
and fatty acid metabolism, \*835
- and liver metabolism  
and blood clearance rates, \*983
- ALDOSE REDUCTASE**
- and galactosemic cataracts, 295, 299-300
  - in human placenta, \*330
- ALDOSE REDUCTASE INHIBITORS**  
and insulin release, \*327
- ALKALINE PHOSPHATASE**  
and diabetic pregnancy, 34-35
- ALLERGY**  
to insulin  
and purified pork insulin, 638-643
- ALLOXAN**  
action  
and diphenylhydantoin, 80-83
- and beta cell membrane changes, \*326
  - and glucose, \*123  
and insulin secretion, \*326
  - and pancreatic beta cells, 77-78
- ALLOXAN DIABETES**
- in arteriosclerotic and nonarteriosclerotic rats, \*1123
  - in female rats  
and fetal pancreas transplants, 193-201
  - and glucagon secretion, \*183
  - glucose protection against, \*123
  - and glycosaminoglycans metabolism,  
1162-1166
  - and hypertriglyceridemia  
and diet, \*353-354
  - and jejunal mucosa enzymes, \*188
  - and ketosis  
and kidney function, \*121
  - and lipid synthesis, \*189

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- and lipoprotein lipase release, 149-155  
 and liver mitochondria  $\alpha$ -oxoglutarate carboxylation, \*981  
 and liver protein synthesis, \*339  
 and liver ribosomes, 84-88  
 and pH of inflammatory exudates, \*1201  
 and pressor response to angiotensin and norepinephrine  
 and insulin treatment, \*354-355
- ALPHA-ADRENERGIC BLOCKADE**  
 and alanine-induced hyperglucagonemia, \*1043  
 and insulin release, \*181, 783-784, \*1045
- ALPHA ADRENERGIC RECEPTORS**  
 and diazoxide-induced insulin secretion, \*1045  
 and L-dopa  
     and growth hormone secretion, \*911  
 and hypoinsulinemia, \*348
- ALPHA-KETOMONOCARBOXYLIC ACIDS**  
 and insulin secretion, \*359
- AMERICAN DIABETES ASSOCIATION**  
 Address of the President, 918-919  
 annual awards  
     Lilly, 920-921, 985, 1049, 1127-1128  
 Annual Banquet, 917  
 annual meetings  
     Central Council, 919  
     Thirty-second, 61-62, 124, 190, 255, 317-318, 840, 915-916, 1049  
     Thirty-third, 1128, 1208  
 Committee on Employment and Insurance  
     statement on employment of diabetics, 834-835  
 Committee on the Use of Therapeutic Agents, 832  
*Diabetes* index, 255  
*Diabetes Week*, 778, 841, 921, 986, 1049  
 and FDA labeling of oral hypoglycemic drugs, 833
- FORECAST**  
 "Cholesterol and Other Blood Fats in Diabetes," 1208  
 "Diabetes in the Desert: The Pima Indians of Arizona," 841  
 "Health Foods: Are They Healthful for Diabetics?" 778
- "U100 Insulin: A New Era in Diabetes Therapy," 1128
- International Diabetes Federation Eighth Congress**, 1050, 1128, 1208
- necrology, 63, 128, 192, 256, 320, 778, 842, 922, 986, 1050, 1130, 1210
- new members, 191-192, 256, 921-922, 1208-1209
- news of Affiliate Associations, 128, 192, 319-320, 778, 986, 1129, 1209
- news notes, 62-63, 128, 192, 256, 320, 778, 842, 922, 986, 1050, 1130, 1210
- obituaries  
     Beardwood, Joseph T., Jr., 839  
     Marks, Henry E., 178
- personals, 63, 256, 320, 922, 1050, 1130, 1210
- postgraduate courses, 62, 125-127, 190-191, 777, 840, 919-920, 984, 1048, 1124-1127, 1207, 1208, 1210
- Research and Development Awards, 127, 841, 920, 985, 1048-1049
- research grants program, 62, 1050
- research symposiums, 191, 255, 318-319, 777, 840, 919, 984, 1128-1129
- AMES REFLECTANCE METER**, \*1120
- AMINES**  
 and insulin secretion, \*248  
 uptake by brain, \*315
- AMINO ACIDS**  
 and alloxan toxicity, \*123  
 in fasted and fed rats  
     and exercise, \*119  
 and glucagon metabolism, 848-855  
 and glucagon secretion, \*183  
 and insulin, 447-451, \*909  
 and insulin release, \*56, 613, 617-618  
 insulin response to  
     and 2-deoxy-D-glucose and mannose-heptulose, 1-5  
 and insulin secretion, 539, 570-571  
 liver transport  
     and proteins, \*316  
 metabolic and hormonal responses to  
     in malnourished infants, \*182  
 metabolism  
     and exercise, \*770-771  
     and glucose, \*56  
     in perfused rat liver, \*57
- and starvation during pregnancy, \*1118-1119
- plasma and tissues  
     and starvation, \*179
- sequences of insulin, 457-459, 485
- sequences of proinsulins and intermediates, 461-466
- uptake  
     by brain, \*315  
     by pancreatic beta cells, \*772
- 6-AMINONICOTINAMIDE**  
 as diabetogenic agent in rats, 143-148  
 and insulin release  
     and glucose C-14 metabolism, \*1198
- AMINOPHYLLINE**  
 and 6-aminonicotinamide, \*1198  
 and glucagon and insulin secretion, 289-293  
 and insulin release, 689-690  
 and insulin-resistant hyperglycemia, \*775  
 and insulin response to glucose, \*770
- AMITRIPTYLINE**  
 and lipolysis and cyclic AMP in isolated fat cells, \*1045
- AMMONIA**  
 intoxication  
     and mitochondrial swelling, \*835-836  
 production  
     and ketone bodies, \*251  
     in muscle, \*1203  
     and renal gluconeogenesis, \*57
- AMMONIUM CHLORIDE**  
 -induced acidosis  
     and glucose tolerance and insulin sensitivity, 794-796  
 and insulin secretion, \*248
- AMNIOTIC FLUID**  
 substrates  
     and maternal caloric deprivation, \*1202
- AMPHETAMINES**  
 and insulin release, \*252
- AMPHOTERICIN B**  
 and rhinocerebral phycomycosis, \*185
- ANDROGENS**  
 and diabetic impotency, 23-28

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- ANEMIA**  
 hemolytic  
     and pancreatic acinar atrophy and fibrosis, \*773-774  
 hypochromic microcytic  
     and acetoacetate, \*311  
 and hypothyroidism  
     and diabetes, \*769
- ANGINA PECTORIS**  
 and clofibrate therapy, \*838, \*910
- ANGIOGRAPHY**  
 fluorescein  
     and prediabetes diagnosis, \*354
- ANGIOPATHY, DIABETIC**  
 and hemochromatosis  
     and cirrhosis, \*123  
 in juvenile diabetics, \*913
- ANGIOTENSIN**  
 pressor response to  
     and insulin treatment in alloxan diabetic rats, \*354-355
- ANOXIA**  
 and lactic acid levels  
     and phenformin and Tolinsin therapy, \*351
- ANTIBODIES**  
 to insulin, 649-656, 657-659, 660, 677  
     assays, \*769  
     and diabetes, \*57, \*775  
     in dogs adapted to bovine-porcine insulin, \*182  
     and insulin secretion, \*914  
     and insulitis, 764-765  
     polyethylene glycol screening test for, \*379  
     and serum-bound insulin neutralization, 930-934  
     without previous immunization, 814-825  
 to C-peptide, 1013-1025  
 proinsulin  
     in insulin-resistant patient, \*368  
 to smooth muscle tissue  
     binding to fibroblasts, \*314  
 to thyroid antigen, \*253
- ANTICOAGULANT DRUGS**  
 hereditary resistance to  
     and vitamin K, \*183
- ANTIMITOTIC AGENTS**  
 and insulin release, 987-997
- ANTIMYCIN A**  
 and insulin release, \*56
- APES, See *Macaca nigra***
- ARGAMINE**  
 and lipolysis, 427
- ARGININE**  
 and blood glucose levels, 308-310  
     derivatives  
         and metabolism, \*1122-1123  
 and glucose  
     and serum insulin and growth hormone, \*316  
     and glucose-induced insulin secretion, \*1045  
     and growth hormone secretion and sex, \*774-775  
     -induced glucagon and insulin secretion and aminophylline, 289-293  
     -induced glucagon release and diabetes, \*324  
     -induced insulin release and cyclic AMP system in man, \*312  
 infusion  
     and Huntington's chorea, \*1121  
 and insulin release, 1-2, \*56, 570, 617  
     insulin response to  
         in *acomys cahirinus*, 1063  
         and diethylstilbestrol and growth hormone, \*378  
         maternal and fetal, \*251  
     metabolism  
         and glucose, \*56  
     and plasma glucagon, 218-223  
     plasma growth hormone response to and diabetes, \*312  
     provocative tests  
         plasma growth hormone unresponsiveness to, \*981  
         uptake by pancreatic beta cells, \*772
- ARGININE-U-C-14**  
 incorporation into blood glucose, 308-310
- ARTERIES**  
 calcification  
     and glucose tolerance, \*252
- ARTERIOGRAPHY**  
 and insulinoma diagnosis, \*1206  
     and islet cell adenomas, \*185
- ARTERIOSCLEROSIS**  
 and diabetes mortality, 634  
     and hyperglycemia  
         and tolbutamide therapy, \*122-123  
         in rats  
         and alloxan diabetes, \*1123
- ARTERITIS**  
 and insulin response to glucose, \*837
- L-ASPARAGINASE**  
 and leukemia  
     and transient diabetes, \*1119
- ASPARTATE**  
 metabolism, \*57
- ASPIRIN**  
 and hypoglycemia, 959
- ATHEROSCLEROSIS**  
 and familial hypercholesterolemia, \*1121  
     and insulin, \*186, 684  
     and insulin response, \*836  
     and macroangiopathy, 679-680  
     and plasma insulin, blood sugar, and serum lipid abnormalities, \*253
- ATROPINE**  
 and serum insulin response to glucose and konnyaku ingestion, \*60
- AUTOANALYZER**, 308-310, 644  
 and glucose tolerance tests in *Macaca nigra*, 1078-1088
- AUTO-IMMUNE DISEASE**, \*914  
 and insulitis in late-onset diabetes, 764-766
- AUTOTUTOR MARK II**, 967-971
- B**
- BABOONS**  
 and alpha-adrenergic blockade  
     and insulin release, \*181  
 and diabetes  
     and kidney glomerulosclerosis, \*338  
     and hemorrhagic shock  
         insulin release during, \*982
- BACTERIA**  
 and jet insulin injection studies, 41
- BACTERIURIA**  
 and diabetes, \*118
- BANTING, FREDERICK G.**, 385-395
- BANTING MEMORIAL LECTURE**, 1181-1150
- BASEMENT MEMBRANE**  
 and diabetic glomerulosclerosis, 163-173  
     and fluid secretion, \*315  
     thickening  
         and aging and diabetes, 881-896, 899-905
- 
- DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE**
- |                  |                       |                     |
|------------------|-----------------------|---------------------|
| January, 1-64    | Supplement 1, 321-384 | August, 843-922     |
| February, 65-128 | Supplement 2, 385-714 | September, 923-986  |
| March, 129-192   | June, 715-778         | October, 987-1050   |
| April, 193-256   | July, 779-842         | November, 1051-1130 |
| May, 257-320     |                       | December, 1131-1210 |

## SUBJECT INDEX 1972

- and glucose tolerance, \*321  
 and insulin and gamma globulin complexes, 872-879  
 and juvenile diabetes, \*913  
 and pseudodiabetes of myopathy, \*118  
 width, \*254
- BEARDWOOD, JOSEPH T., JR., 839
- BETA ADRENERGIC BLOCKING AGENTS  
 and glucagon secretion, \*332-333  
 and insulin secretion, 783-784  
 and pancreatic glucagon and insulin secretion, \*332  
 and tolbutamide response and diazoxide, \*311
- BETA ADRENERGIC RECEPTORS  
 and carbohydrate metabolism, \*1203
- BICARBONATE  
 and diabetic ketoacidosis, \*323, \*1203  
 and lactic acidosis, \*1198
- BIGUANIDES  
 and sugar transport, \*119  
 and unstable diabetes, \*123
- BILE  
 lipids  
 and pregnancy, \*912
- BLADDER  
 dysfunction  
 and diabetes, \*364  
 function  
 and prediabetes, \*359  
 neurogenic  
 and diabetic impotency, 24, 26-27
- BLOOD  
 acetoacetate, 3-hydroxybutyrate and glucose  
 diurnal variations in, \*1205  
 and acetoacetate injections in rats, \*311  
 and brain metabolism, \*774  
 cholesterol  
 and diet, \*1043  
 cholesterol, triglycerides and immunoreactive insulin  
 in normals and prediabetics, \*383  
 circulation  
 and diabetes, \*981
- citrated  
 and exchange transfusion, \*185  
 coagulation  
 and diabetes, 108-112  
 constituents  
 and diet, \*1202  
 erythrocytes  
 glycolytic enzymes, in insulinoma, \*773  
 ethanol and tolbutamide clearance  
 and alcoholism, \*983  
 flow  
 and brain perfusion technic, \*1123  
 and diabetes and prediabetes, \*769  
 and glucose tolerance during bedrest and exercise, 103-104  
 pancreatic, and exogenous insulin, \*1204  
 and prostaglandins, \*369  
 retinal, \*354  
 ketone bodies  
 rapid estimation of, \*1117  
 lactate and ketone bodies  
 and diabetic ketoacidosis, \*186-187  
 lactic and pyruvic acids  
 and diabetic coma, \*350  
 lipids  
 in monkeys, 1084-1086  
 lipoproteins  
 in combined hyperlipoproteinemia, \*376  
 lymphocytes  
 response to phytohemagglutinin and *Candida albicans* antigen, 906-907  
 lymphocytes and fibroblasts  
 insulin binding to, 426-427  
 C-peptide, 661-670  
 platelet aggregation  
 and diabetes, 108-112; \*355  
 and glucagon, \*311-312  
 platelets  
 and diabetic retinopathy, \*120-121  
 and fatty acid metabolism, \*312  
 proinsulin, 661-670  
 prothrombin time  
 and vitamin K, \*183  
 samples  
 and responses to amino acids in malnourished infants, \*182  
 in study of diabetes in *Mystromys albicaudatus*, 716  
 and sulfonylurea study, 217-223  
 transfusions  
 and glucose, \*1120
- viscosity  
 and juvenile diabetics, \*254
- BLOOD GLUCOSE. See also Blood sugar  
 and alloxan  
 and diphenylhydantoin and glutathione, 80-83  
 and 6-aminonicotinamide, 144-148  
 and arginine, 308-310  
 assays  
 and surgery for islet cell adenomas, \*185  
 and body weight, \*362-363  
 capillary and venous, 1103-1105, 1107  
 control  
 and vascular diseases, 976-978  
 determination  
 and reflectance meter/enzyme test strip system, \*1119  
 and diabetic instability, \*836  
 and diet  
 in obese hyperglycemic mice, \*119  
 diurnal  
 and unstable diabetes, \*1203  
 and exercise  
 and diabetes, \*89-99  
 and obesity, \*909  
 in female diabetic rats  
 and fetal pancreatic transplants, 199-200  
 and glucose dosage, 1103-1104  
 and insulin  
 in diabetics and nondiabetics, \*1047  
 and insulin administration to gastrointestinal tract, 203-207  
 and insulinoma, \*250  
 and ketoacidosis, \*181  
 and lipoatrophic diabetes, 827-830  
 and metformin, \*771  
 monitoring, 705-706  
 plasma immunoreactive insulin during, \*324-325  
 and oral insulin, 644-647  
 and plasma growth hormone  
 and diabetic retinopathy, \*322  
 production, and oxidation  
 and insulin-dependent diabetes, \*375  
 and propranolol, \*122  
 response to catecholamines  
 and noradrenaline and adrenaline, \*912  
 response to glucagon, glucose and tolbutamide  
 and liver cirrhosis and insulinemia, \*121-122

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

**BLOOD PRESSURE.** *See also*, Hypertension  
and kidney transplantation  
and diabetes, \*322

**BLOOD SUGAR**  
and atherosclerosis, \*253  
control, 834  
and nerve tissue sorbitol and fructose, 1173-1178  
determination  
and Ames reflectance meter, \*1120  
and diabetic pregnancy outcome, \*1201-1202  
in diabetes survey, 1193-1196  
formation  
and lactate, \*189  
and glucagon infusion  
in congestive heart failure patients, 940-944  
and glycosuria  
and insulin, \*186  
and insulin stability, 812  
and nialamide, \*363-364  
in normals and prediabetics, \*383  
and pancreas extract injection in depancreatized dogs  
and discovery of insulin, 386-389  
and phenobarbital, \*1123  
and sulfonylureas, \*1120  
and kidney failure, \*1120-1121  
and uterine relaxants, \*1045

**BLOOD VESSELS.** *See* Capillaries; Vascular disease; Vascular system

**BODY**  
composition  
and growth hormone administration to hypopituitary dwarfs, \*982-983  
and obesity and insulin secretion, \*118  
fat  
and adipose tissue fat cell size and number, \*180  
forearm metabolism  
and tolbutamide, \*1206  
growth  
and adrenocorticotrophic hormone unresponsiveness, \*981  
and Cushing's syndrome, \*1122  
and metabolic response to growth hormone, \*119-120  
hands  
and diabetic neuropathy, \*314

height  
and abetalipoproteinemia, \*60  
height and weight  
in diabetes survey, 1193  
and muscle capillary basement membrane changes, 883, 899-905  
limbs  
and gangrene surgery, \*187  
lower extremity ischemia  
and femorotibial bypass, \*322-323  
organs  
and insulin and proinsulin degradation, 1091-1100  
weight  
and adipose tissue glycerol kinase and lipolysis, \*911-912  
and diabetes, \*362-363  
and hypothalamic damage, \*1206  
and insulin sensitivity, 6-11  
and spontaneous diabetes in monkeys, 1081  
weight reduction  
cardiovascular effects of, \*980  
and fat utilization and caloric restriction, \*835  
and insulin secretion, \*1118

**BONE**  
calcium, phosphorus, and magnesium and intestinal microflora, \*775  
neonatal development  
and maternal protein restriction, \*1047

**BOOK REVIEWS**  
*Calories and Carbohydrates*, by Barbara Kraus, 908  
*Current Topics on Glucagon*, edited by M. Austoni, C. Scandellari, G. Federspil, and A. Trisotto, 311  
*Diabetic at Work and Play, The: A Modern Manual for Diabetics with the Latest Information on Oral Drugs, Diabetic Camps, Research and Many Other New Topics*, by Burris R. Boshell, 908  
*Gourmet Recipes for Diabetics: The International Diabetic Diet Book*, by Dorothy Tompkins Revell, 908  
*How to Live with Diabetes*, by Henry Dolger, and Bernard Seeman, 1041

**BRAIN**  
amino acid, amines and hexose uptake, \*315  
calcium  
and feeding response in satiated rats, \*1046  
and extracellular markers for blood and cerebrospinal fluid transport, \*774  
and galactose toxicity, \*315  
glucose metabolism  
in newborn rat, \*775  
hexokinase  
localization on synaptosomal mitochondria, \*1205  
metabolism  
and galactose toxicity, 202-208  
and hepatic response to insulin-induced hypoglycemia, 802-803  
and neonatal hypoglycemia, \*910  
perfused rat  
glucose and D-3-hydroxybutyrate uptake, \*1206  
perfusion technic, \*1123  
utilization of ketone bodies  
and ketoacidosis, \*247

**BRIJ 98**  
and oral insulin, 643-647, 648

**BRUNNER'S GLAND**  
enterokinase secretion  
and glucagon, \*771

**BUPHENIN**  
and hyperglycemia, \*1045

**BUTYLAMINE**  
and insulin secretion, \*248

## C

**CAFFEINE**  
and cholesterol and triglyceride changes during glucose tolerance tests  
in prediabetics, \*365  
and insulin secretion, 540, 543, 571

**CALCIUM**  
absorption  
and diabetes, \*983  
binding mechanisms  
and hormones, \*1121-1122  
and feeding response in satiated rats, \*1046

## DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64  
February, 65-128  
March, 129-192  
April, 193-256  
May, 257-320

Supplement 1, 321-384  
Supplement 2, 385-714  
June, 715-778  
July, 779-842

August, 843-922  
September, 923-986  
October, 987-1050  
November, 1051-1130  
December, 1131-1210

## SUBJECT INDEX 1972

- flux  
and glucose ingestion in children, \*376  
and insulin action, 696, 697-698  
and insulin release, 544-545, 570, \*837  
and insulin storage, 591-592  
intestinal absorption, \*775  
in isolated adrenal cells, \*982  
and lipoprotein lipase, \*188  
and pancreatic beta cell amino acid uptake, \*772  
and serum cholesterol and triglycerides and hyperlipidemia patients, \*980  
uptake  
and cytochalasin B, 602, 605
- CALCIUM-45  
efflux from perfused islets, \*326-327
- CALORIES  
intake  
and plasma insulin levels, 613, 617-618  
and weight loss in obese hyperglycemic mice, \*835  
and pregnancy  
and amino acid metabolism, \*1118-1119  
and maternal and amniotic fluid substrate level, \*1202
- CANDIDA ALBICANS ANTIGEN  
peripheral blood lymphocytes response to  
and diabetes, 906-907
- CAPILLARIES  
basement membrane thickening  
and age and diabetes, \*837  
and pseudodiabetes of myopathy, \*118  
muscle  
basement membrane changes, \*254, 881-896, 899-905  
permeability and blood flow  
and diabetes and prediabetes, \*769  
and polyol pathway activity, \*330
- CARBOHYDRATES  
antidiuretic effects of, \*772  
dietary  
and childhood ketotic hypoglycemia, \*56  
and glucagon and insulin secretion, \*912-913
- islet cell  
circulating insulin in, \*909-910  
and streptozotocin therapy, \*1204  
and pancreateoduodenectomy, \*188
- CARDIOVASCULAR DISEASE  
and disodium ethylenediaminetetraacetate and hypoglycemia, 960  
etiology, 679-680  
and oral hypoglycemic drug labeling, 832  
and patient selection for UGDP, 1035-1036  
and pheochromocytoma  
and insulin-dependent diabetes, \*838
- CARDIOVASCULAR SYSTEM  
in chickens  
and nonavian insulin, \*59  
and weight reduction, \*980
- CARNITINE  
and liver palmitate metabolism, 259
- CASE REPORTS  
abetalipoproteinemia, \*60  
adipose tissue resection, 13-15  
adrenocorticotrophic hormone unresponsiveness and excessive growth, \*981  
alcoholic ketoacidosis, \*56  
ateliotic dwarfism and growth hormone treatment, \*366  
concurrent bullous and atrophic skin lesions, \*251  
congenital neuroblastoma and islet hyperplasia, \*1122  
Cushing's syndrome and growth retardation, \*1122  
diabetes  
and defective pituitary reserve capacity, \*981  
and hypokalemic nephropathy, \*1042  
and mumps in siblings, \*182  
in neonate, \*249  
and renal transplantation, \*322  
and rhinocerebral phycomycosis, \*185  
secondary to L-asparaginase therapy in acute leukemia, \*1119  
diabetic coma  
and fibrinolysis and peritoneal dialysis, \*913  
diabetic glomerulosclerosis without diabetes, \*769

## DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

- January, 1-64  
February, 65-128  
March, 129-192  
April, 193-256  
May, 257-320  
Supplement 1, 321-384  
Supplement 2, 385-714  
June, 715-778  
July, 779-842  
August, 843-922  
September, 923-986  
October, 987-1050  
November, 1051-1130  
December, 1131-1210

## SUBJECT INDEX 1972

- diabetic microangiopathy in identical twins, \*321-322  
drug-induced hypoglycemia, 956-962  
femorotibial bypass, \*322-323  
generalized lipodystrophy with abnormal growth hormone homeostasis, \*771  
hyperglycemia and hypoglycemia attacks  
and anti-insulin antibodies production without previous immunization, 814-825  
hyperparathyroidism  
and plasma insulin, \*773  
hypoglycemia during pregnancy following pancreateoduodenectomy, \*188  
hypophysectomy during diabetic pregnancy, 972-974  
idiopathic hypoglycemia and epinephrine excretion, \*1200  
infant hypoglycemia  
and cataracts, \*182  
infant ketoacidosis  
new syndrome in, \*181  
insulitis and late-onset diabetes, 762-763  
islet hypertrophy and beta-cell hyperplasia in juvenile diabetic, 114-116  
ketoacidosis and hemorrhaging, 108-110  
lipoatrophic diabetes without ketosis, 827-830  
lipoatrophy, \*381-382  
lipoproteinemia, 745  
maternal blood sugar levels and fetal mortality and morbidity, \*1201-1202  
pancreas transplantation, \*355  
pheochromocytoma with insulin-dependent diabetes, \*838  
temperate sprue, \*773
- CATARACTS  
and galactosemia, 202, 295-800  
and infant hypoglycemia, \*182  
and polyol accumulation, \*352  
in tucu-tucu, \*1206
- CATECHOLAMINES  
action  
and cyclic AMP, \*251  
blood glucose and free fatty acid responses to  
and noradrenaline and adrenaline, \*912
- CATS  
adrenalectomized  
and splanchnic nerve stimulation, \*770
- CAUDAL DYSPLASIA  
and diabetic pregnancy, \*1042
- CEREBROSPINAL FLUID  
and brain metabolism, \*774  
and diabetic ketosis, \*181
- CHICKS  
galactose toxicity in, \*315  
and nonavian insulin  
and cardiovascular response, \*59  
and oral glucose loading  
and plasma insulin and glucose, \*1046  
ornithine utilization in, \*771
- CHILDREN. *See also* Diabetes, juvenile; Infants  
and chemical diabetes, 45-47  
and Cushing's syndrome  
and growth retardation, \*1122  
diabetes control evaluation in, \*361-362  
and diabetic ketoacidosis  
and coma, \*60  
of diabetic parents  
retinal blood flow in, \*354  
and effects of neonatal hypoglycemia, \*910  
and glucose ingestion  
and calcium, magnesium and phosphorus flux, \*376  
and glucose tolerance tests  
and diphenylhydantoin therapy, \*355-356  
and growth hormone levels during sleep, \*776  
and hypoglycemia, \*248  
and epinephrine excretion, \*1200  
and intravenous hyperalimentation, \*837
- CHINESE  
and diabetes prevalence, \*353
- CHINESE HAMSTER  
prediabetic  
diabetes prevention in, \*337-338  
pancreas structure in newborns, 1051-1059
- CHLORMADINONE ACETATE  
and insulin release, \*313
- CHLORPROMAZINE  
-induced hypoglycemia, \*184, 961
- CHLORPROPAMIDE  
anti-diuretic action of, \*189  
and plasma glucagon, 216-223
- CHOLECYSTOKININ  
release, \*252
- CHOLESTEROL  
and clofibrate, \*838, \*910  
levels  
and alloxan diabetes, 1163-1166  
and pediatric familial type II hyperlipoproteinemia, \*1043  
metabolism  
and clofibrate, \*1200-1201  
and insulin, \*186  
and temperature, \*314  
and metformin, \*771
- CHOLESTEROL-C-14  
production  
and liver tissue injury, \*315
- CHOLINERGIC AGENTS  
and pancreatic glucagon and insulin secretion, \*332
- CHORIONIC GONADOTROPIN  
and diabetic pregnancy, 33-34
- CHORIONIC SOMATOMAMMOTROPIN  
and insulin and glucagon release, 1072-1075

## DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

- January, 1-64  
February, 65-128  
March, 129-192  
April, 193-256  
May, 257-320
- Supplement 1, 321-384  
Supplement 2, 385-714  
June, 715-778  
July, 779-842
- August, 843-922  
September, 923-986  
October, 987-1050  
November, 1051-1130  
December, 1131-1210

SUBJECT INDEX 1972

CHROMATOGRAPHY

- column
  - and isolation of insulin-tryptophan complex, \*1045
  - and mucopolysaccharides assays, 735
  - and glycoprotein study, 865-866
  - and insulin antibodies study, 822-823
  - and serum nonsuppressible insulin-like activity study, 271-278
- thin layer
  - and sodium acetate incorporation into rat aorta lipids, \*186

CHROMIUM

- dietary
  - and diabetes in monkeys, 1079
- in glucose tolerance factor, \*1043
- and glucose utilization
  - and marasmus, \*313
- hepatic
  - and diabetes, \*1046

CINANSERIN

- and insulin secretion, 784-786

CITRATE

- and amino acid metabolism, \*56
- pancreatic
  - and insulin release, 999-1001

CITRIC ACID CYCLE

- and diabetic ketosis, 257
- and liver ketogenesis, 50-52

CLOFIBRATE

- and cholesterol metabolism
  - and hyperlipidemia, \*1200-1201
- and fatty acid metabolism, \*835
- and ischaemic heart disease, \*838, \*910
- and tumor-bearing mice, \*837

COLCHICINE

- and insulin release, 991, 996-997

COLLAGEN

- in connective tissue study of diabetic rats, 736, 739

COMA, DIABETIC

- and blood ketone body estimation method, \*1117
- and blood lactic and pyruvic acids, \*350
- and diabetic ketoacidosis, \*60
- and drug-induced hypoglycemia, 955-962
- and fibrinolysis and peritoneal dialysis, \*913

COMA, HYPOGLYCEMIC

- diagnosis, 961
- treatment, 961-962

CONCANAVALIN A

- binding to isolated white fat cells, \*336-337
- and insulin, 1144

CONGENITAL DEFECTS

- dwarfism, \*366, 633, 872-873, \*982-983, \*1046
- neuroblastoma and islet hyperplasia, \*1122
- rubella
  - and diabetes incidence, \*248-249

CORONARY DISEASE. *See* Arteriosclerosis; Cardiovascular disease; Heart disease; Myocardial infarction

CORTICOTROPHIN

- and lipolysis
- and iodinated insulin, \*55

CORTISONE ACETATE

- and fasting triglyceride and cholesterol in offspring of diabetic couples, \*1044-1045

COXSACKIE B<sub>4</sub> VIRUS

- and diabetes, 766-767

CTENOMYS TALARUM. *See* Tuco-Tuco

CUSHING'S SYNDROME

- and growth retardation, \*1122
- in infancy, \*120

CYCLAMATES

- and blood constituents and hepatic lipids, \*1202

CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE

- and adipose tissue metabolism
  - and insulin, 414-424
- and adrenalectomy, \*340
- and amino acid metabolism, \*56
- binding mechanisms, \*1122
- formation
  - in islet cell adenoma, \*912
- formation and degradation
  - in islet cell tumor, \*185

and glucagon

- and pancreatectomy, 453

and glucose, 571

- and glucose-induced insulin release, \*1042

and glucose release

- and glucagon, \*332

- and glucose repression in rat liver, \*187

and glycogen synthase, 429, 433-436

and growth hormone secretion, \*313

and hormone action, \*251

and insulin

- and lipolysis, 403

and liver metabolism, 439-445

- and insulin action, 454-455, 696-697, \*772

- and insulin release, 1, 224-225, \*312, \*329, 545

and prediabetes, 689-690

in islet cell adenomas

- and glucose, glucagon, tolbutamide

and theophylline, \*346-347

in isolated adrenal cells, \*983

in isolated fat cells, 1027-1034

and amitriptyline, \*1045

and kidney gluconeogenesis, \*910

and lipolysis

and mercury, \*771

and tolbutamide, \*836

and liver protein synthesis, 453

and phosphofructokinase, \*363

and plasma insulin, \*180

and plasma insulin response to tolbutamide, \*311

and protein synthesis

and hormones, \*119

in white fat cells

and tolbutamide, \*835

CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE PHOSPHODIESTERASE, 441, \*838

and insulin, 415-416

localization in islets of Langerhans, \*328

CYCLIC GUANOSINE 3',5'-MONOPHOSPHATE

and glycogen synthase, 435

phosphodiesterase activity against, \*838

CYCLIC NUCLEOTIDES

receptor sites in fat cells, \*336

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64

Supplement 1, 321-384

August, 843-922

February, 65-128

Supplement 2, 385-714

September, 923-986

March, 129-192

June, 715-778

October, 987-1050

April, 193-256

July, 779-842

November, 1051-1130

May, 257-320

December, 1131-1210

## SUBJECT INDEX 1972

**CYCLOHEXAMIDE**  
 and gluconeogenesis  
 and glucocorticoid, \*349  
 and hexokinase, \*185  
 and insulin secretion, \*55  
 and rat adipocyte fatty acid synthetase activity, \*914

**CYCLOHEXYLAMINE**  
 and insulin secretion, \*248

**CYCLOPHOSPHAMIDE**  
 and immune response to insulin, \*58

**CYPROHEPTADINE**  
 and acromegaly, \*352  
 and insulin release, 784-786  
 and pancreatic beta-cell alterations, 71-78

**CYTOCHALASIN B**  
 and insulin release, \*327, 598, 600-602, 603

### D

**DECADRON**  
 and shock, \*1201

**2-DEOXYGLUCOSE**  
 and insulin release, 565  
 in fetal rat pancreas, \*121  
 and insulin response to amino acids, 1-5

**DEUTERIUM OXIDE**  
 and insulin release, 991-993, 996-997

**DEXTRAN**  
 -insulin complex  
 and insulin action studies, \*1122

**DEXTROSTIX**  
 and blood glucose determination, \*119

**DIABETES MELLITUS**  
 and acute pancreatitis, \*911  
 and adipose tissue lipolysis, \*361  
 and adipose tissue resection, 13-15  
 adult-onset  
     and oral hypoglycemic agents and vascular complications, \*57  
     and 6-aminonicotinamide, 143-148  
 and arterial calcification  
     and glucose tolerance, \*252  
 in baboons, \*338  
 and bacteriuria, \*118

and beta-cell sensitivity to glucose, 224-233  
 and bladder dysfunction, \*364  
 and blood glucose levels  
     and walking, 89-99  
 and blood lymphocytes response to phytohemagglutinin and *Candida albicans* antigen, 906-907  
 and body weight constancy, \*362-363  
 and calcium absorption, \*983  
 chemical  
     in children, 45-47  
     and hyperglycemia and hyperinsulinemia, \*1121  
 and circulating C-peptide immunoreactivity, 1013-1025  
 and connective tissue changes, 733-743  
 control  
     and diabetic retinopathy, \*382  
 diagnosis  
     and glucose tolerance during pregnancy, \*186  
     and scintiphotoscanning, \*351  
     and UCDP patient selection criteria, 1036  
 duration  
     and platelet aggregation, \*120-121  
     and retinopathy, \*187, \*321-322  
 and employment, 834-835  
 etiology  
     and insulin action, 698-700  
     and viruses, 713-714  
 and fructose, \*314  
 and gangrene surgery study, \*187  
 and glibenclamide therapy, \*55, \*913  
 and glomerular lesions  
     and proteinuria, \*1120  
 and glucagon, \*60, \*332  
 and glucagon secretion, \*183  
 and gluconeogenesis  
     and alanine, \*341-342  
 and glucose tolerance  
     and microangiopathy, \*321  
 and glycoprotein fucose elevation, 863-870  
 and graded insulin infusions  
     and plasma glucose, serum growth hormone and cortisol responses to, \*379  
 growth-hormone induced  
     and Huntington's chorea, \*374-375  
 in guinea pigs, \*338  
 and hemochromatosis  
     and angiopathy, \*123  
 hospital care for, \*1120

and Huntington's chorea, \*1121  
 and hyperphagia and polydipsia  
     and adrenalectomy and hypophysectomy, \*358-359  
 and hypertriglyceridemia  
     and postheparin lipolytic activity, \*342  
 and hypophysectomy during pregnancy, 972-974  
 and hypothyroidism, \*769  
 and impotence  
     and androgenic function, 23-28  
 incidence  
     and congenital rubella, \*248-249  
 and infection  
     and plasma glucagon, \*324  
 and insulin  
     and antigenicity, 649-656, 657-659, 660  
 and insulin antibodies, \*57, \*775  
 insulin-dependent  
     and acute hypoglycemic insulin action, \*182  
     and blood glucose production and oxidation, \*375  
     and pheochromocytoma, \*838  
 and insulin disappearance rates, \*1047  
 and insulin and glucagon patterns, \*359-360  
 and insulin resistance  
     and proinsulin antibodies, \*368  
 and insulin secretion, 608-613  
     and alcohol hypoglycemia, 65-69  
     and methysergide maleate, \*315-316  
     and xylitol and glucose, \*187-188  
 insulin-treated, 632-636  
     and plasma insulin, glucose and free fatty acids, \*325  
 and intestinal absorption, \*252-253  
 and intestinal growth and hexose transport in rats, \*59  
 juvenile  
     and blood viscosity, \*254  
     control evaluation, \*361-362  
     and fructose, \*349-350  
     and glomerular basement membrane thickening, \*913  
     and growth hormone, \*312  
     and growth hormone metabolism, 175-177  
     and islet hypertrophy and beta-cell hyperplasia, 114-116  
     and plasma lipid levels and diet, \*366  
     and programmed education, 967-971

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- and pseudo-dwarfism and Mauriac syndrome, 633  
 "remission," \*1205  
 and self-management, \*1204  
 and sensory perception thresholds, \*1199  
 and ketone body metabolism, \*246  
 and kidney disease  
     in Pima Indians, \*365-366  
 late-onset  
     and insulitis, 762-767  
 -like syndrome  
     and encephalomyocarditis virus infection, \*247  
 and lipemia  
     and insulin concentrations, \*376-377  
 and liver cholesterol turnover, \*314  
 and liver chromium content, \*1046  
 and liver free fatty acid metabolism, \*280-288  
 and liver gluconeogenesis  
     and glucocorticoids, \*339-340  
 and liver 3-hydroxybutyrate dehydrogenase, \*184-185  
 and liver metabolism, 257-268  
 and lower extremity ischemia  
     and femorotibial bypass, \*322-323  
 management, 683, 684  
 computer-delivered protocol for, \*367  
 and diabetic neuropathy, 679  
 and diet, 681-682  
 and insulin, 678, 713  
 and macroangiopathy and atherosclerosis, 679-680  
 and microangiopathy, 680-681  
 and new insulins, 637-647  
 maternal  
     and carbohydrate metabolism in newborn infants, \*912  
     and diabetic fetopathy, 687  
     and infant erythroblastosis fetalis, \*1199-2000  
 and infant hypocalcemia, \*914  
 and infant hypoglycemia, \*1202-1203  
     and neonatal carbohydrate metabolism, \*1046  
 maturity-onset  
     and diet, 1116-1117  
     and serotonin antagonists, \*352  
 and metabolic insulin clearance, 1003-1011  
 and metformin, \*771  
 and microangiopathy  
     and age, \*837  
     mortality studies, \*1044  
     and mumps, \*182  
     and muscle capillary basement membrane changes, 881-896, 899-905  
     and muscle capillary permeability and blood flow, \*769  
     in *Mystromys albicaudatus*, 715-721  
     in neonate, \*249  
     and neuropathy of hands, \*314  
     new research on, \*314  
     and obesity, \*246  
         and insulin resistance, \*370  
         and insulin secretion, \*1118  
         and low calorie diet with phenetermine resin, \*361  
         and phenformin, \*362  
     onset  
         and heredity and diet, \*770  
     and oral hypoglycemic drug labeling, 833  
     and pancreatic alpha cell function  
         and insulin, 301-307  
     and pancreatic beta cell function, 511  
     and pancreas transplantation, \*355  
     and peripheral circulation  
         infrared thermography studies, \*981  
     and phenformin  
         and lactic acidosis, \*1198  
     and pituitary gland reserve capacity, \*981  
     and placental glycogen metabolism, 1185-1190  
     and plasma amino acids, \*340-341  
     and plasma glucagon levels, \*324  
     and plasma immunoreactive insulin during continuous blood glucose monitoring, \*324-325  
     and platelet aggregation, \*355  
     and prediabetes transition to, 691-693  
     prevalence  
         among Florida Seminoles, \*776  
         and heredity and obesity, \*250  
     prevention, 693  
         and diet, \*337-338  
     and rat liver nuclear proteins, \*377  
     and renal transplantation, \*322  
     research  
         and beta-cell dysfunction, 703-704  
         and blood glucose analysis, 705-706  
         and glucose-insulin relationships, 704, 707-710  
 and rhinocerebral phycomycosis, \*185  
 screening  
     errors in, \*254  
 and serum N-acetyl-beta-glucosaminidase, 1168-1171  
 and serum phospholipids, \*123  
 and serum protein changes  
     and microangiopathy, \*371  
 and skin lesions, \*251  
 spontaneous  
     in *Macaca nigra*, 1077-1088  
 and submaxillary gland extirpation, 722-731  
 and sulfonylureas  
     and kidney insufficiency, \*1120-1121  
 surveys  
     among Chinese, \*353  
     and Pima Indians, \*180  
     of rural population of India, 1192-1195  
 therapy  
     and U100 insulin, 832  
 and thyrotoxicosis, \*370-371  
 transient  
     and L-asparaginase therapy in acute leukemia, \*1119  
 treatment  
     and hemochromatosis, \*1199  
     and jet insulin injection, 39-44  
     and sulfonylureas, \*120  
     and UGDP, 1036-1037  
 in tuco-tuco, \*1205  
 unstable  
     and biguanides, \*123  
     and diurnal growth hormone and glucose abnormalities, \*1203  
     and insulinogenic reserve, \*836  
 and vascular disease, \*314  
     and blood coagulation study, 108-112  
     in combined hyperlipoproteinemia, \*376  
 and venous changes, \*909

### DIALYSIS

- and diabetes, \*322  
 peritoneal  
     and diabetic coma, \*913

### DIAMINE OXIDASE

- and diabetic pregnancy, 35

### 20, 25-DIAZACHOLESTEROL, \*837

### DIAZOXIDE

- and amino acid metabolism, \*56  
 and beta cell tumors, 535

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64  
 February, 65-128  
 March, 129-192  
 April, 193-256  
 May, 257-320

Supplement 1, 321-384  
 Supplement 2, 385-714  
 June, 715-778  
 July, 779-842

August, 843-922  
 September, 923-986  
 October, 987-1050  
 November, 1051-1130  
 December, 1131-1210

## SUBJECT INDEX 1972

- and hyperresponsiveness to tolbutamide, \*360  
 and insulin secretion, \*327, 856-861, \*1045  
 and pancreatic beta cell uptake of amino acids, \*772  
 and tolbutamide response, \*311
- DIBUTEROL**  
 and amino acid metabolism, \*56
- DIBUTYRYL CYCLIC 3',5'-ADENOSINE MONOPHOSPHATE**  
 and fat cell metabolism, \*343  
 and insulin  
     and adipose tissue lipolysis, 427  
 and insulin release  
     in *acomys cahirinus*, 1065, 1067  
 and isolated fat cells, 1027-1034  
 and lipolysis  
     and insulin, 415-424  
 and phosphofructokinase, \*363  
 and protein synthesis, \*119
- DIET**  
 and adipose tissue glucose metabolism  
     and insulin response, 1152  
 and alimentary lipemia, \*58  
 and blood constituents and hepatic lipids, \*1202  
 and blood glucose control  
     and tolbutamide and phenformin, 976-978  
 and blood glucose and serum insulin in obese hyperglycemic mice, \*119  
 carbohydrate  
     and glucose metabolism, \*179  
     and pancreatic alpha cell function, 301-307  
 and cerebral development in rat fetus, \*189  
 and diabetes control, \*361-362  
 and diabetes management, 681-682  
 and diabetes onset, \*770  
 and diabetes prevention, \*337-338  
 and diabetes survey of rural population in India, 1192  
 and diabetes treatment, 1116-1117  
 diabetic  
     and xylitol, \*350-351  
 and differential feeder for parabiotic rats, \*983  
 "elemental" liquids  
     and hemolytic anemia and pancreatic acinar atrophy and fibrosis, \*773-774
- and exocrine pancreas development in neonatal rat, \*186  
 food intake  
     and stomach tumors in obese mice, \*774  
 galactose  
     and motor nerve conduction studies in rats, 295-300  
 and glucagon and insulin secretion, \*912-913  
 and glucose tolerance tests, 1197  
 and growth hormone release during sleep, \*913  
 high fat  
     and obese-hyperglycemic and non-obese mice, \*182  
 high fructose  
     and juvenile diabetes, \*349-350  
 high protein  
     and liver gluconeogenesis from fructose and glycerol, \*358  
 and hyperlipemia  
     in gerbils, \*60  
 and hypertriglyceridemia of streptozotocin diabetes, \*353-354  
 -induced hypercholesterolemia, \*1044  
 -induced jejunal lipodystrophy, \*248  
 isocaloric  
     in lipoproteinemia study, 744  
 and konnyaku ingestion  
     and serum insulin response to glucose, \*60  
 and lactose intolerance, 871  
 low calorie  
     and anorectic agents, obese diabetics and, \*361  
 low casein and methionine  
     and rat fatty liver metabolism, \*183  
 low cholesterol, high polyunsaturated fat  
     and insulin sensitivity, \*361-362  
 and nutrient regulation of insulin secretion, 606-615, 617-618  
 and obesity  
     and hyperinsulinemia, \*249  
     and pancreatic enzymes, \*186  
         in weaned rats, \*59  
 and pediatric familial type II hyperlipoproteinemia, \*1043  
 and plasma glucagon, \*331-332  
 and plasma lipid levels, \*366  
 and proliferative diabetic retinopathy, \*382
- protein-restricted  
     and neonatal growth hormone production and bone development, \*1047  
 safflower oil  
     and insulin secretion, 923-928  
 sucrose  
     serum triglyceride response to, \*835  
 and ventromedial hypothalamic nuclei destruction  
     and glucose metabolism, \*1204-1205  
 vitamin K deficient  
     and resistance to oral anticoagulants, \*183
- DIETHYLSTILBESTROL**  
 and insulin response to arginine and tolbutamide, \*378
- DIHYDROXYACETONE**  
 and liver gluconeogenesis, \*330-331
- DI-ISOPROPYLAMMONIUM DI-CHLORACETATE**, \*358
- DILANTIN.** *See* Diphenylhydantoin
- DIMETHYLBIGUANIDE.** *See* Metformin
- DIPA.** *See* Di-isopropylammonium dichloracetate
- DIPHENYLHYDANTOIN**  
 and alloxan diabetogenic action, 80-83  
 and insulin secretion, \*327, 856-861, \*982  
 long-term therapy  
     and glucose and insulin responses to glucose tolerance tests, \*355-356
- DISODIUM ETHYLENEDIAMINE-TETRA-ACETATE**  
 and insulin  
     and hypoglycemia, 960
- DIURESIS**  
 and secretin, \*769
- DNA**  
 fetal, \*315  
 kidney  
     in progeny of protein-deficient rats, \*1041  
 in mouse diaphragm, \*184  
 pancreatic  
     and diet in neonatal rats, \*186

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- DOGS**
- and acute uremia and metabolic acidosis
  - and carbohydrate tolerance, 1109-1114
  - adrenalectomized
    - and splanchnic nerve stimulation, \*770
  - and ammonium chloride acidosis
    - and glucose tolerance, 794, 796
  - and antidiuretic action of chlorpropamide, \*189
  - arginine and tolbutamide infusion
    - and diethylstilbestrol and growth hormone, \*378
  - Brunner's gland secretion in
    - and glucagon, \*771
  - and carbohydrate metabolism
    - and catecholamines and methylprednisolone, \*772
  - depacreatized
    - and discovery of insulin, 385-394
    - glucose turnover rates during running, \*382-383
  - and exercise
    - and plasma glucagon, \*1198-1199
  - and glucagon secretion
    - and growth hormone, \*313
  - glucagon studies in, \*360-361
  - and glucose feeding
    - and insulin secretion, \*911
  - and glucose kinetics studies, \*188
  - hypophsectomized
    - and tolbutamide and glybenclamide injections, \*378-379
  - and insulin antibodies, \*182
  - insulin distribution and binding in hindlimb of, \*775
  - and insulin-induced hypoglycemia, 802-803
  - and insulin release
    - and amino acids, \*56
  - and insulin secretion
    - and oral glucose feedings, \*909
    - and thyroxine and hypophsectomy, \*253
  - and intestinal glucagon-like immunoreactivity
  - and insulin secretion and glucose levels, \*58
  - liver free fatty acids metabolism
    - and anti-insulin serum, 280-288
  - mongrel and beagle
    - and serum insulin response, \*356
- E**
- EDEMA**
- cerebral, \*1203
  - and diabetic ketosis, \*180-181
- ELECTROPHORESIS**
- agar, 816
  - of glycoproteins and collagen
    - in connective tissue study of diabetic rats, 736, 738-739
  - and neutral regular insulin study, 236, 241
- ELIPTEN, \*837**
- EMBRYO, *See also* Fetus**
- pancreas islets study, 511-533
- EMIOCYTOSIS**
- and insulin release, 535, 603
- ENCEPHALOMYOCARDITIS VIRUS**
- and diabetes-like syndrome, \*247
  - and mouse pancreas, \*338-339
- ENDOCRINE GLANDS**
- adenomatosis
    - and familial nesidioblastosis, \*1122
  - and diabetic microangiopathy, 872-873
- ENDOPEPTIDASE**
- trypsin-like
    - and proinsulin conversion to insulin, 577-578
- ENZYMES**
- N-acetyl-beta-glucosaminidase
    - and diabetes, 1168-1171
  - adenyl cyclase
    - and nervous system function, \*773
    - adenyl cyclase and cyclic AMP phosphodiesterase
      - localization in rat islets of Langerhans, \*328
    - adenylate cyclase and phosphodiesterase
      - and insulin release, \*328-329
      - aldose reductase
        - and insulin release, \*327
      - assays
        - and diabetic pregnancy, 34-35
    - and cyclic AMP
      - and insulin, 439-445
    - cyclic AMP phosphodiesterase, \*328
      - and insulin, 415-416

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- enterokinase**  
     and glucagon, \*771  
     and galactose metabolism, 202, 208  
     glutathione-insulin transhydrogenase, \*353
- glycogen synthetase**  
     and insulin, 428-437
- glycogen synthetase and phosphorylase**  
     and diabetes, 1185-1190
- glycolytic**  
     and insulinoma, \*773  
     hexokinase, \*1205  
     and insulin degradation, 468  
         by placenta, \*374-375  
         and proinsulin assays, \*122  
     and insulin and proinsulin degradation, 1093-1100  
     in jejunal mucosa  
         and alloxan diabetes and fasting in rats, \*188  
     lipoprotein lipase  
         in rat heart and adipose tissue, \*344
- liver**  
     and alcoholism, \*983  
     liver acetic thiokinase  
         and lipogenesis, \*982
- liver adenylate cyclase**  
     and glucagon, \*981
- liver threonine dehydratase**, \*980-981
- pancreatic**  
     and diet, \*186  
     and serum anti-insulin, \*911
- phosphodiesterase**  
     and cyclic AMP and cyclic GMP, \*888
- phosphofructokinase**  
     and cyclic AMP and dibutyryl cyclic AMP, \*363
- of placental polyol pathway, \*330
- and proinsulin conversion to insulin, 577-578, 581-583
- proteolytic**  
     and fat cell lipolysis, 423  
     and leucine incorporation into protein, \*336
- EPINEPHRINE**  
     adenyl cyclase response to, \*772  
     and calcium transport, \*327  
     and cyclic AMP, 441, 445  
     excretion  
         and idiopathic hypoglycemia, \*1200  
     and glucagon secretion, \*332-333  
     and glycogen synthase, 436  
     and insulin  
         and adipose tissue lipolysis, 427
- and insulin release  
     and glucose administration, \*348  
     and insulin response to glucose, \*773  
     and insulin secretion, \*770
- and lipolysis  
     and mercury, \*771
- and protein synthesis  
     and cyclic AMP, \*119
- responsive adenyl cyclase  
     and insulin, \*1117-1118
- stimulated lipolysis  
     in siblings of diabetics, \*361
- ERYTHROBLASTOSIS FETALIS**  
     and fetal pancreas, \*253-254  
     and glucose metabolism, plasma insulin and growth hormone secretion, \*1199-2000
- 17B-ESTRADIOL**  
     and tRNA methylases, \*253
- ESTROGEN**  
     and diabetic pregnancy, 31-32  
     and growth hormone secretion, \*774-775
- ETHANOL**  
     and alanine  
         and gluconeogenesis, \*1202  
     blood clearance of  
         and alcoholism, \*983  
     and diabetes, \*1042  
     -induced fatty liver  
         and pyrazole and glucose, \*247  
     -induced hypoglycemia, 958  
     and insulin release  
         in healthy subjects, 158-161  
     and intestinal triglyceride synthesis, \*769-770
- metabolism  
     and hypo-, hyper-, and euthyroid rats, \*181
- and muscle damage, \*838
- and phenformin  
     in obesity and prediabetes, \*363
- and skeletal muscle lactate metabolism, \*367
- ETHINONINE**  
     and pancreas mitotic activity, 1055
- EXERCISE**  
     and amino acid levels  
         in fasted and fed rats, \*119  
     and amino acid metabolism, \*770-771  
     and cardiovascular system  
         and weight reduction, \*980
- decreased  
     and glucose intolerance, 101-107  
     and glucagon secretion, \*1198-1199  
     and glucose metabolism, \*179, \*776  
     and glucose turnover in depancreatized dogs  
         and insulin and glucagon infusion, \*382-383
- induced glucagon secretion  
     and catecholamines, \*334
- and insulin and glucose uptake, \*980
- and insulin secretion  
     and obesity, \*909  
     and phentolamine, \*119
- and lactic acid levels  
     and phenformin and Tolinsin therapy, \*351
- walking  
     and blood glucose levels in normals and diabetics, 89-99

## F

### FAMILY HISTORY

- and alcohol-induced glucose intolerance, \*184
- and chemical diabetes in children, 45
- and diabetes following mumps in siblings, \*182
- and diabetes prevention, \*337-338
- and endocrine adenomatosis, \*1122
- and epinephrine-stimulated lipolysis, \*361
- and myotonic dystrophy  
     and insulin secretion, \*378
- and prediabetes, \*359
- and renal glycosuria, \*248
- and sensory perception thresholds in relatives of diabetics, \*1199

### FASTING. See Starvation

- FAT CELLS.** *See also* Adipose tissue  
     adenylate cyclase  
         and insulin, \*772  
     and antilipolytic action of tolbutamide, \*836
- and insulin action study, 454
- insulin binding with membranes of, 398-401
- and insulin and lipolytic hormones  
     and mercury, \*771
- insulin receptor of  
     and insulin resistance, \*1042
- leucine incorporation into protein by, \*336

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

SUBJECT INDEX 1972

- lipolysis**  
 and insulin, 414-424  
 lipolysis and cyclic AMP  
 and amitriptyline, \*1045  
 and tolbutamide, \*835  
**metabolism**  
 and dibutyryl cyclic AMP, \*343  
 and insulin, \*351-352, 403-411  
 purification of plasma membranes  
 and adenyl cyclase response to hormones, \*772  
 and receptor sites for insulin and cyclic nucleotides, \*336  
**size and number**  
 assay method, \*247  
 and enlargement of epididymal fat pads, \*247  
**white**  
 concanacalbin A binding to, \*336-337
- FATS**  
 and insulin release, 613-615, 617-618  
 tolerance  
 and oral contraceptives, \*316
- FATTY ACIDS**  
 free  
 and anti-insulin serum, 280-288  
 and glucagon, \*60  
 and glucose ingestion, 1104-1105  
 and  $\beta$ -hydroxybutyrate, \*836  
 and hypertriglyceridemia and phenformin, \*380  
 and phenformin, \*1045  
 release from adipose tissue, \*59-60  
 renal, \*314  
 responses to catecholamines, adrenaline and noradrenaline and, \*912  
 and streptozotocin, \*59  
 and insulin release, 613-615, 617-618  
 metabolism  
 and pancreas alpha and beta cells, \*909  
 by sheep liver and viscera, \*118  
 and thrombin, \*312  
 oxidation, oxidative phosphorylation  
 and diabetic rat liver mitochondria ultrastructure, 257-268  
 release by adipose tissue  
 and insulin, 414-424  
 synthetase activity  
 and glucose and insulin, \*914
- FETUS**  
 cerebral development  
 and diet and growth hormone studies, \*189  
 and diabetic fetopathy, 687  
 endocrine pancreas  
 cytological studies, \*253-254  
 fibroblasts  
 glucose oxidation in, \*360  
 growth  
 and maternal diabetes, \*912  
 insulin response  
 and arginine, \*251  
 lamb  
 and metabolism studies, \*187  
 and maternal diabetes, 31, \*315, 687, \*912  
 mortality  
 and diabetic pregnancy, 31  
 mortality and morbidity  
 and maternal blood sugar levels, \*1201-1202  
 pancreas, 620, 621, 623-624  
 insulin content, 193-201  
 insulin release studies, \*345-346  
 islets study, 511-533, 536  
 and placental nitrogen conservation, \*340  
 and streptozotocin therapy, \*316  
 subhuman primate  
 and theophylline, \*180
- FIBRINOLYSIS**  
 and diabetic coma, \*913
- FIBROBLASTS**  
 cultured  
 glucose oxidation in, \*360  
 of granulation tissue  
 and antismooth muscle serum, \*314
- FLUID SECRETION STUDIES, \*315**
- FLUPHENAZINE**  
 -induced hyperglycemia, \*184
- FOOD AND DRUG ADMINISTRATION**  
 and labeling of oral hypoglycemic drugs, 833, 1116-1117
- FORMALDEHYDE**  
 -treated insulin, \*55
- FREEZE ETCHING TECHNIC, \*326, 619-620**
- FRUCTOSE**  
 and diabetes, \*314  
 dietary  
 and diabetic children, \*349-350  
 and fetal metabolism, \*187  
 gluconeogenesis from, \*358  
 and insulin secretion, 543, 561  
 and liver glucose production  
 and insulin-induced hypoglycemia, 797-803  
 metabolism  
 in fasted and streptozotocin diabetic rat, \*122  
 in nervous tissues  
 and blood sugar control, 1173-1178  
 serum triglycerides response to and age, \*835  
 small intestine permeability for, \*249
- D-FRUCTOSE**  
 and insulin response to glucose, 540  
 transport  
 and biguanides, \*119
- FUCOSE**  
 protein-bound  
 and diabetes, 863-870
- G**
- GALACTOSE**  
 and insulin release, 543, 561  
 and nervous system defects, 295-300  
 toxicity, \*315  
 and brain metabolism, 202, 208
- D-GALACTOSE**  
 and alloxan toxicity, \*123  
 and insulin response to glucose, 540  
 intestinal uptake, \*249  
 transport  
 and biguanides, \*119
- GALACTOSEMIA**  
 and brain metabolism, 202, 208  
 and diabetic microangiopathy, \*352
- GAMMA GLOBULIN**  
 and insulin complexes  
 and diabetic microangiopathy, 872-879
- GANGRENE**  
 and femorotibial bypass, \*322-323  
 and insulin response, \*836  
 and limb salvage arterial surgery, \*187

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- GASTRECTOMY**  
and glucagon and insulin response, \*1047
- GASTRIN**  
and insulin secretion, 535
- GASTROENTERITIS**  
and hypoglycemia, \*248
- GASTROINTESTINAL SYSTEM**  
absorption  
and diabetes, \*252-253  
and cholecystokinin  
and secretin, \*252  
and diet-induced jejunal lipodystrophy, \*248  
diseases  
and "elemental liquid" diets, \*773-774  
and duodenal acidification  
and pepsin secretion study, \*250  
enzyme activity  
in rats, \*59  
gastric emptying rate  
and oral glucose tolerance tests, \*381  
glucagon and insulin responses, \*1047  
glucagon-like immunoreactivity, \*837-838  
assays, \*1206  
and insulin and glucose, \*58  
glucose and galactose absorption, 1107  
growth and hexose transport  
in diabetic rats, \*59  
hormones  
and insulin response to triglyceride, 928  
and insulin administration  
and plasma immunoreactive insulin, 203-207  
jejunal mucosa  
and glycolytic and pentose phosphate pathway enzymes, \*188  
lipodystrophy  
diet-induced, \*1044  
lipoprotein production, \*121  
mechanical stimulation of  
and serum insulin response to glucose, \*60  
microflora  
and calcium and magnesium absorption, \*775  
and oral insulin, 643-647  
permeability to glucose  
and synthetic surfactants, \*182-183  
and portacaval shunting  
and glucose tolerance and serum immunoreactive insulin response, \*179
- small bowel  
and insulin response to glucose absorbed from, \*54
- small intestine  
permeability for fructose, \*249
- sugar transport  
and biguanides, \*119
- surgery  
and glucose homeostasis, \*1199
- transport  
and glucagon, \*983
- triglyceride synthesis  
and ethanol, \*769-770
- xylitol absorption, \*350-351
- GEESE**  
and liver metabolism  
and glucagon, \*55
- GENES**  
and autosomal recessive inheritance of renal glycosuria, \*248  
and familial hypercholesterolemia, \*1121  
and longevity in mice, \*914
- GERBILS**  
and diet-induced intestinal lipodystrophy, \*1044  
and hyperlipidemia, \*60  
pancreas structure in newborns, 1051-1059
- GIRAFFES**  
muscle capillaries basement membrane width in, \*254
- GLIBENCLAMIDE**  
and amino acid metabolism, \*56  
-glucose-response-test, \*913  
intrapancreatic infusion  
and insulin release, 209-215  
and pancreatic beta cell uptake of amino acids, \*772  
pharmacodynamic aspects, \*249, \*249-250  
studies, \*55
- GLIBORNURIDE**  
pharmacodynamic aspects, \*249, \*249-250
- GLICLAZIDE**  
and microangiopathy, \*357
- GLISOXEPIDE**  
pharmacodynamic aspects, \*249, \*249-250, \*912
- GLOMERULOSCLEROSIS, DIABETIC**  
immunohistopathological study of, 163-173  
without diabetes, \*769
- GLUCAGON**  
action  
and cyclic AMP, \*251  
and adenosine 3'5'-monophosphate levels, \*54  
and adenyl cyclase activation in islet cell adenoma, \*912  
adenyl cyclase response to, \*772  
biosynthesis, \*58-59  
and carbohydrate homeostasis, \*357  
and carbohydrate metabolism, insulin and growth hormone secretion  
in congestive heart failure patients, 939-944  
chronic administration of  
and glucose tolerance and insulin hyperresponsiveness, \*374  
and cyclic AMP, 440  
and pancreatectomy, 453  
and diabetes  
and infection, \*324  
and diuresis, \*769  
and enterokinase secretion, \*771  
gastrointestinal response to, \*1047  
and gastrointestinal transport, \*983  
and gluconeogenesis, \*331  
and hypoglycemic coma, 961-962  
immunoreactive  
in islet cell tumors, \*333  
and immunoreactive insulin and blood glucose, \*360-361  
infusion  
and glucose turnover in depancreatized dogs, \*382-383  
and insulin immunoreactivity, \*313  
-insulin ratio  
and liver metabolism, \*341  
and insulin release  
and arginine, \*312  
and insulin response, 1  
in *acomys cahirinus*, 1064, 1069  
and islet cell adenoma cyclic AMP content, \*346-347  
kidney sensitivity to  
and starvation, \*334  
-like immunoreactivity  
assays, \*1206  
and insulin secretion and glucose concentration, \*58

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- and liver adenosine 3',5'-monophosphate and glucose, \*187  
 and liver cirrhosis, \*121-122  
 and liver gluconeogenesis  
     and D-glyceraldehyde and dihydroxyacetone, \*330-331  
 -mediated plasma insulin responses  
     and theophylline, \*180  
 metabolism, \*333  
     and diabetes, \*332  
 and myocardial oxygen consumption  
     and potassium balance, \*118-119  
 physiology and pathophysiology, \*60  
 and plasma amino acids, \*340-341  
 and plasma lipids and blood platelets, \*311-312  
 and related synthetic peptides, 843-855  
 release  
     and human chorionic somatomammotropin, 1072-1075  
 resistance  
     and lipemia, \*357  
 -responsive adenyl cyclase  
     macromolecular inhibitor of, \*180  
 secretion, \*314  
     adrenergic control of, \*332-333  
     and alanine, \*183  
     and aminophylline, 289-293  
     and catecholamines, \*334  
     and diet, \*912-913  
     and exercise, \*1198-1199  
     during glucose infusions in starvation and diabetes, \*359  
     and growth hormone, \*313  
     and insulin deficiency, \*183  
     and pituitary and adrenal glands, \*375  
     selectively blocked  
         and liver adenylate cyclase, \*981  
     serum insulin response to  
         in mongrel and beagle dogs, \*356
- GLUCAGON I-131**  
 and glucagon metabolism studies, \*333
- GLUCOCORTICOIDS**  
 and ACTH, growth hormone or thyroxine and ketosis, 414  
 and diabetic ketosis, 946-954  
 and gluconeogenesis, \*252  
 and liver gluconeogenesis  
     and diabetes, \*339-340  
 and liver mitochondrial structure, 258
- GLUCONEOGENESIS**  
 and alanine  
     and diabetes, \*341-342  
     and ethanol, \*1202  
     from arginine, 308-310  
     and cyclic AMP  
         and insulin, 439-445  
     from fructose and glycerol  
         in liver of high-protein fed rats, \*358  
     and glucagon, \*183  
     and glucocorticoids, \*252
- GLUCORECEPTOR MECHANISMS**, 555-568, 570, 611-613
- GLUCOSAMINE**  
 and insulin release, \*328, 543, 544, 561, 570
- D-GLUCOSAMINE**  
 and insulin response to glucose, 540-541
- GLUCOSE.** *See also* Glucose intolerance; Glucose tolerance; Glucose tolerance tests  
 absorption  
     and gut glucagon-like immunoreactivity, \*837-838  
 absorption from small bowel  
     and insulin response, \*54  
 and adenyl cyclase activity, \*179  
 and alloxan  
     and insulin secretion, \*326  
     and alloxan toxicity, \*123  
     and amino acid metabolism, \*56  
     and arginine  
         and serum insulin and growth hormone, \*316  
 beta cell sensitivity to  
     and prediabetes and diabetes, 224-233  
 binding to intestinal epithelial brush borders  
     and diabetes, \*252-253  
 brain metabolism  
     in newborn rat, \*775  
 and calcium metabolism, \*327  
 disappearance rates  
     in infants of diabetic mothers, \*1046  
     and methysergide maleate, \*316  
 disposal  
     and myopathy, \*118  
     and ethanol-induced fatty liver, \*247  
     and fatty acid metabolism, \*835  
     and fatty acid synthetase activity, \*914
- and fetal metabolism, \*187  
 glibenclamide-response-test, \*913  
 and glucagon, \*60  
 and glucagon-like immunoreactivity, \*58  
 homeostasis  
     and gastric surgery, \*1199  
     and glucagon, \*314  
     and hypoglycemia, 815  
 and hypoglycemic coma, 961  
 infusion  
     insulin and glucagon patterns during, \*359-360  
 ingestion  
     and metabolism, 1102-1108  
 ingestion in children  
     and calcium, magnesium and phosphorus flux, \*376  
 and insulin  
     and hypoglycemia, \*373  
     and lipoatrophy, \*381-382  
 -insulin relationships, 704, 707-710  
 and insulin secretion, \*55, 143, 157-161, \*370, 606-613, 617-618, 713, 989  
 in *acomys cahirinus*, 1062  
 and adenylate cyclase and phosphodiesterase, \*328-329  
 and ammonium ion, \*248  
 and arginine, \*312, \*1045  
 and carbohydrate and lipid metabolism, \*1119  
 and chlormadinone acetate, \*313  
 and cyclic AMP, \*1042  
 and cytochalasin B., \*327  
 and diabetes and obesity, \*187-188  
 and diphenylhydantoin and diazoxide, 856-861  
 and epinephrine, \*770, \*773  
 and human chorionic somatomammotropin, 1072-1075  
 and immunohistological detection of insulin in pancreatic tissue, \*246  
 and iodoacetate and antimycin A, \*56  
 and juvenile diabetes "remission," \*1205  
 and konnyaku ingestion, \*60  
 and kwashiorkor, \*1119-1120  
 and methysergide, 780-787  
 and ouabain, \*246  
 and peripheral vascular disease, arteritis, and Raynaud's phenomenon, \*836-837  
 in rat islets, \*1205

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- and serotonin and dopamine, \*184  
and small vessel disease, \*836  
stimulus-secretion coupling of, 594-603  
and tolbutamide, 684  
intestinal permeability to  
and synthetic surfactants, \*182-183  
intestinal transport  
and biguanides, \*119  
and islet cell adenoma cyclic AMP content, \*346-347  
kinetics  
in dogs, \*188  
levels  
and alcohol hypoglycemia, 65-69  
and liver cirrhosis and insulinemia, \*121-122  
and liver gluconeogenesis, \*371  
loading  
and diet and fasting, \*1046  
and iodinated insulin, \*55  
and obesity, \*54  
and maternal diabetes  
and infant hypoglycemia, \*1202-1203  
metabolism  
adipose tissue, 1151-1161  
and carcinoid syndrome, \*1200  
and cyclic and dibutyryl AMP, 1028-1030  
and erythroblastosis fetalis, \*1199-2000  
and insulin, \*184  
in isolated pancreas islets, 538-545  
in isoproterenol-stimulated rat salivary glands, \*982  
during leg exercise, \*776  
and methylene blue, \*350  
and obesity, 6-11  
and pancreas alpha and beta cells, \*909  
in rat skin, \*189  
and shock, \*1201  
and ventromedial hypothalamic nuclei destruction, \*1204-1205  
oral  
and alimentary lipemia, \*58  
and insulin secretion, \*909, \*911  
output  
and insulin and adenosine 3',5'-monophosphate, \*254  
oxidation  
in cultured fibroblasts, \*360  
and exercise and dietary carbohydrate, \*179  
of isolated islets in tissue culture, 548, 550-551  
and norepinephrine and theophylline, 416-417  
pancreatic islet response to, \*344-345  
and plasma glucagon, growth hormone and insulin  
during exchange transfusion, \*1120  
and plasma insulin  
and diabetes, 1012  
and theophylline, \*180  
and plasma and pancreatic insulin, \*375-376  
production  
and mannose, fructose and hydroxybutyrate, 797-803  
proinsulin response to  
and age, obesity, and degree of carbohydrate intolerance, \*356  
prolonged infusion  
and insulin secretion, \*372  
regulation  
and hypertension, \*776  
renal, \*314  
repression in rat liver  
cyclic 3'5'-AMP during, \*187  
responses  
and diphenylhydantoin therapy, \*355-356  
and serum insulin levels  
and trauma, \*183  
-stimulated insulin release  
and glucoreceptor mechanisms in islets of Langerhans, 555-568  
and insulin storage, 585-592  
and sulfonylureas, \*249-250  
transport  
in fat cells, 403  
in rat adipose tissue, \*1042  
turnover  
in depancreatized dogs, \*382-383  
uptake  
and exercise, \*980  
by isolated perfused rat brain, \*1206  
uptake by brain  
and perfusion technics, \*1123  
uptake by fat tissue  
and  $\beta$ -hydroxybutyrate, \*836  
utilization  
and chromium, \*313  
and growth hormone, \*342-343  
and thyrotoxicosis, \*370-371
- GLUCOSE INTOLERANCE**  
alcohol-induced, \*184  
and catecholamine-secreting tumors, \*888  
and chromium deficiency, \*313  
and decreased physical activity, 101-107  
and gastrectomy, \*1047  
and hypokalemia, \*1043-1044  
and myocardial infarction, \*119  
and obesity, \*1118  
and phenytoin, \*187
- GLUCOSE TOLERANCE**  
and acute uremia and metabolic acidosis, 1109-1114  
and alcohol, \*247-248  
and ammonium chloride-induced acidosis, 794-796  
and arterial calcification, \*252  
and carbohydrate and lipid metabolism, \*1119  
and chronic glucagon administration, \*374  
and encephalomyocarditis infection, \*247  
and glibenclamide, \*55  
and growth hormone treatment in ateliotic dwarfism, \*366  
and insulin response  
in partially pancreatectized dogs, \*339  
intravenous  
and myocardial infarction, \*184  
and metformin, \*771  
and microangiopathy, \*321  
and myotonic dystrophy, \*378  
and nicotinic acid, \*313  
and obesity, 759, \*1205  
and portacaval shunt in rats, \*179  
and prediabetes, 686  
and renal lesions, \*769  
seasonal variations in, \*312-313  
and submaxillary gland extirpation, 722-731  
and temperate sprue, \*773
- GLUCOSE TOLERANCE FACTOR**  
and insulin, \*1043
- GLUCOSE TOLERANCE TESTS**  
and acute pancreatitis, \*911  
and bedrest and exercise, 102-106  
and caffeine  
and prediabetes, \*365  
and chemical diabetes in childhood, 46-47  
and Chinese, \*353  
in diabetics and obese patients, 1012  
and diphenylhydantoin therapy, \*353-356  
and ethanol and phenformin, \*363  
among Florida Seminoles, \*776  
and gastric emptying, \*381  
and glucose metabolism, 1102

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- in guinea pigs, \*338  
 and Huntington's chorea, \*1121  
 and hypertension, \*776  
 and liver cirrhosis, \*356  
 in *Macaca nigra*, 1078-1088  
 and myocardial infarction, \*119  
 in neonates of diabetic mothers, \*912  
 in obese children, \*1042-1043  
 and obesity, \*1205  
 oral  
     and diabetes screening errors, \*254  
     discriminant analytical technic, \*251  
     and serum insulin and growth hormone levels in children, 16-20  
     standardization of, 1197-1198  
 and peripheral vascular disease, arteritis, and Raynaud's phenomenon, \*837  
 and phenformin  
     and diabetic obesity, \*362  
 and Pima Indians, \*180  
 plasma catecholamines during, \*348  
 and plasma insulin and uric acid  
     and nicotinic acid, \*313  
 and plasma lipids  
     in normals and predabetics, \*383  
 and pregnancy, \*186  
 and serum immunoreactive insulin levels and age, \*183-184
- D-GLUCOSE**  
 and alloxan toxicity, \*123  
 brain uptake of  
     and phlorizin, \*315  
 and insulin release, 559-561  
 transport  
     and biguanides, \*119
- GLUCOSE C-14**  
 metabolism  
     and 6-aminonicotinamide, \*1198
- GLUCOSE-6-PHOSPHATE DEHYDROGENASE**  
 in jejunal mucosa  
     and alloxan diabetes, \*188
- GLUCOSE U-C-14**  
 metabolism  
     in fasted and streptozotocin diabetic rats, \*122  
 utilization  
     rat strain differences in, \*770
- GLUCOSURIA**  
 and chemical diabetes screening, 47  
 and dietary fructose, \*349
- GLUTAMATE**  
 metabolism, \*57
- GLUTATHIONE**  
 and alloxan, 81-83
- GLUTATHIONE-INSULIN TRANSHYDROGENASE**, \*353, 1095-1100
- GLYBENCLAMIDE**  
 and hypophysectomized dogs, \*378-379
- GLYBURIDE.** See Glibenclamide
- D-GLYCERALDEHYDE**  
 and liver gluconeogenesis, \*330-331
- GLYCERIDE-GLYCEROL SYNTHESIS**  
 of mammalian adipose tissue, 1154-1155
- GLYCEROL**  
 gluconeogenesis from, \*358  
 and insulin secretion, 923-928  
 release  
     and weight reduction, 758
- GLYCEROL KINASE**  
 in adipose tissue  
     and body weight, \*911-912  
     and insulin regulation, \*122
- L-GLYCEROL 3-PHOSPHATE**  
 and lipid synthesis in rat skin, \*189
- GLYCINE**  
 metabolism, \*57
- GLYCOGEN**  
 placental metabolism  
     and diabetes, 1185-1190
- GLYCOGEN STORAGE DISEASE**  
 and hypoglycemia, \*248
- GLYCOGEN SYNTHASE**  
 and insulin, 428-437
- GLYCOGENOLYSIS**  
 and arginine infusion, 308-310  
 and cyclic AMP  
     and insulin, 439-445
- GLYCOLATE**  
 urinary  
     and streptozotocin diabetes, \*372
- GLYCOLYSIS**  
 and insulin secretion, 4
- GLYCOPROTEIN**  
 in connective tissue study of diabetic rats, 736, 738-739, 740-741
- GLYCOPROTEIN FUCOSE**  
 and diabetes, 863-870
- GLYCOSAMINOGLYCANs**  
 metabolism  
     and alloxan diabetes, 1162-1166
- GLYCOSURIA**  
 and diabetes prevalence among Chinese, \*353  
 in diabetes survey of rural population in India, 1193-1196  
 and insulin, \*186  
 and nicotinic acid, \*313
- GOLGI APPARATUS**, 620  
 and insulin biosynthesis, 574-577, 582, 583  
 and insulin secretion, 510
- GROWTH HORMONE**  
 activity  
     and lipoatrophy, \*381-382  
 and body composition of hypopituitary dwarfs, \*982-983  
 and carbohydrate homeostasis, \*357  
 and cerebral development in rat fetus, \*189  
 and diabetes, 699-700, \*1203  
 and diabetic ketosis, 946-954  
 and diabetic retinopathy, \*349  
 diurnal  
     and unstable diabetes, \*1203  
     and glucagon secretion, \*313  
 and glucose tolerance and adipose tissue cellularity  
     in ateliotic dwarfs, \*366  
 homeostasis abnormalities  
     and generalized lipodystrophy, \*771  
 -induced diabetes  
     and Huntington's chorea, \*374-375  
 insufficiency  
     beta-1-24 corticotropin tests of, \*775-776  
 and insulin response to arginine and tolbutamide, \*378  
 and juvenile diabetes, \*312  
 levels  
     in small normoglycemic and hypoglycemic infants, \*250  
 and lipid and carbohydrate homeostasis, \*342-343

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- and lipoatrophic diabetes, 829, 830  
 and lipolysis  
     and iodinated insulin, \*55  
 metabolic clearance rates  
     and juvenile diabetes, 175-177  
 metabolic response to  
     and short stature, \*119-120  
 and metabolism of obese patients, \*1046  
 neonatal  
     and maternal protein restriction, \*1047  
 and pancreas compartments of insulin, \*372  
 release  
     in sleep, \*776, \*913  
 secretion  
     and Cushing's syndrome, \*1122  
     and L-dopa, \*911  
     and erythroblastosis fetalis, \*1199-2000  
     and glucagon, in congestive heart failure patients, 939-944  
     and prostaglandins, \*313  
     regulation by growth hormone, 22, 30  
     and serum secretin, \*1118  
 sex-based variation of, \*774-775  
 synthesis  
     and lipids, \*187
- GUINEA PIGS**  
 adipose tissue  
     glucose metabolism and insulin response, 1151-1161  
 and diabetes, \*338  
 immune response to insulin, \*58  
 perfused liver  
     and gluconeogenesis inhibition study, \*910
- H**
- HALOPERIDOL**  
 and hypoglycemia, 960  
 and insulin secretion, 783-784
- HAMSTERS. See also Chinese hamsters; *Mystromys albicaudatus***  
 adipose tissue  
     glucose metabolism and insulin response, 1151-1161  
 and insulin secretion  
     and glucose and tolbutamide, \*370  
 and islet cell tumors  
     and cyclic 3'5' AMP, \*185  
 and insulin studies, \*313
- HEART**  
 myocardial oxygen consumption and potassium balance  
     and glucagon, \*118-119  
 perfused rat  
     and lipoprotein lipase release, 149-155  
 rat  
     lipoprotein lipase, \*344  
 rat aorta  
     and sodium acetate incorporation, \*186
- HEART DISEASE. See also Arteriosclerosis; Myocardial infarction**  
 congestive heart failure  
     and glucagon infusion, 939-944  
 ischaemic  
     and clofibrate, \*838, \*910
- HEMOCHROMATOSIS**  
 and diabetes, \*1199  
 and diabetic angiopathy, \*123
- HEMORRHAGE**  
 and argon laser photocoagulation, \*189  
 and diabetes, 108-112  
 and insulin release, \*982  
 and shock  
     insulin response to, \*364
- HEPARIN**  
 and lipolysis, \*342  
 and lipoprotein lipase  
     and oral contraceptives, \*316  
     release from alloxan diabetic rat heart, 149-155
- HEPATECTOMY**  
 and angiotensinogen and renin levels, \*253
- HEPATITIS**  
 autoimmune, \*314
- HEREDITY**  
 and autoimmune disorders, \*914  
 and diabetes, \*250  
     and fasting triglycerides and cholesterol in offspring of diabetic couples, \*1044-1045  
     and Huntington's chorea, \*1121  
 and diabetes onset  
     and diet, \*770  
 and diabetic-like microangiopathy, \*373  
 and endocrine adenomatosis, \*1122  
 and hypercholesterolemia, \*1121  
 and lactose tolerance, 871  
 and lipodystrophy and growth hormone abnormality, \*771
- and obesity  
     and insulin resistance and release, \*316  
 and renal glucosuria, \*248  
 and resistance to oral anticoagulants, \*183
- HEXOKINASE**  
 and insulin release, 565  
 in rat prostate glands  
     and hormonal control, \*185
- HEXOSE**  
 protein-bound  
     and diabetes, 867  
 transport  
     in diabetic rats, \*59  
 uptake by brain, \*315
- HEXOSE MONOPHOSPHATE SHUNT**  
 and dibutyryl cyclic AMP, 1033-1034
- HISTAMINE**  
 and insulin secretion, \*248
- HISTONE PHOSPHORYLATION**  
 and cyclic AMP  
     and insulin, 439-445
- HORMONES**  
 adenyl cyclase response to, \*772  
 and amino acids  
     and infantile malnutrition, \*182  
 androgen  
     and diabetic impotence, 23-28  
 and calcium and insulin binding mechanisms, \*1121-1122  
 and cyclic AMP, \*251  
 and diabetic pregnancy, 31-35  
 gastrointestinal  
     and insulin response to triglycerides, 928  
 and hexokinase control in rat prostate glands, \*185  
 human chorionic somatomammotropin  
     and insulin and glucagon release, 1072-1075  
 and insulin secretion, 539  
 lipolytic  
     fat cell response to, mercury and, \*771  
 lipolytic and glucocorticoid  
     and diabetic ketosis, 946-954  
 in pancreas, 536  
 parathyroid  
     and plasma insulin, \*773  
 and protein synthesis  
     and cyclic AMP, \*119  
 sex  
     and growth hormone secretion, \*774-775

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

SUBJECT INDEX 1972

- sex steroids  
and liver triglyceride biosynthesis, \*365
- HUNTINGTON'S CHOREA  
and diabetes, \*374, \*1121
- HYDROCORTISONE  
and liver mitochondrial structure, 258  
and rat fatty liver, \*183
- HYDROCORTISONE SODIUM SUCINATE  
and hypoglycemic coma, 961-962
- $\beta$ -HYDROXYBUTYRATE  
and lipolysis, \*836  
and liver glucose production  
and insulin-induced hypoglycemia, 797-808  
metabolism, \*343
- 3-HYDROXYBUTYRATE  
brain utilization of, \*247
- D-3-HYDROXYBUTYRATE  
uptake  
by isolated perfused rat brain, \*1206
- 3-HYDROXYBUTYRATE DEHYDROGENASE  
in diabetic liver mitochondria, \*184-185
- 5-HYDROXYTRYPTAMINE  
and insulin secretion, \*251-252
- HYPERALIMENTATION  
intravenous  
in children, \*837
- HYPERAMMONEMIA  
and glucose metabolism  
and insulin, \*184
- HYPERBILIRUBINEMIA  
neonatal  
and phenobarbitone therapy, \*1123
- HYPERCALCEMIA  
and hyperparathyroidism, \*773
- HYPERCHOLESTEROLEMIA  
and diabetes  
and diet, \*366  
diet-induced, \*1044  
familial, \*1121
- HYPERCOAGULABILITY  
and diabetes, 108-112
- HYPERGLUCAGONEMIA  
alanine-induced  
and alpha-adrenergic blockade, \*1043  
and insulin, 301-307
- HYPERGLYCEMIA  
and alcohol ingestion, \*247-248  
and L-asparaginase therapy, \*1119  
and chemical diabetes, \*1121  
compared with ketosis, 257  
and diabetes  
in tuco-tuco, \*1206  
and diet, \*770  
in obese mice, \*119  
and glucagon, \*360-361  
and glucagon secretion  
and alanine, \*183  
and growth hormone metabolic clearance rates, 176  
and hemorrhagic shock, \*364  
and hyperglucagonemia, 301-307  
and hypoglycemia  
and anti-insulin antibodies production, 814-825  
and hypothalamic stimulation, \*771  
insulin-resistant  
and aminophylline, \*775  
and intravenous alimentation, \*837  
and islet of Langerhans structure, \*1043  
and liver cirrhosis, \*356  
and metabolic acidosis and acute uremia, 1109-1114  
and myocardial infarction  
and tolbutamide therapy, \*122-123  
in *Mystromys albicaudatus*, 716-721  
neonatal  
and insulin studies, \*181  
and obesity  
and high-fat diet in mice, \*182  
and pentobarbital, \*836  
phenotiazine-induced, \*184  
and phenytoin toxicity, \*187  
and postheparin lipolytic activity, \*342  
and splanchnic nerve stimulation  
and andrenalectomy, \*770  
and streptozotocin, \*59  
and synthetic glucagon peptides, 845-846  
and uterine relaxants, \*1045  
and vascular disease, 679-680
- HYPERINSULINISM  
and adipose tissue resection, 18-15  
and chemical diabetes, \*1121  
and diabetes  
and connective tissue changes, 733-743  
and diabetic pregnancy, \*912  
and insulin insensitivity, 6  
and insulin resistance  
in genetically obese rats, \*838  
and liver cirrhosis, \*356  
and liver glucose production, \*380-381
- and obesity, \*314, \*380, 613, 617-618  
and blood proinsulin, 663-664  
and diet, \*249  
and obesity and hyperlipidemia  
induced in monkeys, \*1201
- HYPERLIPEMIA  
alcoholic, \*770  
and diabetes, \*123  
in gerbils, \*70
- HYPERLIPIDEMIA  
and calcium, \*980  
and cholesterol metabolism  
and clofibrate, \*1200-1201  
and metformin, \*771  
and obesity and hyperinsulinemia  
induced in monkeys, \*1201
- HYPERLIPOPROTEINEMIA, 744-752  
combined  
and diabetes and vascular disease, \*376  
and cortisone acetate, \*1044  
pediatric familial type II  
and diet, \*1043  
type II, \*1121  
and diet, \*366
- HYPEROSMOLALITY  
and diabetes  
and ketogenesis, \*369-370  
in galactose-fed chicks, \*315
- HYPERPARATHYROIDISM  
and infant hypocalcemia, \*914  
and plasma insulin, \*773
- HYPERRHAGIA  
dietary prevention of, \*337-338  
and polydipsia  
and adrenalectomy and hypophysecomy, \*358-359
- HYPERTENSION  
and glomerulonephritis  
without diabetes, \*769  
and glucose regulation, \*776
- HYPERTHYROIDISM  
and thyroid function tests, 1012
- HYPERTRIGLYCERIDEMIA  
endogenous  
and plasma triglycerides synthesis, \*55  
and insulin deficiency, \*366-367  
and phenformin  
and insulin and free fatty acids, \*380  
and plasma free fatty acid metabolism, \*835

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384
February, 65-128	Supplement 2, 385-714
March, 129-192	June, 715-778
April, 193-256	July, 779-842
May, 257-320	
	August, 843-922
	September, 923-986
	October, 987-1050
	November, 1051-1130
	December, 1131-1210

## SUBJECT INDEX 1972

- and postheparin lipolytic activity, \*342  
 and pregnancy, \*365  
 and streptozotocin diabetes  
     and diet, \*353-354
- HYPOCALCEMIA**  
 in infants of diabetic mothers, \*914
- HYPOCHOLESTEREMIC DRUGS**  
 and tumor-bearing mice, \*857
- HYPOGLYCEMIA**  
 and alcohol  
     and basal insulin secretion, 65-69  
 and arginine-induced insulin release,  
     \*312  
 and biguanides  
     and insulin, \*123  
 and cataracts  
     in infants, \*182  
 and diabetes  
     and kidney insufficiency, \*1120-1121  
 drug-induced, 955-962  
 and exchange transfusions of citrated  
     blood, \*185  
 factitious, \*980  
 and glixoepid, \*912  
 and hyperglycemia  
     and anti-insulin antibodies produc-  
         tion, 814-825  
 and hyperparathyroidism, \*773  
 idiopathic  
     and epinephrine excretion, \*1200  
 and infants, \*248  
     and beta cell nesidioblastosis, \*189  
     and glucose administration in diabetic  
         mother, \*1202-1203  
     and growth hormone levels, \*250  
 and insulin  
     and central nervous system, \*337  
     and growth hormone, 22, 30  
 and intravenous glucose, 610  
 and iodinated insulin, \*55  
 ketotic  
     diagnosis in children, \*56  
 and lactic acidosis, \*1198  
 liver response to  
     and mannose, fructose and hydroxy-  
         butyrate, 797-803  
 and metformin, \*771  
 and monamine oxidase inhibitor, \*251-  
     252  
 neonatal, \*179-180, \*910  
 nondiabetic reactive and asymptomatic  
     biochemical  
         and insulin-glucose dynamics, \*373  
 and oral insulin, 644, 645  
 and pancreateoduodenectomy  
     and pregnancy, \*188
- and phenobarbitone, \*1123  
 reactive  
     and phenformin therapy, \*367-368  
     and tolbutamide, \*1123
- HYPOGLYCIN A**  
 and Jamaican vomiting sickness, \*316
- HYPOGONADISM**  
 hypogonadotropic  
     and diabetic impotence, 23, 26
- HYPOINSULINEMIA**  
 and alpha-adrenergic activity, \*348
- HYPOKALEMIA**  
 and glucose intolerance, \*1043-1044
- HYPOLIPEMIA**  
 in pregnant rhesus monkeys, \*912
- HYPOLIPIDEMIA**  
 in "acatalasemic" mice \*56
- HYPOPHTHYSCECTOMY**  
 and aminophylline  
     and hyperglycemia, \*775  
     and diabetic pregnancy, 972-974  
     and diabetic retinopathy, \*349  
     and glucagon secretion, \*375  
     and insulin secretion, \*253  
     and pancreatectomy  
         and diabetic ketosis in rats, 946-954  
     and tolbutamide and glybenclamide,  
         \*378-379
- HYPOPITUITARISM**  
 and dwarfism  
     and growth hormone, \*982-983  
     and growth hormone levels, \*776  
     and hypoglycemia, \*248
- HYPOTHALAMIC-HYPOPHYSEAL  
 SYSTEM**  
 and insulin, \*1200
- HYPOTHALAMUS**  
 damage  
     and obesity, \*1206  
 lesions  
     and insulin resistance and hyperinsu-  
         linemia, \*838  
     and lipolysis, \*55  
     stimulation  
         and plasma glucose, insulin and glu-  
             cagon, \*771  
     ventromedial destruction  
         in diabetic rats, \*1043  
         and glucose metabolism, \*1204-1205
- HYPOTHYROIDISM**  
 and diabetes, \*769

## I

- IMMUNE COMPLEX DISEASE**  
 and diabetic microangiopathy, \*352
- IMMUNOELECTROPHORESIS**  
 and diabetic glomerulosclerosis, 163-173  
 and insulin antibodies assays, 816, 819
- IMPOTENCE**  
 and diabetes  
     and androgenic function studies, 23-  
         28
- IMURAN**  
 and immune response to insulin, \*58
- INDIA**  
 diabetes survey of rural population of,  
     1192-1195
- INFANTS**  
 big  
     and glucose tolerance during preg-  
         nancy, \*186  
 congenital neuroblastoma and islet hy-  
         perplasia, \*1122  
 and Cushing's syndrome, \*120  
 of diabetic mothers  
     and carbohydrate metabolism, \*912,  
         \*1046  
     and caudal dysplasia, \*1042  
     and drug-induced hypoglycemia, 955  
     and hypocalcemia, \*914  
 and erythroblastosis fetalis  
     and glucose metabolism, plasma in-  
         sulin and growth hormone se-  
         cretion, \*1199-2000  
 and exchange transfusion  
     of citrated blood, \*185  
     and glucose, \*1120  
 and hyperbilirubinemia  
     and phenobarbitone therapy, \*1123  
 and hypoglycemia, \*248  
     and cataract, \*182  
     and glucose administration in dia-  
         abetic mother, \*1202-1203  
 hypoglycemic and normoglycemic  
     and growth hormone levels, \*250  
 and ketoacidosis, \*181  
 and malnutrition  
     and metabolic and hormonal re-  
         sponses to amino acids, \*182  
 and marasmus  
     and chromium and glucose utiliza-  
         tion, \*313  
 mortality  
     and glucose tolerance during preg-  
         nancy, \*186  
 and neonatal hypoglycemia, \*179-180,  
     \*910

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- temporary, \*181  
 newborn  
     and permanent diabetes, \*249  
 premature  
     and intravenous hyperalimentation, \*877  
     and serum insulin and growth hormone response to arginine and glucose, \*316  
 and severe idiopathic hypoglycemia  
     and beta cell neosiblastosis, \*189  
 and type II hyperlipoproteinemia  
     and plasma and blood cholesterol, \*1043
- INFECTION**  
 and diabetes  
     and plasma glucagon levels, \*324  
 rhinocerebral phycomycosis, \*195
- INFRARED THERMOGRAPHY**  
 and circulation studies in diabetics, \*981
- INSULIN**  
 action, 454-455, 485  
     and amino acid sequences, 457-459  
     and atomic structure, 509  
     computer studies of, \*347  
     and insulin-dextran complex studies, \*1122  
     and insulin receptor, 396-401  
     and lead intoxication, \*381  
     molecular basis of, 468-474, 695-700  
     related to atomic structure, 492-505  
 acute hypoglycemic action  
     and insulin-dependent diabetes, \*182  
 acute response to glucose  
     and epinephrine, \*773  
 and adipose tissue lipolysis, 427  
 administration  
     to gastrointestinal tract in rabbit, 203-207  
 amino acid sequences, 485  
 analogs synthesis, \*772-773  
 antibodies, \*57, \*182, \*379, 649-656, 657-659, 660, 677, \*775, 764-765, \*769, 814-825, 914, 930-934  
 antisera  
     proinsulin cross-reactivity with, 465-466  
 assays  
     in monkeys, 1078-1089  
     in obese rats, \*1123  
     and atherosclerosis, 684  
 "big"  
     and streptozotocin therapy for islet cell carcinoma, \*1204
- "big" and "little", 677  
 binding  
     to lymphocytes and fibroblasts, 426-427  
 binding activity  
     in diabetics and nondiabetics, \*775  
     and hormones, \*1121-1122  
 -binding proteins, 426  
 bioassays  
     and insulin stability determinations, 805-812  
 biosynthesis  
     and amino acids, \*772  
     and cytochalasin B, 602-603  
     monolayer newborn rat pancreas for study of, 627-630  
 and blood glucose levels  
     and exercise, 98-99  
 and carbohydrate homeostasis, \*357  
 circulating antibodies to  
     polyethylene glycol screening test for, \*379  
 concentrations  
     and diabetic lipemia, \*376-377  
 content  
     of beta cell tumors, 535  
     of fetal rat pancreas, 193-201  
 and cyclic AMP and dibutyryl cyclic AMP activity, 1028  
 and cyclic AMP levels, 453  
 deamino-A<sup>1</sup> sheep  
     synthesis, \*981  
 deficiency  
     and glucagon secretion, \*183  
     and hypertriglyceridemia, \*366-367  
     and ketosis, 257-258  
     and liver glucose production, \*380-381  
     and liver ribosomal aggregation, 84-88  
 degradation  
     and chemicals and hormones, 468-469  
     and fat cells, 403-411  
     by human placenta, \*374-375  
     in rat liver, \*382  
     in rats, 1091-1100  
 -degrading enzymes  
     and proinsulin assay, \*122  
 -dependent diabetes  
     and blood glucose production and oxidation, \*375  
     and pheochromocytoma, \*838  
 derivatives, 427-473  
 and diabetes control  
     and retinopathy, \*382  
 and diabetes management, 632-636, 678  
 and diabetes mortality, 633-636
- and diabetic pregnancy, \*315  
 dimer, 494, 496-497  
     macromolecular modeling system for, 506-508  
 disappearance rates  
     in nondiabetics and diabetics, \*1047  
 discovery of, 385-395  
 distribution and binding  
     in dog hindlimb, \*775  
 dosage  
     and diabetes in neonate, \*249  
 and drug-induced hypoglycemia, 959-960  
 exogenous  
     and insulin secretion in normal and obese hyperglycemic mice, \*344  
 and fat cells  
     and lipolysis, 414-424  
     and mercury, \*771  
 and fatty acid synthetase, \*914  
 fish  
     amino acid sequences, 459  
     and fructose metabolism, \*314  
     and gamma globulin  
         and diabetic microangiopathy, 872-879  
 and glucagon, \*60  
 -glucagon ratio  
     and liver metabolism, \*341  
 and glucose  
     and hypoglycemia, \*373  
     and glucose metabolism  
         in hyperammonemic rats, \*184  
         in rat diaphragm and epididymal fat pads, 935-938  
         in rat skin, \*189  
 -glucose relationships, 704, 707-710  
 and glucose tolerance factor, \*1043  
 and glycogen synthase, 428-437  
 and glycolytic enzymes, \*773  
 and glycosuria, \*186  
 graded infusions of  
     and plasma glucose, serum growth hormone and cortisol responses, \*379  
 guinea pig and cavy  
     amino acid sequences, 457-458  
 hexamer structure, 497-499  
 hyperresponsiveness  
     and chronic glucagon administration, \*374  
 and hypertriglyceridemia  
     and phenformin, \*380  
 immune response to, \*58  
 immunoassays  
     and antibodies study, 814-825

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- immunohistological detection in pancreatic tissue, \*246  
 immunoreactive  
     circulating components of, 673-676  
     and glucose dosage, 1105-1106  
     and intravenous glucagon, \*360-361  
     and neonatal hyperglycemia, \*181  
     and obesity, 13-15  
     and serum nonsuppressible insulin-like activity, 278  
     during thyrotoxic periodic paralysis attacks, \*1047  
 -induced hypoglycemia  
     and mannose, fructose and hydroxybutyrate, 797-803  
     and plasma growth hormone, \*312  
 infusion  
     and glucose kinetics in dogs, \*188  
     and glucose turnover in depancreatized dogs, \*382-383  
 and insulin antibodies  
     in dogs, \*182  
 interaction with liver membranes, \*334-335  
 intestinal response to, \*1047  
 in islet cell carcinoma, \*909-910  
 jet injections of, 39-44  
 and late-onset diabetes, 763  
 levels  
     and obesity, \*380  
 -like activity  
     of arginyl compounds, \*1122-1123  
     in fibrosarcoma, \*352-353  
     nonsuppressible, 271-278  
 and lipid synthesis, \*189  
 and liver adenylate cyclase, \*772  
 and liver enzymes, 713  
 and liver epinephrine-responsive adenyl cyclase, \*1117-1118  
 and liver gluconeogenesis, \*371  
 and liver glucose-6-phosphate dehydrogenase, 49, 53  
 and liver metabolism, 453, \*1200  
     and intracellular cyclic AMP level, 439-445  
 and liver plasma membranes, \*335  
 and liver protein synthesis, 453  
 liver response to  
     and prediabetes, \*323-324  
 metabolic clearance of, 1003-1011  
 modified  
     activity of, 502-504  
 monomer structure, 493-494  
 neutral Regular, 235-245, 637-638  
 new forms of, 637-647, 648  
 nonavian  
     and cardiovascular response in chickens, \*59  
 nonhypoglycemic, \*55  
 oral, 643-647, 648  
 and oxytetracycline  
     and hypoglycemia, 960  
 pancreas compartments of,  
     and growth hormone, \*372  
 and pancreatic alpha-cell function  
     and diabetes, 301-307  
 and pancreatic blood flow and insulin output, \*1204  
 and placental glycogenesis, \*1199  
 and plasma amino acids, \*340-341  
 plasma growth hormone unresponsiveness to, \*981  
 and plasma insulin, glucose and free fatty acids, \*325  
 and plasma tryptophan in rats, \*909  
 polyalanyl derivatives of, \*835  
 and potassium flux and glucose output, \*254  
 and pressor response to angiotensin and norepinephrine  
     and alloxan diabetes, \*354-355  
 and proinsulin, \*57, \*314  
     conformational studies, 486-491  
 proinsulin conversion to, 572-579, 581  
 proinsulin-like component of, \*313  
 -proinsulin ratio  
     and diabetes, 664  
 and propranolol  
     and hypoglycemic coma, 960  
 and protein synthesis, 447-451  
     in anterior pituitary gland, \*1200  
     and cyclic AMP, \*119  
 and protein turnover in skeletal muscle, \*341  
 purified pork  
     and insulin allergy, 638-643  
 and pyruvic dehydrogenase, 427  
 rat  
     amino acid sequences, 458-459  
 and rat adipocytes, \*60  
 and rat fatty liver, \*183  
 and rat mammary cell metabolism, \*315  
 reactions  
     and pituitary reserve capacity, \*981  
 receptor sites in fat cells, \*336  
 receptors  
     in central nervous system, \*337  
     of liver plasma membranes, \*335  
 and regulation of glycerol kinase, \*122  
 release  
     and acromegaly, \*1118  
     "acute phase," 157-161  
 and adenylate cyclase and phosphodiesterase, \*328-329  
 and age, \*184  
 and aldose reductase inhibitors, \*327  
 and alpha adrenergic receptors, \*348  
 and alpha-adrenergic receptor blockade, \*181  
 and amino acids, \*56  
 and 6-aminonicotinamide, \*1198  
 and antimitotic agents, 987-997  
 arginine-induced, \*312  
 and autonomic nervous system, 624-627  
 and cyclic 3'5' AMP, \*185  
 and diazoxide, \*360  
 and diphenylhydantoin and diazoxide, \*327  
 and encephalomyocarditis infection, \*247  
 and fats and fatty acids, 613, 615, 617-618  
 in fetal pancreas, \*345-346  
 and glucoreceptor mechanisms, 570  
 glucosamine-induced, \*328  
 and glucose, 143, 713, \*1042  
 and glyburide infusion, 209-215  
 and human chorionic somatomammotropin, 1072-1075  
 and intracellular pH of pancreatic beta cells, \*911  
 and iodoacetate and antimycin A, \*56  
 in islet cell adenomas, \*346-347  
 and islet glucoreceptor mechanisms, 555-568  
 L-leucine and L-phenylalanine induced, \*369  
 methamphetamine induced, \*252  
 by monoamine oxidase inhibitor, \*363-364  
 and ouabain, \*246  
 and packet storage, 585-592  
 and pancreatic calcium uptake, \*837  
 and pancreatic islet citrate levels, 999-1001  
 perfusion studies, 987-997  
 and phenformin, \*1045  
 and phenytoin, \*187  
 and prostaglandins, \*329, \*369  
 and protein and amino acids, 613, 617-618  
 and pyridine nucleotide, \*983  
 stimulus-secretion coupling of, 594-603, 605  
     and uremia, \*910-911  
 release and content  
     in rat islets, \*1205  
 release and inhibition  
     in fetal rat pancreas, \*121

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- requirements  
and infection, \*324
- reserves  
and diabetic instability, \*836
- resistance  
and alcohol, \*247-248  
and fat cell insulin receptors, \*1042  
in genetically obese rats, \*838  
and hemochromatosis, \*1199  
in obese mice, \*314-315  
and obesity, \*249, \*314  
and proinsulin antibodies, \*368  
and steroid-induced ketoacidosis, \*54
- resistance factor  
secretion by hyperfunctioning pancreatic islets, \*370
- resistance and release  
and obesity, \*316
- resistant hyperglycemia  
and aminophylline, \*775
- response  
by adipose tissue, 1151-1161  
to amino acids, 2-deoxy-D-glucose, mannoheptulose and, 1-5  
to arginine and tolbutamide, \*378  
and diphenylhydantoin, therapy, \*355-356  
to hemorrhagic shock, \*364  
in partially depancreatized dogs, \*339  
and prediabetes, 685-687  
of pregnant women and their fetuses, \*251  
and small-vessel disease, \*836  
to sucrose and glucose, \*58  
to tolbutamide and propranolol, \*122
- response to glucose  
and carbohydrate and lipid metabolism, \*1119  
and chlormadinone acetate, \*313  
and myocardial infarction, \*119  
and peripheral vascular disease, arteritis and Raynaud's phenomenon, \*836-837
- and prediabetes and diabetes, 224-233  
from small bowel, \*54  
and tolbutamide, 684
- secreting tumors, \*1120  
secretion, \*188, 510, 535  
in *acomys cahirinus*, 1060-1070  
and alcohol hypoglycemia, 65-69  
and alpha-ketomonocarboxylic acids, \*359  
and amines and pancreatic beta cells, \*248  
and amino acids, 570-571  
and aminophylline, 289-293
- and ammonium ion, \*248  
and arginine, \*1045  
and beta adrenergic and cholinergic agents, \*332  
and body composition in obese patients, \*1118
- and carcinoid syndrome, \*1200  
and chemical diabetes, \*1121  
and diazoxide, \*1045  
and diet, \*912-913  
and diphenylhydantoin, \*982  
and diphenylhydantoin and diazoxide, 856-861  
and epinephrine, \*770  
and glibenclamide, \*913  
and Glisoxepid, \*912  
and glucagon, in congestive heart failure patients, 939-944  
and glucagon-like immunoreactivity, \*58  
and glucose, 606-613, 617-618  
and glucose and alloxan, \*326  
glucose-induced, and juvenile diabetes "remission," \*1205  
during glucose infusions in starvation and diabetes, \*359-360  
and glucose and tolbutamide, \*370  
and isolated insulin antibodies, \*914  
in isolated pancreas islets, 538-545  
and kwashiorkor, \*1119-1120  
and lipotrophy, \*381-382  
and long-chain triglycerides, 923-928
- and metal ions, 570  
and metformin, \*914  
and methylene blue, \*350  
and methysergide maleate, \*315-316  
and monoamines, \*251-252  
and myotonic dystrophy, \*378  
nutrient regulation of, 606-615, 617-618
- and obesity after exercise, \*909  
and oral glucose administration, \*909, \*911  
and ouabain, \*913  
and pancreatic beta-cell webs, \*838  
and pancreatic monoamines, \*345  
and phentolamine, \*119  
and prediabetes, 688-691  
and prolonged glucose infusion, \*372  
seasonal variations in, \*312-313  
and serotonin antagonists, \*352, 779-787
- and serotonin and dopamine, \*184  
and slow-rise and square wave stimuli, \*55  
and sodium beta-hydroxybutyrate, \*373-374
- and sulfonylureas, \*1120  
and synthetic glucagon, 845-846  
and thyrotoxicosis, \*370-371  
and thyroxine and hypophysectomy, \*253
- and tolbutamide, \*1123  
and xylitol and glucose, \*187-188
- secretion and content  
of isolated islets in tissue culture, 548-549, 551-553
- sensitivity  
and ammonium chloride-induced acidosis, 794-796  
scoring system for clinical evaluation of, \*361-362
- sensitivity of adipose tissue  
and obesity, 6-11
- sepharose-bound  
and muscle, adipose tissue and cultured liver cells, \*335-336
- serum-bound  
and insulin antibodies, 930-934  
and sodium acetate incorporation into lipids of rat aorta, \*186
- storage  
threshold distribution hypothesis for, 585-592
- structure, 1131-1149
- synthesis, 469-471
- therapy  
and antigenicity, 649-656, 657-659, 660, 677
- and tissue cyclic AMP levels, 426
- tolerance  
and dosage, \*121  
and submaxillary gland extirpation, 722-731
- tolerance tests  
during bedrest, 104-105  
and triglyceride synthesis, \*351-352
- tryptophan complex  
isolation of, \*1045
- U100 Lente, 832, 954
- and unstable diabetes  
and biguanides, \*123  
and zinc, 487-489
- INSULIN RECEPTOR**, 396-401
- I-131 INSULIN**  
and fat cell metabolism, 403-411  
metabolic clearance studies of, 1003-1011
- uptake  
and exercise, \*980
- INSULINASE**, 1095-1100
- INSULINEMIA**  
and liver cirrhosis

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64  
February, 65-128  
March, 129-192  
April, 193-256  
May, 257-320

Supplement 1, 321-384  
Supplement 2, 385-714  
June, 715-778  
July, 779-842

August, 843-922  
September, 923-986  
October, 987-1050  
November, 1051-1130  
December, 1131-1210

## SUBJECT INDEX 1972

- and glucose, tolbutamide and glucagon administration, \*121-122
- INSULINOMAS**  
and blood proinsulin-like components, 665  
and glycolytic enzymes, \*773
- INSULITIS**  
and late-onset diabetes, 762-767
- IODINE**  
—treated insulin, \*55
- IODOACETAMIDE**  
and amino acid metabolism, \*56
- IODOACETATE**  
and insulin release, \*56  
in fetal rat pancreas, \*121
- IONOGRAMS**  
and tissue glycogen synthase study, 429, 431
- IRON**  
deficiency  
and acetoacetate-induced anemia, \*311
- ISLETS OF LANGERHANS.** *See also Pancreas, islets*  
adenyl cyclase, \*179  
alpha and beta cells  
and glucose and fatty acid oxidation, \*909  
of fetal pancreas, \*253-254  
glucoreceptor mechanisms, 555-568  
hyperplasia  
and congenital neuroblastoma, \*1122  
immunohistological detection of insulin in, \*246  
and insulin biosynthesis, 572-579, 581-583  
insulin secretion  
and insulin antibodies, \*914  
isolated in tissue culture  
metabolism studies, 546-553  
localization of adenyl cyclase and cyclic AMP phosphodiesterase, \*328  
structure, \*1043
- L-ISO PROPYLNORADRENALINE**  
and insulin secretion, \*252
- ISOPRENALEINE**  
insulin response to  
in *acomys cahirinus*, 1065, 1069
- ISOPROTERENOL**  
—stimulated rat salivary glands and glucose metabolism, \*982
- ISOXSUPRINE**  
and hyperglycemia, \*1045
- J**
- JAMAICAN VOMITING SICKNESS,**  
\*316
- K**
- KETOACIDOSIS**  
alcoholic, \*56-57  
in infancy, \*181
- KETOACIDOSIS, DIABETIC**, 794,  
\*1203  
and L-asparaginase, \*1119  
and bicarbonate therapy, \*323  
and blood coagulation, 108-110  
and blood ketone body estimation method, \*1117  
and blood lactate and ketone bodies, \*186-187  
and blood lactic and pyruvic acids, \*350  
and brain utilization of ketone bodies, \*247  
and coma, \*60  
and insulin, 632-633  
steroid-induced, \*54
- KETOGENESIS**  
and hyperosmolar diabetic syndrome, \*369-370  
regulation, \*1203
- KETONE BODIES**  
in amniotic fluid  
and maternal caloric deprivation, \*1202  
brain utilization of  
in normal and ketoacidotic rats, \*247  
formation, \*1203  
and diabetes, 257-268  
and lipolysis suppression, \*377  
metabolism  
in fasted and diabetic rats, \*246  
in perfused skeletal muscle, \*343  
and renal ammoniogenesis, \*251  
and renal metabolism, \*314  
and unstable diabetes, \*836  
uptake by dog kidney, \*251
- KETONURIA**  
and dietary fructose, \*349-350  
and ketoacidosis in infancy, \*181  
and lipoatrophic diabetes, 827-830
- and nicotinic acid, \*313
- KETOSIS**  
and cerebrospinal fluid pressure, \*180-181  
and hypoglycemia  
diagnosis of, \*56  
and insulin deficiency, 414  
and ketogenesis regulation, \*1203  
and kidney function, \*121  
lipoatrophic diabetes without, 827-830  
and lipolytic and glucocorticoid hormones, 946-954  
and liver mitochondria, 257-268
- KETOSTIX**  
and blood ketone body estimation, \*1117
- KIDNEY**  
amino acids  
and exercise, \*119  
ammoniogenesis  
and ketone bodies, \*251  
and antidiuretic action of chlorpropamide, \*189  
and bladder dysfunction, \*364  
and diabetic glomerulosclerosis, 163-173  
in diabetic guinea pigs, \*338  
diabetic-like microangiopathy, \*373  
disease  
and diabetes, in Pima Indians, \*365-366  
dog  
and ketone bodies uptake, \*251  
failure  
and sulfonylurea blood-sugar-reducing action, \*1120-1121  
function  
and bacteriuria, \*118  
and diabetic ketosis, \*121  
glomerular lesions  
and proteinuria, \*1120  
glomerulonephritis  
without diabetes, \*769  
glomerulosclerosis  
in diabetic baboons, \*338  
diabetic-like, \*373  
gluconeogenesis  
and ammonia production, \*57  
and cyclic AMP, \*910  
glycosaminoglycans  
and alloxan diabetes, 1163-1166  
glycosuria  
and heredity, \*248  
hypokalemic nephropathy, \*1042  
and insulin and proinsulin degradation, 1091-1100

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

SUBJECT INDEX 1972

- and liver cholesterol synthesis in rat, \*1047  
 metabolism, \*314  
 microangiopathy, \*357  
 polyalanyl insulin, \*835  
 of progeny of protein-deficient rats, \*1041  
 and starvation  
     and mineralcorticoid and glucagon sensitivity, \*334  
 transplantation  
     and diabetes, \*322  
     and pancreas transplantation, \*355  
 uric acid excretion  
     and nicotinic acid, \*313
- KIMMELSTIEL-WILSON DISEASE**  
 and glomerulosclerosis without diabetes, \*769
- KWASHIORKOR**  
 and insulin secretion, \*1119-1120
- L**
- LACTASE**  
 and race, 871
- LACTATE**  
 and blood sugar and liver glycogen formation, \*189  
 and liver gluconeogenesis and phenylethylbiguanide, \*910  
 metabolism  
     and ethanol, \*367
- LACTIC ACID**  
 and serum and plasma osmolality, \*838
- LACTOSE TOLERANCE TESTS**  
 in Nigeria, 871
- LACTOSURIA**  
 in diabetes survey, 1193
- LEAD**  
 intoxication  
     and insulin action, \*381
- LESIONS**  
 arterial  
     and diabetes, \*187  
 beta-cell  
     and encephalomyocarditis infection, \*247  
 glomerular  
     and proteinuria, \*1120  
 microangiopathic, \*357  
 neurologic  
     and impotence, 23-28
- skin  
     and diabetes, \*251  
 testicular  
     and diabetic impotence, 25-28
- LEUCINE**  
 incorporation into protein, \*336  
 and insulin release, 3-4, \*56  
 and insulin secretion, 539  
 metabolism  
     and glucose, \*56  
 pancreatic islet cell electrical activity in response to, \*345  
 uptake by pancreatic beta cells, \*772
- L-LEUCINE**  
 -induced insulin release, \*369
- LEUCINE-C-14**  
 incorporation into growth hormone and lipids, \*187
- LEUKEMIA**  
 and L-asparaginase therapy  
     and transient diabetes, \*1119
- LEYDIG CELLS**  
 and diabetic impotence, 25-26
- LIPEMIA**  
 alimentary  
     and sucrose and glucose, \*58  
 and diabetes  
     and insulin concentrations, \*376-377  
     and glucagon resistance, \*357
- LIPIDS**  
 biliary  
     and pregnancy, \*912  
 and growth hormone synthesis, \*187  
 metabolism  
     in dogs, \*312  
     and glucose tolerance and insulin response to glucose, \*1119  
     and menstrual cycle, \*1204  
     and prediabetes, 687  
     and streptozotocin, \*59  
 mobilization  
     and tumors in obese mice, \*774  
 rat aorta  
     and sodium acetate incorporation, \*186  
 synthesis  
     and starvation, alloxan diabetes and insulin, \*189
- LIPOATROPHIC DIABETES**  
 and urine polypeptides, \*837  
 without ketosis, 827-830
- LIPOATROPHY**  
 and growth hormone activity  
     and glucose and insulin abnormalities, \*381-382
- LIPODYSTROPHY**  
 and growth hormone abnormalities, \*771  
 intestinal  
     diet-induced, \*1044
- LIPOGENESIS**  
 and high-fat diet, \*182  
     and liver acetic thiokinase, \*982
- LIPOLYSIS**  
 adipose tissue  
     and body weight, 754-760, \*911-912  
     and cyclic AMP, 1034  
     epinephrine-stimulated  
         in siblings of diabetics, \*361  
         and growth hormone, \*342-343  
         and  $\beta$ -hydroxybutyrate, \*836  
     in hypophysectomized rats, 950-951  
     inhibition, \*55  
     and insulin, 414-424  
         and cyclic AMP, 403  
     in isolated fat cells  
         and amitriptyline, \*1045  
     ketone suppression of, \*377  
     and mercury, \*771  
     and phenformin, \*362  
     postheparin, \*54, \*342  
     in white fat cells  
         and tolbutamide, \*835
- LIPOMATOSIS**  
 and adipose tissue resection, 13-15
- LIPOPROTEIN LIPASE, \*188**  
 and insulin, \*377  
 and plasma triglyceride removal, \*342  
 post heparin  
     and oral contraceptives, \*316  
     in rat heart and adipose tissue, \*344  
 release  
     from alloxan diabetic rat heart, 149-155
- LIPOPROTEINS**  
 release  
     and cyclic AMP and insulin, 439-445
- LIPOTROPHIN**  
 and lipolysis  
     and iodinated insulin, \*55
- LIVER**  
 acetic thiokinase  
     and lipogenesis, \*982

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

adenylate cyclase  
 and insulin, \*772  
 and selectively blocked glucagon,  
     \*981  
 and alcoholic ketoacidosis, \*56-57  
 amino acids  
     and exercise, \*119  
 cells  
     and sepharose-bound insulin, \*335-  
         336  
 cholesterol  
     and temperature, \*314  
 cholesterol synthesis  
     and kidney inhibitory factor, \*1047  
 chromium  
     and diabetes, \*1046  
 cirrhosis  
     and angiopathy, \*123  
     and diabetes and hemochromatosis,  
         \*1199  
     and hyperinsulinemia, \*356  
     and insulinemia, \*121-122  
 cycloleucine  
     and *D. pneumoniae*, \*316  
 cytosol  
     and ethanol and sorbitol metabolism,  
         \*181  
 enzymes  
     and alloxan diabetes, \*188  
     and cold exposure, \*58  
     and insulin, 713  
 epinephrine-responsive adenyl cyclase  
     activity  
     and insulin, \*1117-1118  
 ethanol-oxidizing and drug metabolizing  
     enzymes  
     and alcoholism, \*983  
 fatty  
     alcohol-induced, \*770  
     and pyrazole and glucose, \*247  
 free fatty acid metabolism  
     and anti-insulin serum, 280-288  
     and diabetic ketosis, 947-948, 950-  
         954  
 glucagon-responsive adenyl cyclase  
     macromolecular inhibitor of, \*180  
 gluconeogenesis  
     from fructose and glycerol, \*358  
     and glucagon, \*331  
     and glucocorticoids, \*339-340  
     and D-glyceraldehyde and dihydroxyacetone, \*330-331  
     and insulin and glucose, \*371  
     and phenylethylbiguanide, \*910  
 and glucose homeostasis, 686-687  
 glucose output  
     and acute hypoglycemic action of  
         insulin, \*182

glucose production  
     and insulin deficiency and hyperinsulinemia, \*380-381  
     and mannose, fructose and hydroxybutyrate, 797-803  
 glucose-6-phosphate dehydrogenase and carbohydrate and insulin, 49,  
     53  
 and glycerol kinase  
     and regulation by insulin, \*122  
 glycogen formation  
     and lactate, \*189  
     and glycoprotein synthesis, 868-870  
 and growth hormone metabolism, 177  
 homeostasis  
     and L-asparagine, \*254  
 3-hydroxybutyrate dehydrogenase  
     and diabetes, \*184-185  
 and hyperglycemic response to splanchnic nerve stimulation, \*770  
 injury  
     and pancreatic mitosis, 1054-1055  
 and insulin and proinsulin degradation,  
     1091-1100  
 ketogenesis  
     and gluconeogenesis, 50-52  
 lipids  
     and diet, \*1202  
 lipogenesis  
     and diet, \*60  
     and free fatty acid conversion to  
         triglyceride fatty acid, \*835  
 membranes  
     insulin interaction with, \*334-335  
 metabolism  
     and glucagon:insulin ratio, \*341  
     and insulin, 453, \*1200  
     and insulin and cyclic AMP levels,  
         439-445  
     and rapid indicator-dilution technic  
         studies, \*180  
     and streptozotocin, \*59  
     and tissue injury, \*315  
 mitochondria  
     and diabetic ketosis, 257-268  
 mitochondrial swelling  
     and ammonia toxicity, \*835-836  
 α-oxoglutarate carboxylation and diabetes, \*981  
 perfused rat  
     and amino acid metabolism, \*57  
     and glucocorticoids and gluconeogenesis, \*252  
     potassium flux and glucose output  
         studies, \*254  
 perfused sheep, \*57-58  
 and plasma angiotensinogen and renin  
     levels, \*253

plasma membrane  
     and calcium and insulin binding  
         mechanisms, \*1122  
     and insulin receptors of, \*335  
 protein synthesis  
     and alloxan diabetes, \*339  
     and insulin and cyclic AMP, 453  
 rat  
     and carbohydrate metabolism and  
         adrenergic agents, \*1203  
     and cyclic 3'5'-AMP during glucose  
         repression, \*187  
     and diabetic ketosis, 257-268  
     and diet, \*183  
     and glucagon and adenosine 3'5'-  
         monophosphate levels, \*54  
     and insulin degradation, \*382  
     nuclear proteins and diabetes, \*377  
 ribosomes  
     and insulin deficiency, 84-88  
     and protein synthesis, \*339  
 sensitivity to endogenous insulin  
     and prediabetes, \*323-324  
 splanchnic nerve stimulation and adrenalectomy, \*770  
 threonine dehydratase  
     and tris aminomethane and orthophosphate, \*980-981  
 triglycerides  
     biosynthesis, and pregnancy and sex  
         steroids, \*365  
     and ethanol, \*247  
     and glucagon, \*55  
     and oral contraceptives, \*316

## M

**MACROANGIOPATHY**  
 and atherosclerosis, 679-680

**MAGNESIUM**

flux  
     and glucose ingestion in children,  
         \*376  
 and insulin action, 696, 697-698  
     and insulin secretion, 570  
 intestinal absorption, \*775  
 loss  
     and ammonia toxicity, \*836

**MALATE**

labeled  
     and gluconeogenesis study, \*252

**MALNUTRITION**

infantile  
     and amino acid responses, \*182  
 kwashiorkor  
     and insulin secretion, \*1119-1120

## DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- marasmus**  
and glucose utilization and chromium, \*313
- maternal**  
and lactosuria, 1195
- MAMMARY GLAND**  
metabolism  
and insulin, \*315
- MANGANESE**  
-induced hypoglycemia, 960
- MANNOHEPTULOSE**  
and amino acid metabolism, \*56  
and glucose protection from alloxan toxicity, \*123  
and insulin release, 544, 570-571  
in fetal rat pancreas, \*121  
and insulin response to amino acids, 1-5  
and insulin synthesis, 570  
and pancreas metabolism, 562-564
- D-MANNOHEPTULOSE**  
and insulin response to glucose, 541
- MANNOSE**  
and insulin secretion, 539, 543  
and liver glucose production  
and insulin-induced hypoglycemia, 797-803
- D-MANNOSE**  
and alloxan toxicity, \*123
- MARASMUS**  
and glucose utilization  
and chromium, \*313
- MARIHUANA**  
and hypoglycemia, 961
- MARKS, HENRY E.**, 178
- MARMOSETS**  
and diet-induced jejunal lipodystrophy, \*248
- MAURIAC SYNDROME**, 633
- MEBANAZINE**  
and insulin  
and hypoglycemia, 960
- MENSTRUATION**  
and carbohydrate and lipid metabolism, \*1204  
and growth hormone secretion, \*774-775
- MENTAL ILLNESS**  
and sulfonylureas, 959
- MENTAL RETARDATION**  
and galactosemia, 202, 208
- 6-MERCAPTOPURINE**  
and immune response to insulin, \*58
- MERCURY**  
and fat cell response to insulin and lipolytic hormones, \*771
- METABOLISM**  
adipose tissue  
and glycerol kinase regulation by insulin, \*122  
and insulin, 414-424  
and obesity, 6-11, \*54  
and adipose tissue fat cell size and number, \*180  
in African pygmies, \*1045-1046  
amino acids  
and exercise, \*770-771  
and glucagon and insulin, \*340-341  
and glucose, \*56  
and infantile malnutrition, \*182  
in perfused rat liver, \*57  
and starvation during pregnancy, \*1118-1119  
and arginine derivatives, \*1122-1123  
and blood proinsulin and C-peptides, 669  
brain, \*315  
and galactose toxicity, 202, 208  
and hepatic response to insulin-induced hypoglycemia, 802-803  
and ketoacidosis, \*247
- brain glucose  
in newborn rat, \*775
- calcium, \*326-327
- carbohydrate  
and adrenergic agents, \*1203  
and age, \*183-184  
and alcohol, \*247-248  
and catecholamines and methylprednisolone, \*772  
and diabetic microangiopathy, 872  
in infants of diabetic mothers, \*1046  
and metformin, \*914  
in newborn infants of diabetic mothers, \*912  
and pancreatic enzymes, \*186  
and psoriasis, \*250
- carbohydrate and lipid  
and glucose tolerance and insulin response to glucose, \*1119  
and menstrual cycle, \*1204  
and streptozotocin, \*59
- cholesterol  
and clofibrate, \*1200-1201  
and insulin, \*186
- ethanol and sorbitol  
in hypo-, hyper-, and euthyroid rats, \*181
- fat cell  
and dibutyryl cyclic 3', 5' AMP, \*343  
and insulin, \*351-352
- fat and lactate  
and phenformin, \*1045
- fatty acids  
by sheep liver and viscera, \*118  
and thrombin, \*312
- fetal  
and starvation, \*187
- forearm  
and tolbutamide, \*1206
- free fatty acids, \*835
- fructose  
and insulin, \*314
- gastrin  
and secretin, \*249
- and glomerular basement membrane thickening, \*913
- glucagon, \*333
- glucose  
of adipose tissue, 1151-1161  
and carcinoid syndrome, \*1200  
and dosage, 1102-1108  
and erythroblastosis fetalis, \*1199-1200  
and exercise and dietary carbohydrate, \*179  
in hyperammonemic rats, \*184  
and insulin and proinsulin, 935-938  
in isolated pancreas islets, 538-545  
in isoproterenol-stimulated rat salivary glands, \*982  
and leg exercise, \*776  
and methylene blue, \*350  
in rat skin, \*189  
and shock, \*1201  
and ventromedial hypothalamus nuclei destruction, \*1204-1205
- glucose and fatty acids  
and pancreas alpha and beta cells, \*909
- glucose C-14  
and 6-aminonicotinamide, \*1198
- U-C-14-glucose, xylitol, fructose, and sorbitol  
in fasted and streptozotocin diabetic rats, \*122
- glycosaminoglycans  
and alloxan diabetes, 1162-1166
- growth hormone  
and juvenile diabetes, 175-177  
and short stature, \*119-120
- and insulin clearance, 1003-1011

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- of isolated pancreas islets in tissue culture, 546-553  
 isolated perfused sheep liver, \*58  
 ketone bodies  
     in fasted and diabetic rats, \*246  
     in perfused skeletal muscle, \*343  
 kidney, \*910  
 lactate  
     and ethanol, \*367  
 lipid  
     in dogs, \*312  
 and lipoatrophy, \*381-382  
 liver, 50-52  
     and anti-insulin serum, 280-288  
     and diabetic ketosis, 257-268  
     and glucagon, \*55  
     and glucagon:insulin ratio, \*341  
     and insulin, 453, \*1200  
     and insulin and cyclic AMP levels, 439-445  
     and rapid indicator-dilution technic studies, \*180  
     and tissue injury, \*315  
 mammary cell  
     and insulin, \*315  
 and obesity  
     and exogenous growth hormone, \*1046  
 ornithine, \*771  
 pancreatic beta cell  
     and phlorizin, \*910-911  
 pancreatic islet  
     and glucose, \*344-345  
 placental glycogen  
     and diabetes, 1185-1190  
 and prediabetes, 685-693  
 proinsulin, \*347  
 protein  
     and insulin, 447-451  
 renal, \*314  
 triglyceride and insulin, 923-928
- METABOLITES**  
 and glucose  
     in perfused pancreas, 564-565  
 islet cell, 571  
     and insulin secretion, \*344-345
- METAFORMIN**  
 and carbohydrate metabolism  
     in obese, nondiabetic women, \*914  
 and hyperlipidemia, \*771  
 and hypoglycemia, \*771
- METHAMPHETAMINE**  
 -induced insulin release, \*252
- METHIONINE**  
 and pancreas mitotic activity, 1055
- and pancreatic beta cell uptake of amino acids, \*772  
 and rat fatty liver metabolism, \*183
- L-METHIONINE**  
 and pancreas  $\alpha$ -amino-isobutyric acid transport, \*181
- METHOTREXATE**  
 and immune response to insulin, \*58
- 3-O-METHYL-D-GLUCOSE**  
 excretion  
     and metformin, \*771  
 intestinal uptake, \*249  
 transport  
     and biguanides, \*119
- N-METHYLBENZYLAMINE,**  
 and insulin secretion, \*248
- METHYLCHOLANTHRENE**  
 -induced thyroiditis  
     and autoimmunity, \*253
- METHYLENE BLUE**  
 and glucose metabolism and insulin secretion, \*350
- METHYLPHENIDATE**  
 and tumor-bearing mice, \*837
- METHYLPREDNISOLONE**  
 and carbohydrate metabolism, \*772
- METHYSERGIDE MALEATE**  
 and insulin secretion, \*315-316, 779-787
- MICROANGIOPATHY**  
 and bacteruria, \*118  
 and diabetes, 680-681  
     and age, \*887  
 diabetic  
     and concurrent bullous and atrophic skin lesions, \*251  
     in humans and animals, \*357  
     and insulin and gamma globulin interactions, 872-879  
     and muscle capillary basement membrane changes, 881-896, 899-905  
     and polyol metabolism, galactosemia, and immune complex disease, \*352  
     and serum protein changes, \*371  
 diabetic-like, \*373  
     and glucose tolerance, \*321
- MICROSCOPY**  
 electron  
     and abetalipoproteinemia, \*60
- of beta cell tumors, 535  
 capillary basement membrane, \*118  
 of depancreatized baboon kidney, \*338  
 of diabetic rat liver, 259-260, 264-268  
 of endocrine pancreas in newborn rodents, 1051-1059  
 of glomerular basement membrane of juvenile diabetics, \*913  
 and intestinal lipoprotein production, \*121  
 and islets of Langerhans, \*1043  
 of mouse pancreatic beta cells, 1068-1070  
 and muscle capillary basement membrane changes, 882, 884-896  
 of pancreas of diabetic monkeys, 1086, 1087  
 and pancreatic islets, 595-603  
 of testicular tissue, 25-28  
 light  
     of isolated islets in tissue culture, 547-553  
 light and electron  
     of human embryonic and fetal pancreatic islets, 511-533  
     and islet cell changes in streptozotocin diabetic rabbits, 129-137
- pancreas  
     and long-term juvenile diabetes, 115-116  
 of pancreatic islets  
     from cyroheptadine-treated rats, 71-78  
     in late-onset diabetes, 763-767
- MINERALOCORTICOID**  
 kidney sensitivity to  
     and starvation, \*334
- MINERALS**  
 calcium, magnesium and phosphorus flux  
     and glucose ingestion in children, \*376  
 and insulin secretion, 570  
 lead intoxication  
     and insulin action, \*381  
 zinc  
     and insulin, 497-498, 509
- MONKEYS**  
 and glucose tolerance tests  
     and bedrest and exercise, 105  
 and induced obesity, hyperinsulinemia and hyperlipidemia, \*1201

## DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- Macaca nemestrina*  
and streptozotocin diabetes induced by direct pancreatic infusion, 138-141
- Macaca nigra*  
spontaneous diabetes in, 1077-1089  
rhesus  
and insulin response to hemorrhagic shock, \*364  
and jet insulin injections, 39-44
- MONOAMINE OXIDASE**  
in mouse pancreas, \*120
- MONOAMINE OXIDASE INHIBITORS**  
and hypoglycemia, \*251-252  
and insulin release, \*363-364
- MONOAMINES**  
and insulin secretion, 779-787
- MONOGLYCERIDASE**  
postheparin, \*54
- MONOGLYCERIDE HYDROLASE**  
in obese hyperglycemic mice, \*186
- MORTALITY**  
and Cushing's syndrome in infancy, \*120  
and diabetes, \*1044  
and arteriosclerosis, \*1123  
and insulin, 633-636  
fetal  
and maternal blood sugar levels, \*1201-1202  
and galactose toxicity in chicks, 208  
and heart disease  
and clofibrate therapy, \*838  
and lactic acidosis, \*1198  
and renal transplantation  
and diabetes, \*322  
and sulfonylurea treatment, \*120  
and tolbutamide  
in UGDP study, 1036-1037  
and x-irradiation in mice, \*914
- MOUSE**  
*acomys cahirinus*  
and defective immunoreactive insulin secretion, 1060-1070  
and alloxan  
and diphenylhydantoin, 80-83  
and anti-insulin serum  
and pancreatic islet studies, \*911  
diabetic  
and glomerular lesions and proteinuria, \*1120  
and diabetic-like microangiopathy, \*373  
and encephalomyocarditis virus infection
- and diabetes-like syndrome, \*247  
hyperglycemic  
and pancreas  $\alpha$ -amino isobutyric acid transport, \*181  
and insulin release  
and methamphetamine, \*252  
islets  
and insulin release, \*328-329, \*914  
longevity and mortality distribution studies, \*914  
and microangiopathy, \*357  
mutant "acatalasemic"  
and hypolipidemia, \*56  
obese, \*1044  
and adipose tissue glycerol kinase and lipolysis, \*911-912  
and glycerol kinase regulation, \*122  
and insulin resistance, \*314-315  
and plasma growth hormone, \*122  
with transplanted tumors, \*774  
obese hyperglycemic  
and adipose tissue monoglyceride hydrolase, \*186  
and caloric restriction studies, \*835  
and diet, \*119  
and exogenous insulin, \*344  
and high-fat diet, \*182  
and insulin release and citrate studies, 999-1001  
obese and lean  
and islets of Langerhans adenyl cyclase and phosphodiesterase, \*179
- pancreas  
and encephalomyocarditis virus infection, \*338-339
- tumor-bearing  
and hypocholesteremic drugs, \*837
- MUCOPOLYSACCHARIDES**  
metabolism  
and psoriasis, \*250
- MUMPS**  
and diabetes, \*182, 766
- MUSCLE**  
alanine synthesis  
and exercise, \*770-771  
amino acids  
and exercise, \*119  
ammonia production, \*1203  
antibody to  
binding to fibroblasts, \*314  
capillaries basement membrane changes, \*254  
and aging and diabetes, 881-896, 899-905
- capillary permeability and blood flow  
and diabetes and prediabetes, \*769  
and ethanol, \*838  
and insulin and proinsulin degradation, 1091-1100  
myopathy  
and capillary basement membrane thickening, \*118  
phosphofructokinase  
and cyclic AMP and dibutyryl cyclic AMP, \*363  
and sepharose-bound insulin, \*335-336  
skeletal  
ketone-body metabolism in, \*343  
lactate metabolism and ethanol, \*367  
protein turnover in, \*341
- MYOCARDIAL INFARCTION**, 763  
and clofibrate therapy, \*838, \*910  
and glucose tolerance, \*184  
and glucose tolerance tests, \*312-313  
and hormone and metabolic disturbances, \*119  
and hyperglycemia  
and tolbutamide therapy, \*122-123
- MYOTONIC DYSTROPHY**  
and insulin secretion, \*378
- MYSTROMYS ALBICAUDATUS**  
pancreatic islet structure studies, \*1043  
spontaneous diabetes mellitus in, 715-721

## N

- NAUSEA**  
and oral insulin, 645
- NEPHRECTOMY**  
and uremia  
and insulin release, \*910-911
- NERVOUS SYSTEM**  
and adenyl cyclase, \*773  
autonomic  
and insulin release, 624-627  
central  
insulin-sensitive receptor in, \*337  
conduction  
in galactose-fed rats, 295-300  
and diabetic impotence, 23  
disease  
and hypoglycemia, \*248  
and growth hormone release, \*913  
and impotence  
and diabetes, 23-28  
and lipolysis  
and  $\beta$ -hydroxybutyrate, \*836  
and phenothiazine-induced hyperglycemia, \*184

## DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- sensory perception thresholds  
and diabetes, \*1199  
splanchnic nerve stimulation, \*770  
tissue  
and insulin binding proteins, 427  
sorbitol and fructose, blood sugar control and, 1173-1178
- NEUROBLASTOMA**  
congenital  
and islet hyperplasia, \*1122
- NEUROPATHY, DIABETIC**  
and diabetes management, 679  
galactosemic, 295-300  
of hands, \*314  
and impotence, 23-28  
and prediabetes, \*359
- NIALAMIDE**  
and insulin release, \*363-364
- NICOTINAMIDE**  
and streptozotocin-induced beta-cell toxicity, \*325-326
- NICOTINAMIDE ADENINE NUCLEOTIDES**  
and insulin, \*315
- NICOTINIC ACID**  
and glucose tolerance, plasma insulin, and uric acid excretion, \*313
- NIGERIA**  
lactase activity levels in, 871
- NITROGEN**  
conservation  
placental, \*340
- NITROGEN MUSTARD**  
and steroid-induced ketoacidosis, \*54
- NORADRENALINE**  
and blood glucose and free fatty acid responses to catecholamines, \*912
- NOREPINEPHRINE**  
and fat cell metabolism, 420  
and glucose tolerance tests, \*348  
and insulin release  
and prostaglandins, \*329  
pressor response to  
and insulin treatment in alloxan diabetic rats, \*354-355  
and theophylline  
and cyclic AMP, 417
- NUCLEOTIDES**  
and glucagon, 440
- NUTRITION, \*59.** *See also Diet; Malnutrition; Starvation*  
and insulin secretion, 606-615, 617-618  
postnatal  
and kidney cellular development in progeny of protein-deficient rats, \*1041
- O**
- OBESITY**  
and adipose tissue  
fat cell size and metabolism, \*54  
glycerol kinase and lipolysis, \*911-912  
monoglyceride hydrolase, \*186  
and caloric restriction, \*835  
and cardiovascular disease, \*980  
in children  
and glucose tolerance tests, \*1042-1043  
and diabetes, \*246, \*250  
and low calorie diet with phentermine resin, \*361  
and phenformin, \*362  
and diabetes prevalence, \*776  
and ethanol  
and phenformin, \*363  
and exercise  
and insulin secretion, \*909  
and food intake  
and plasma glucagon, \*331-332  
and glucose tolerance, 1012, \*1205  
and growth hormone administration, \*1046  
and hyperglycemia  
and high-fat diet in mice, \*182  
and hyperinsulinemia, \*380, 613, 617-618  
and adipose tissue resection, 13-15  
and beta cell hyperplasia and insulin resistance, \*314  
and blood proinsulin, 663-664  
and diet, \*249  
and hyperinsulinemia and hyperlipidemia  
induced in monkeys, \*1201  
and hypothalamic damage, \*1206  
and insulin assays, \*1123  
and insulin resistance, \*314-315, \*370  
and insulin resistance and release, \*316  
and insulin secretion  
and alcohol hypoglycemia, 65-69  
and body composition, \*1118  
and xylitol and glucose, \*187-188  
and insulin sensitivity of adipose tissue, 6-11
- and metformin  
and carbohydrate metabolism, \*914  
in new strain of mouse, \*1044  
and plasma growth hormone response to hypoglycemia and arginine, \*312  
and proinsulin response to oral glucose, \*356  
and weight reduction  
and adipose tissue lipolysis and cellularity, 754-760
- OBITUARIES**  
Beardwood, Joseph T., Jr., 839  
Marks, Henry E., 178
- OCTANOATE**  
and fat cell lipolysis, 418, 419, 421  
and growth hormone synthesis, \*187
- OLEATE**  
and fat cell lipolysis, 418, 419
- OLIGOMYCIN**  
and insulin release  
in fetal rat pancreas, \*121
- ORAL CONTRACEPTIVES**  
and plasma lipids, lipoproteins, and intravenous fat tolerance, and post-heparin lipoprotein lipase activity, \*316
- ORAL HYPOGLYCEMIC AGENTS**  
and diabetic mortality, \*1044  
di-isopropylammonium dichloracetate, \*358  
labeling laws, 833, 1116-1117  
and vascular disease, \*57
- ORNITHINE**  
utilization  
by chick, \*771
- ORPHENADRINE**  
-induced hypoglycemia, 961
- ORTHOPHOSPHATE**  
and liver threonine dehydratase, \*980-981
- OUABAIN**  
and glucose-induced biphasic insulin release, \*246  
and insulin secretion, \*913
- OXYGEN**  
consumption by splanchnic bed, 50-51  
myocardial consumption of  
and glucagon, \*118-119  
uptake  
in diabetic rat liver, 257-268  
of isolated islets in tissue culture, 547-548, 550

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

### OXYTETRACYCLINE

- and insulin
- and hypoglycemia, 960

### P

#### PALMITATE

- and glucose metabolism, 419
- and growth hormone synthesis, \*187
- metabolism
- and ketosis, 258, 259, 261, 267

#### PANCREAS

- acinar atrophy and fibrosis
- and hemolytic anemia, \*773-774
- of *acomys cahirinus*, 1068-1070
- and alloxan
- and diphenylhydantoin, 81-83
- alpha and beta cells
  - and glucose and fatty acid oxidation, \*909
- alpha cell function
  - and diabetes, 301-307
- amino acid metabolism
  - and glucose, \*56
- anglerfish islets
  - and glucagon biosynthesis, \*58-59
- beta cell dysfunction
  - and diabetes, 703-704
- beta cell metabolism
  - and phlorizin, \*910-911
- beta cell neosdioblastosis
  - in idiopathic hypoglycemia of infancy, \*189
- beta cell C-peptide
  - immunoreactivity studies, 1013-1025
- beta cell responses, 619-630
- beta cell structure, 536
- beta cell tumors, 535
- beta cell webs
  - and insulin secretion, \*838
- beta cells
  - alanine, arginine and leucine uptake by, \*772
  - and alloxan and streptozotocin, \*326
  - and amines, \*248
  - and  $\alpha$ -amino-isobutyric acid transport, \*181
  - and arginine, \*312
  - calcium uptake assays, \*837
  - and cyclic AMP, \*329
  - of cyroheptadine-treated rats, 71-78
  - embryonic, 523, 528, 531-533
  - and encephalomyocarditis infection, \*247
  - and glucose-induced insulin release, 594-603, 605
  - and glucose protection from alloxan toxicity, \*123

#### insulin detection study, \*246

- and insulin secretion, \*914
- intracellular pH, \*911
- and obesity, \*314
- replication, \*346
- and sensitivity to glucose in prediabetes and diabetes, 224-233
- and sulfonylurea-induced insulin response, \*122
- vital damage, 713-714
- blood flow and insulin output
  - and exogenous insulin, \*1204
- citrate levels
  - and insulin release and inhibition, 999-1001
- cultured fetal human, \*345-346
- of diabetic monkeys, 1086, 1087
- duct-ligated
  - response to glucose, \*344-345
- early research, 385-395
- endocrine
  - structure in newborn rodents, 1051-1059
- endocrine cells
  - in embryos, 519-523
- enzyme activity
  - in rats, \*59
- enzymes
  - and dietary regulation, \*186
- exocrine
  - and diet, \*186
- fetal, 620, 621, 623-624
- fetal and embryonic, 536
- fetal endocrine
  - cytological studies, \*253-254
- fetal rat
  - insulin content study, 193-201
  - insulin release and inhibition studies, \*121
- glucagon
  - and sulfonylureas, 216
- glucagon and insulin secretion
  - and beta adrenergic and cholinergic agents, \*332
- golden hamster cell cultures
  - and insulin secretion study, \*370
- insulin
  - and glucose, \*375-376
- insulin output and blood flow
  - and prostaglandins, \*369
- insulin release
  - and calcium, 591-592
  - and hemorrhagic shock, \*982
- and insulin secretion, 510
  - and diphenylhydantoin and diazoxide, 856-861
  - and species variation, \*184
  - and sulfonylureas, \*1120

#### islet cell adenoma

- and adenyl cyclase activation by glucagon and tolbutamide, \*912
- cyclic AMP content, glucose, glucagon, tolbutamide and theophylline and, \*346-347
- and factitious hypoglycemia, \*980

#### islet cell carcinoma

- circulating insulin in, \*909-910
- and streptozotocin, \*1204

#### islet cell tumors

- and immunoreactive glucagon, \*333
- and plasma proinsulin, \*1204
- proinsulin content, 675-676
- and proinsulin-like component of insulin, \*313

#### islet hyperplasia, 536

- congenital, \*1122

#### islet insulin secretion

- and exogenous insulin, \*344

#### islets

- and 6-aminonicotinamide, \*1198
- and anti-insulin serum, \*911
- calcium efflux from, \*326-327
- cyclic AMP levels, starvation and, \*329

#### in diabetic guinea pigs, \*338

- and electrical activity in response to leucine and tolbutamide, \*345
- embryogenesis, 511-533

#### hypertrophy and beta cell hyperplasia in long-term juvenile diabetics, 114-116

- and insulin release, 571
- and insulin release and content, \*1205

#### and insulin resistance factor secretion, \*370

#### insulin secretion and glucose metabolism, 538-545

- and late-onset diabetes, 762-767
- metabolism, 546-553

#### monoamines, \*120

- pyridine nucleotide depletion, 789-792

#### response to glucose, \*344-345

#### and streptozotocin diabetes, 129-137

#### structure, 536-537, \*1043

#### ultrastructure studies, \*120

#### isolated perfused rat

- and human chorionic somatomammotropin effects on insulin and glucagon release, 1072-1075

#### isolated rat islets

#### perfusion, 987-997

#### monoamines

- and insulin secretion, \*345, 779-787

## DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64

Supplement 1, 321-384

August, 843-922

February, 65-128

Supplement 2, 385-714

September, 923-986

March, 129-192

June, 715-778

October, 987-1050

April, 193-256

July, 779-842

November, 1051-1130

May, 257-320

December, 1131-1210

## SUBJECT INDEX 1972

- monolayer cultures**  
and insulin biosynthesis studies, 627-630
- mouse**  
and monoamines, \*251-252
- perfused canine**  
and glucagon secretion studies, \*314
- perfused rat**  
and insulin release studies, \*55, \*56, \*369
- rat**  
endocrine function in monolayer cultures of, \*368  
and ouabain and insulin release, \*246
- rat islets**  
and alloxan and glucose interactions, \*326  
and methylene blue, \*350
- scintiphotoscanning**, \*351
- and streptozotocin-induced beta cell toxicity**  
and nicotinamide and pyridine nucleotides, \*325-326
- streptozotocin infusion**  
in *Macaca nemestrina*, 138-141
- transplantation**  
in diabetic subject, \*355
- tumors**  
insulin secreting, \*1120
- PANCREATECTOMY**  
and discovery of insulin, 385-394
- and glucagon**  
and cyclic AMP, 453
- and glucose turnover**  
and insulin and glucagon infusion, \*382-383
- and hypophysectomy**  
and diabetic ketosis in rats, 946-954
- and liver free fatty acid metabolism**, 280
- and liver 3-hydroxybutyrate dehydrogenase**, \*184
- subtotal**  
and chlormadinone acetate, \*313
- PANCREATITIS**  
acute  
diabetes incidence after, \*911
- and oral insulin**, 646-647
- PANCREOZYMIN**  
and insulin release, 928
- PARAPLEGIA**  
and impotence  
and androgenic function, 23-28
- PARATHORMONE**  
action  
and cyclic AMP, \*251
- PARATHYROIDECTOMY**  
and plasma insulin levels, \*773
- PARKINSON'S DISEASE**  
and L-dopa  
and plasma growth hormone, insulin, and thyroxine, \*911
- PENTOSE PHOSPHATE PATHWAY**  
and insulin, \*315  
and insulin release, 143  
overactivity  
and psoriasis, \*250  
and xylitol absorption, \*352
- PEPSIN**  
secretion  
and secretin and duodenal acidification, \*250
- C-PEPTIDE**  
in blood, 661-670  
circulating immunoreactivity studies  
and diabetes, 1013-1025  
proinsulin conversion to, 572-579
- PEPTIDES**  
diabetogenic, 714  
synthetic  
and glucagon, 843-855  
C-terminal, 714
- PEROXIDASE**  
and hypolipidemia, \*56  
pH  
arterial  
and acidosis diagnosis, 1110  
of inflammatory exudates  
in acidotic diabetic rabbits, \*1201  
intracellular  
of pancreatic beta cells, \*911
- PHENFORMIN**  
and ethanol  
and obesity and prediabetes, \*363  
and fat and lactate metabolism and insulin production  
and starvation, \*1045  
and glibenclamide, \*55  
and lactic acid levels  
and anoxia and exercise, \*351  
and lactic acidosis, \*1198  
lipid-lowering effect of, \*380  
and lipomatosis, 15  
and obese diabetics, \*362  
and reactive hypoglycemia, \*367-368  
UGDP study of, 976-978  
and vascular disease, \*57
- PHENOBARBITONE**  
and blood sugar, \*1123
- PHENOTHIAZINE**  
-induced hyperglycemia, \*184
- PHENOXYBENZAMINE**  
and diazoxide-induced insulin secretion, \*1045  
and insulin secretion, 783-784
- PHENTERMINE RESIN**  
and low-calorie diet  
and obese diabetics, \*361
- PHENTOLAMINE**  
induced alpha-adrenergic blockade  
and insulin release, \*181  
and insulin secretion, \*248  
and exercise, \*119
- L-PHENYLALANINE**  
and cholecystokinin release, \*252  
-induced insulin release, \*369
- $\beta$ -PHENYLETHYLAMINE**  
and insulin secretion, \*248
- PHENYLETHYLBIGUANIDE**  
and liver gluconeogenesis, \*910
- PHENYLISOTHIOCYANATE**  
degradation studies, \*835
- PHENYTOIN**  
and hyperglycemia, \*187
- PHEOCHROMOCYTOMA**  
and insulin-dependent diabetes, \*838
- PHLORIZIN**  
and brain uptake of D-glucose, \*315  
and intestinal fructose uptake, \*249  
and pancreatic beta cell metabolism, \*910-911
- PHOSPHATE**  
-induced hypoglycemia, 961
- PHOSPHENOLPYRUVATE**  
formation, \*189
- PHOSPHODIESTERASE**  
and cyclic AMP and cyclic GMP, \*838  
and insulin release, \*328-329  
in islets of Langerhans  
of obese and lean mice, \*179
- PHOSPHENOLPYRUVATE CARBOXY-KINASE**  
and cyclic AMP  
and insulin, 439-445
- PHOSPHOFRUCTOKINASE**  
and cyclic AMP and dibutyryl cyclic AMP, \*363

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- 6-PHOSPHOGLUCONATE DEHYDRO-GENASE**  
in jejunal mucosa  
and alloxan diabetes, \*188
- PHOSPHOLIPIDS**  
levels  
and alloxan diabetes, 1163-1166
- PHOSPHORUS**  
flux  
and glucose ingestion in children, \*376
- PHOSPHORYLASE**  
and synthase, 480
- PHOSPHORYLATION**  
fatty acid  
and diabetes, 257-268
- PHOTOCOAGULATION**  
argon laser  
and diabetic retinopathy, \*189
- PHYTOHEMAGGLUTININ**  
peripheral blood lymphocyte response to  
and diabetes, 906-907
- PIMA INDIANS**  
and diabetes, \*180  
and kidney disease, \*365-366  
and viral hypothesis, 766
- PITUITARY GLAND**  
ablation  
during diabetic pregnancy, 972-974  
diabetogenic polypeptide from, \*837  
and glucagon secretion, \*375  
growth hormone synthesis  
and lipids, \*187  
protein synthesis  
and insulin, \*1200  
reserve capacity  
and diabetes, \*981
- PLACENTA**  
glycogen metabolism  
and diabetes, 1185-1190  
glycogenesis  
and insulin, \*1199  
insulin degradation by, \*374-375  
lactogen  
and diabetic pregnancy, 32-33  
and insulin and glucagon release, 1072-1075  
and maternal diabetes, \*315  
and nitrogen conservation during pregnancy, \*340  
polyol pathway, \*329-330
- enzymes of, \*330  
and streptozotocin, \*316
- PLASMA**  
amino acids  
and exercise, \*119  
glucagon and insulin control of, \*340-341  
and starvation, \*179  
angiotensinogen and renin regulation by liver, \*253  
L-asparagine  
and hepatic homeostasis, \*254  
catecholamine  
during oral glucose tolerance test, \*348  
cholesterol  
and diet, \*1043  
cholesterol and triglycerides  
and clofibrate, \*1200-1201  
fasting growth hormone levels  
and diabetic retinopathy, \*322  
free fatty acids  
conversion to plasma triglyceride fatty acid, \*835  
and glucagon infusion in congestive heart failure patients, 942, 944  
and menstrual cycle, \*1204  
uptake by liver, 947-948, 950-954  
free fatty acids and glucose  
and L-dopa, \*1121  
free fatty acids, glucose, insulin, and ketones  
and sodium linoleate infusion, 1179-1184  
free fatty acids and insulin  
in malnourished infants, \*182  
free fatty acids and ketone  
and insulin secretion, 923  
free fatty acids metabolism  
and anti-insulin serum, 280-288  
glucagon  
and diabetes, \*324  
and exercise, \*1198-1199  
and food intake, \*331-332  
and infection, \*324  
and sulfonylureas, 216-223  
glucagon, growth hormone and insulin  
and glucose during exchange transfusions, \*1120  
glucose  
and graded insulin infusions, \*379  
and growth hormone secretion, \*774-775  
glucose and free fatty acids  
and pentobarbital, \*836
- glucose, free fatty acids, cortisol and growth hormone  
and growth hormone administration, 22, 30  
glucose and immunoreactive insulin  
and adipose tissue resection, 13-15  
glucose, insulin and glucagon  
and hypothalamic stimulation, \*771  
growth hormone  
clearance, 175-177  
and juvenile diabetes, \*312  
in obese mice, \*122  
during sleep, \*776  
growth hormone, insulin and thyroxine  
and L-dopa, \*911  
growth hormone responses  
and Cushing's syndrome, \*1122  
growth hormone and sulfation factor  
in African pygmies, \*1045-1046  
hyperosmolality  
and hyperglycemia, \*837  
immunoreactive insulin  
in *acomys cahirinus*, 1060-1070  
during continuous blood glucose monitoring in diabetics, \*324-325  
and insulin administration to gastrointestinal tract, 203-207  
and surgery for islet cell adenomas, \*185  
and weight reduction, \*1118  
insulin  
and adipose tissue fat cell size and number, \*180  
and atherosclerosis, \*253  
and diet, \*249  
and erythroblastosis fetalis, \*1199-1200  
and glucose, \*375-376  
and hyperparathyroidism, \*773  
and hypokalemia, \*1043-1044  
in kwashiorkor, \*1119-1120  
and metabolic insulin clearance, 1003-1011  
and metformin, \*771  
and methamphetamine, \*252  
and nicotinic acid, \*313  
and obesity and exercise, \*909  
and pancreatic alpha cell response to hyperglycemia, 301-307  
response to glucose, 226-233  
and theophylline, \*180  
insulin and blood glucose  
and obesity, \*54  
insulin, glucose and free fatty acids  
and insulin-treated diabetes, \*325  
insulin and glucose response to glucose loading

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- and diet and fasting, \*1046  
 insulin and triglycerides  
     seasonal variations in, \*312-313  
 insulin and uric acid  
     and nicotinic acid, \*313  
 isovaleric acid and  $\alpha$ -methylbutyric acid  
     and hypoglycin A, \*316  
 lipase activity  
     and heparin, 152-153  
 lipids  
     and diet, \*366  
     and glucagon, \*311-312  
     and glucose tolerance tests, \*383  
     and pregnancy in rhesus monkeys, \*774  
 lipids and lipoproteins  
     and oral contraceptives, \*316  
 membrane vesicles  
     and glucose transport, \*1042  
 membranes of fat cells  
     and insulin, 403-411  
 osmolality  
     and serum osmolality, lactic acid values and, \*838  
 and platelet aggregation, \*355  
 proinsulin  
     assay, \*122  
     and islet cell tumors, \*1204  
 proinsulin-like components of, 673-676  
 testosterone  
     and diabetic impotence, 23-24  
 triglyceride removal  
     and hyperglycemia, \*342  
 triglycerides  
     and adipose tissue fat cell size and number, \*180  
     and exercise, \*909  
     and fasting, \*54  
     and glucagon, \*55  
     synthesis, \*55  
 triglycerides and cholesterol  
     and cortisone acetate, \*1044-1045  
 tryptophan  
     and insulin, \*909  
 very-low-density lipoprotein study, 744-752
- POLYDIPSIA**  
 and hyperphagia  
 and adrenalectomy and hypophysectomy, \*358-359
- POLYETHYLENE GLYCOL**  
 and insulin antibodies screening test, \*379
- POLYOL**  
 metabolism  
 and diabetic microangiopathy, \*352
- POLYOL PATHWAY**  
 activity  
     in isolated capillary preparation, \*330  
 placental, \*329-330  
     enzymes, \*330
- POLYPEPTIDES**  
 diabetogenic  
     from pituitaries, \*837  
     synthesis, 476-484
- POSTHEPARIN LIPOLYTIC ACTIVITY**  
 deficiency in  
     and hyperglycemia, \*342
- POTASSIUM**  
 and antinatriuretic effects of carbohydrate, \*772  
 flux  
     and insulin and adenosine 3', 5'-monophosphate, \*254  
 and insulin action, 697-698  
 and insulin secretion, 570  
 myocardial  
     and glucagon, \*118-119  
 and prostaglandins  
     and growth hormone secretion, \*313  
 uptake and loss  
     and cyclic AMP and insulin, 439-445
- POTASSIUM PARA-AMINOBENZOATE**  
 and hypoglycemia, 960
- PREDIABETES**  
 and beta cell sensitivity to glucose, 224-233  
 and caffeine  
     and glucose tolerance tests, \*365  
 in children, 45-47  
 in Chinese hamster  
     and prevention of diabetes, \*337-338  
 and diabetes prevention, \*337-338, 693  
 and diabetic neuropathy, \*359  
 and ethanol  
     and phenformin, \*363  
 and glucose tolerance, \*321  
 and hypoglycemia  
     and insulin-glucose dynamics, \*373  
 and insulin secretion, \*314, 688-691  
 and liver sensitivity to endogenous insulin, \*323-324  
 and low insulin response, 685-687  
 and plasma lipids during glucose tolerance tests, \*383  
 and retinal blood flow, \*354  
 and transition to diabetes, 691-693
- PREDNISOLONE**  
 and immune response to insulin, \*58
- PREGNANCY**  
 and amino acid metabolism  
     and starvation, \*1118-1119  
 and biliary lipids, \*912  
 and caloric deprivation  
     and maternal and amniotic fluid substrate level, \*1202  
 and glucose tolerance test indications, \*186  
 and human chorionic somatomammotropin  
     and insulin and glucagon release, 1074-1075  
 and hypoglycemia following pancreateoduodenectomy, \*188  
 and insulin response  
     and arginine, \*251  
 and liver triglyceride biosynthesis, \*365  
 and maternal protein restriction  
     and postnatal growth hormone production and bone development, \*1047  
 and placental nitrogen conservation, \*340  
 in rhesus monkeys  
     and plasma lipid levels, \*774  
 and uterine relaxants  
     and hyperglycemia, \*1045
- PREGNANCY, DIABETIC**  
 and blood sugar levels  
     and perinatal mortality and morbidity, \*1201-1202  
 and fetal and placental composition, \*315  
 and glucose tolerance tests in neonates, \*912  
 and hypophysectomy for diabetic retinopathy, 972-974  
 and insulin deficiency  
     and endogenous hypertriglyceridemia, \*366-367  
 and laboratory studies, 31-35  
 and lactosuria, 1195  
 and phacomelic diabetic embryopathy syndrome, \*1042  
 and pituitary reserve loss, \*981  
 and placental glycogen metabolism, 1185-1190  
 and streptozotocin, \*316
- PROGESTERONE**  
 and diabetic pregnancy, 34
- PROGESTIN**  
 and carbohydrate tolerance, \*313
- PROINSULIN**  
 action, \*57
- 
- DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE**
- |                  |                       |
|------------------|-----------------------|
| January, 1-64    | Supplement 1, 321-384 |
| February, 65-128 | Supplement 2, 385-714 |
| March, 129-192   | June, 715-778         |
| April, 193-256   | July, 779-842         |
| May, 257-320     | August, 843-922       |
|                  | September, 923-986    |
|                  | October, 987-1050     |
|                  | November, 1051-1130   |
|                  | December, 1131-1210   |

## SUBJECT INDEX 1972

- in adipose tissue, 485  
and structure, 505  
amino acid sequences, 461-463, 465-466  
antibodies  
    and insulin resistance, \*368  
and antibodies to insulin, 656-657  
assay, \*122  
biosynthesis  
    and glucose, 538  
biosynthesis, intracellular transport, and  
    conversion to insulin and C-peptide, 572-579, 581-583  
in blood, 661-670  
content of beta cell tumors, 535  
conversion to insulin, \*314  
degradation  
    in rats, 1091-1100  
and glucose metabolism  
    in rat diaphragm and epididymal  
        fat pads, 935-938  
and insulin  
    conformational studies, 486-491  
-like component of insulin, \*313  
    and hypokalemia, \*1043-1044  
-like plasma components, 673-676  
metabolism, \*347  
and C-peptide immunoreactivity, 1013-1025  
porcine  
    synthesis of related polypeptides, 476-484, 485  
response to oral glucose  
    and age, obesity, and degree of carbohydrate intolerance, \*356  
structure  
    and action, 509  
synthesis, 509  
transport, 510
- PROLINE**  
and ornithine utilization studies in chick, \*771
- PROPOXYPHENE**  
and hypoglycemia, 960-961
- PROPRANOLOL**  
and insulin  
    and hypoglycemic coma, 960  
and insulin secretion, 783-784  
    and blood sugar, \*1120  
and liver carbohydrate metabolism, \*1203  
and tolbutamide-induced insulin response, \*122
- PROSTAGLANDINS**  
and blood flow and insulin output, \*369  
and growth hormone secretion, \*313
- and insulin release, \*329
- PROSTATE GLAND**  
hexokinase  
    and testosterone, \*185
- PROTEIN KINASE**  
and cyclic AMP, 571
- PROTEINS**  
adipose tissue noncollagen  
    as index of cell number, \*1201  
and amino acid flux into liver tissue, \*316  
-bound carbohydrates  
    and diabetes, 863-870  
deficiency  
    in pregnant rats, \*1041  
dietary  
    and glucagon and insulin secretion, \*912-913  
and glucagon biosynthesis, \*58-59  
hepatic synthesis  
    and tissue injury, \*315  
insulin binding, 426  
and insulin release, 613, 617-618  
leucine incorporation of, \*336  
of plasma very-low-density lipoprotein selenomethionine incorporation into, 744-752
- rat liver nuclear  
    and diabetes, \*377
- restriction in pregnant rats  
    and postnatal growth hormone production and bone development, \*1047
- synthesis  
    and alloxan diabetes, \*339  
    and cyclic AMP and hormones, \*119  
    and fatty acid synthetase activity, \*914  
    and insulin, 447-451  
    and insulin and cyclic AMP, 453
- synthesis in anterior pituitary  
    and insulin, \*1200
- turnover in skeletal muscle  
    and insulin, \*341
- PROTEINURIA**  
and glomerular lesions, \*1120  
in Pima Indians, \*365-366
- PROTEOLYSIS**  
and cyclic AMP  
    and insulin, 439-445
- PSEUDODIABETES**  
and myopathy  
    and capillary basement membrane thickening, \*118
- PSORIASIS**  
and carbohydrate metabolism, \*250
- PURINE NUCLEOTIDE CYCLE**  
and ammonia production, \*1203
- PYRAZOLE**  
and ethanol-induced fatty liver, \*247
- PYRIDINE NUCLEOTIDES**  
depletion  
    and streptozotocin-induced diabetes, 789-792  
and insulin release  
    from toadfish insulin secretion granules, \*983  
and streptozotocin-induced beta cell toxicity, \*325-326
- PYRUVATE**  
metabolism  
    and glucose, \*56
- PYRUVIC DEHYDROGENASE**  
and insulin, 427
- R**
- RABBIT**  
acidotic diabetic  
    and pH of inflammatory exudates, \*1201
- and antibodies to insulin, 651-656, 657-659, 660
- and blood sugar  
    and insulin storage times, 812
- and insulin administration to gastrointestinal tract, 203-207
- and insulin response to amino acids  
    and 2-deoxy-D-glucose and mannose-heptulose, 1-5
- and iodinated insulin, \*55
- and neutral Regular insulin, 242-245
- renal gluconeogenesis and ammonia production in, \*57
- and serum insulin levels  
    and trauma, \*183
- and streptozotocin diabetes  
    and islet cell changes, 129-137
- and thyrotoxicosis  
    and glucose utilization and insulin secretion, \*370-371
- RACE**  
and alcohol sensitivity, \*254  
and lactose tolerance tests, 871
- RADIOIMMUNOLOGY**  
in synthetic glucagon studies, 844-845, 846-848, 855

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- RAT. *See also* *Mystromys albicaudatus*  
 and acetoacetate  
 and anemia, \*311  
 adipocytes  
 fatty acid synthetase activity, \*914  
 adipose tissue  
 glucose metabolism and insulin response, 1151-1161  
 and alloxan diabetes  
 and arteriosclerosis, \*1123  
 and glycosaminoglycans metabolism, 1162-1166  
 and jejunal mucosa enzymes, \*188  
 and liver ribosomal aggregation, 84-88  
 and pressor response to angiotensin and norepinephrine, \*354-355  
 and 6-aminonicotinamide as diabetogenic agent, 143-148  
 and ammonium chloride-induced acidosis  
 and glucose tolerance and insulin sensitivity, 794-796  
 and blood sugar  
 and nervous system sorbitol and fructose, 1173-1178  
 brain  
 glucose and D-3-hydroxybutyrate uptake, \*1206  
 brain hexokinase, \*1205  
 brain utilization of ketone bodies, \*247  
 and carbohydrate and lipid metabolism and streptozotocin, \*59  
 cyproheptadine-treated  
 and pancreatic beta cell alterations, 71-78  
 diabetic  
 and calcium absorption, \*983  
 and connective tissue changes, 733-743  
 and insulin resistance, \*1042  
 and intestinal growth and hexose transport, \*59  
 and ketosis, 946-954  
 and liver metabolism, 257-268  
 and  $\alpha$ -oxoglutarate carboxylation in liver mitochondria, \*981  
 and ventromedial hypothalamic destruction, \*1043  
 diabetic pregnancy in, \*315  
 and streptozotocin therapy, \*316  
 diaphragm and epididymal fat pads  
 and insulin and proinsulin studies, 935-938  
 and diet  
 and blood constituents and hepatic lipids, \*1202  
 and hypertriglyceridemia, \*353-354  
 and effects of maternal protein restriction, \*1047  
 and ethanol-induced fatty liver and pyrazole and glucose, \*247  
 fasted and fed  
 and amino acid levels, \*119  
 feeding response  
 and brain calcium, \*1046  
 fetal development  
 and diet and growth hormone, \*189  
 galactose-fed  
 and nerve conduction defects, 295-300  
 gastrointestinal transport  
 and glucagon, \*983  
 genetically obese  
 and hyperinsulinemia and insulin resistance, \*888  
 and glibenclamide, \*55  
 and glucose oxidation  
 and diet and exercise, \*179  
 and glucose-U-C-14 and acetate 1-C-14 utilization for fat synthesis, \*770  
 heart  
 lipoprotein lipase, \*344  
 high protein fed  
 and liver gluconeogenesis, \*358  
 hyperammonemic  
 and glucose metabolism, \*184  
 and hyperglycemia  
 and aminophylline, \*775  
 hypo-, hyper-, and euthyroid  
 and ethanol and sorbitol metabolism, \*181  
 and hypothalamic stimulation  
 and plasma glucose, insulin, and glucagon, \*771  
 and insulin and proinsulin degradation, 1091-1100  
 and insulin secretion  
 and phentolamine, \*119  
 islets of Langerhans  
 adenyl cyclase and cyclic AMP phosphodiesterase, \*328  
 and alloxan and glucose, \*326  
 and ketone body metabolism, \*246  
 and kidney function  
 and diabetes, \*121  
 and liver gluconeogenesis  
 and glucose and insulin, \*371  
 and liver triglyceride biosynthesis  
 and pregnancy and sex steroids, \*365  
 mammary cell metabolism  
 and insulin, \*315  
 and microangiopathy, \*357  
 neonatal  
 and diet and exocrine pancreas development, \*186  
 newborn  
 brain glucose metabolism in, \*775  
 and noradrenaline or adrenaline and blood glucose and free fatty acid responses to catecholamines, \*912  
 obese  
 and insulin resistance and release, \*316  
 obese hyperglycemic  
 and pancreatic beta cell uptake of amino acids, \*772  
 pancreas islet structure, 536-537  
 and pancreatic hydrolases from birth to weaning, \*59  
 parabiotic  
 differential feeder for, \*983  
 plasma glucose and free fatty acids and sodium pentobarbital, \*836  
 and plasma tryptophan and insulin, \*909  
 and portacaval shunting  
 and glucose tolerance and serum immunoreactive insulin response, \*179  
 protein-deficient  
 and kidney cellular development in progeny of, \*1041  
 salivary glands  
 isoproterenol-stimulated, \*982  
 and serum triglycerides response to sucrose and age, \*835  
 streptozotocin diabetic  
 and U-C-14 glucose, xylitol, fructose, and sorbitol metabolism, \*122  
 and hyperphagia and polydipsia, \*358-359  
 and liver nuclear proteins, \*377  
 and urine glucolate, \*372  
 and tolbutamide  
 and insulin secretion and hypoglycemia, \*1125  
 and uremia  
 and insulin release, \*910-911  
 and ventromedial hypothalamic nuclei destruction  
 and glucose metabolism, \*1204-1205  
 and obesity, \*1206  
 Zucker "fatty"  
 and insulin and obesity studies, \*1123  
**RAYNAUD'S PHENOMENON**  
 and insulin response to glucose, \*837  
**RESPIRATION**  
 and ketotic diabetes, 264-267

---

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- RETICULOENDOTHELIAL SYSTEM**  
lipid metabolism and vascular clearance in dogs, \*312
- RETINA**  
blood flow  
in children of diabetics and prediabetics, \*354  
of diabetic monkeys, 1086  
glycosaminoglycans  
and alloxan diabetes, 1163-1166  
and microangiopathy, \*357
- RETINOPATHY, DIABETIC**  
and argon laser photocoagulation, \*189  
and bacteruria, \*118  
and blood platelet adhesiveness and aggregation, \*120-121  
and diabetes control program, \*382  
factors in progression of, \*187  
and hypophysectomy, \*349  
and pregnancy, 972-974  
in identical twins, \*321-322  
and plasma growth hormone levels, \*322  
and platelet aggregation, \*355
- REYE'S SYNDROME**  
and hypoglycemia, \*248
- RHESUS MONKEYS**  
and pregnancy  
and biliary lipids, \*912  
and plasma lipid levels, \*774
- RHINOCEREBRAL PHYCOMYCOSIS**  
and diabetes, \*185
- RNA**  
binding to hepatic ribosomes  
and insulin deficiency, 84-88  
and insulin action, 455  
-messenger  
and insulin and liver metabolism, 453  
pancreatic  
and diet in neonatal rats, \*186  
synthesis  
and fatty acid synthetase activity, \*914  
transfer-  
and insulin and protein synthesis, 449  
viruses, 714
- tRNA METHYLASES**  
regulation, \*253
- RP 22410. See Glisoxepid**
- RUBELLA**  
congenital  
and diabetes incidence, \*248-249
- S**
- SALICYLATES**  
and hypoglycemia, 959-960
- SALIVARY GLANDS**  
isoproterenol-stimulated  
and glucose metabolism, \*982
- SCHWANN CELL**  
and aldose reductase, 299
- SCINTIPHOTOSCANS OF PANCREAS,**  
\*351
- SECRETIN**  
and diuresis, \*769  
and insulin release  
and acromegaly, \*1118  
and pepsin secretion, \*250  
release, \*252  
and serum gastrin immunoassays, \*249
- SELENIUM SCAN**  
and insulinoma diagnosis, \*1206
- SELENOMETHIONINE**  
incorporation into apoprotein of plasma very-low-density lipoprotein, 744-752
- SEMINIFEROUS TUBULES**  
and diabetic impotence, 26
- SEMINOLES**  
diabetes survey among, \*776
- SEPHAROSE**  
-bound insulin  
and muscle, adipose tissue and cultured liver cells, \*335-336
- SEROTONIN**  
antagonists  
and insulin secretion, 779-787  
and insulin secretion in acromegaly, \*352  
and carbohydrate tolerance  
and insulin secretion, \*1200  
and insulin secretion, \*184, \*316
- SERUM**  
N-acetyl-beta-glucosaminidase  
and diabetes, 1168-1171  
antiglucagon  
in synthetic glucagon study, 844-855  
anti-insulin  
assays, \*769
- and enzyme histochemical studies of pancreatic islets, \*911  
and hyperglucagonemia, \*183  
and liver free fatty acid metabolism in dogs, 280-288
- betalipoproteins**  
and abetalipoproteinemia, \*60
- bound insulin  
and insulin antisera, 930-934
- cholesterol**  
and atherosclerotic disease, \*253  
cholesterol and triglycerides  
and caffeine, \*365  
and calcium, \*980  
creatine, sodium and potassium  
and acidosis diagnosis, 1110  
creatinine  
in Pima Indians, \*365-366
- free fatty acids**  
and weight reduction, 758  
free fatty acids and glucose  
and L-dopa, \*1121  
free fatty acids, insulin, and growth hormone  
and myocardial infarction, \*119  
gastrin immunoassays  
and secretin, \*249
- glucose**  
in *Mystromys albicaudatus*, 715-721  
glucose, ketones, immunoreactive insulin and free fatty acids  
and sodium beta-hydroxybutyrate, \*373-374
- glycoproteins**  
and diabetes, 863-870
- growth hormone and cortisol responses**  
to graded insulin infusions, \*379
- immunoreactive insulin**  
and age, \*183-184  
and exercise, 104  
in genetically obese rats, \*838  
in monkeys, 1078-1079, 1081  
in obese rats, \*1123  
and portacaval shunt, \*179  
response to glucagon, glucose and tolbutamide, \*121-122
- insulin**  
and arginine, 308-310  
and insulinoma, \*250  
in obese hyperglycemic mice, \*119  
and trauma, \*183
- insulin, cholesterol and triglyceride levels**  
in obese diabetics, \*361
- insulin and growth hormone**  
and arginine and glucose, \*316  
during oral glucose tolerance tests in children, 16-20

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- insulin responses  
 differences between mongrel and beagle dogs, \*356  
 and small-vessel disease, \*836  
 insulin response to glucose  
 and konnyaku ingestion, \*60  
 lipids  
 in "acatalasemic" mice, \*56  
 and atherosclerosis, \*253  
 and metformin, \*771  
 in monkeys, 1078-1079  
 nonsuppressible insulin-like activity, 271-278  
 osmolality  
 and galactose toxicity syndrome, \*315  
 and plasma osmolality, lactic acid values and, \*838  
 C-peptide and proinsulin, 1013-1025  
 phospholipids  
 and diabetes, \*123  
 proinsulin and insulin, \*347  
 protein  
 and diabetic microangiopathy, \*371  
 triglycerides  
 response to fructose, age and, \*835  
 and sucrose and glucose, \*58
- SEX**  
 and adipose tissue fat cell size and number, \*180  
 and blood glucose levels  
 and exercise, 89-99  
 and diabetic mortality, \*1044  
 and glucose tolerance tests in children, 19  
 and growth hormone secretion, \*774-775  
 and muscle capillary basement membrane changes, 883-896, 899-905  
 and serum glucose  
 in *Mystromys albicaudatus*, 718, 719, 720
- SEXUAL FUNCTION**  
 and diabetes, 23-28
- SHEEP**  
 renal glucose, free fatty acid and ketone body metabolism in, \*314
- SHOCK**  
 and fibrinolysis and peritoneal dialysis, \*913  
 hemorrhagic  
 and insulin release, \*364, \*982  
 traumatic  
 and glucose metabolism, \*1201
- SKIN**  
 bullous and atrophic lesions and diabetes, \*251  
 and diabetes  
 and hyperinsulinism, 733-743  
 fibroblasts  
 glucose oxidation in, \*360  
 and glucose metabolism  
 and insulin, \*189  
 glycosaminoglycans  
 and alloxan diabetes, 1163-1166  
 and lipid synthesis  
 and starvation, alloxan diabetes and insulin, \*189  
 psoriasis  
 and carbohydrate metabolism, \*250  
 toad  
 and proinsulin action study, \*57
- SLEEP**  
 growth hormone release during, \*913
- SMOKING**  
 and hypoglycemia, 961
- SODIUM**  
 extracellular  
 and glucose metabolism, 543  
 and insulin secretion, 570, 861  
 and pancreatic  $\alpha$ -amino isobutyric acid transport, \*181  
 transport  
 and proinsulin action, \*57
- SODIUM ACETATE**  
 incorporation into lipids of rat aorta and insulin, \*186
- SODIUM ACETATE I-C-14**  
 incorporation into rat aorta and insulin, \*186
- SODIUM BETA-HYDROXYBUTYRATE**  
 and insulin secretion, \*373-374
- SODIUM LINOLEATE**  
 and plasma free fatty acids, glucose, insulin and ketones, 1179-1184
- SODIUM PENTOBARBITAL**  
 and plasma glucose and free fatty acids, \*836
- SORBITOL**  
 brain synthesis  
 and cerebral edema during diabetic ketosis, \*180-181  
 and insulin release, 565  
 metabolism  
 in fasted and streptozotocin diabetic rat, \*122
- and hypo-, hyper-, and euthyroid rats, \*181  
 in nervous tissues  
 and blood sugar control, 1173-1178
- SORBITOL DEHYDROGENASE**  
 in human placenta, \*330
- L-SORBOSE**  
 intestinal uptake, \*249
- SPASMOLYTIC DRUGS**  
 and vein reactivity in diabetes, \*909
- SPLANCHNIC NERVE**  
 stimulation  
 and adrenalectomy, \*770
- SPRUCE**  
 temperate, \*773
- STARVATION**  
 and amino acid metabolism  
 during pregnancy, \*1118-1119  
 and carbohydrate, \*772  
 and diabetes treatment, 634  
 and fat and lactate metabolism  
 and insulin production, \*1045  
 and fetal metabolism, \*187  
 and glucagon secretion, \*331-332  
 and insulin and glucagon patterns, \*359-360  
 and insulin-induced hypoglycemia, 797-803  
 and jejunal mucosa enzymes, \*188  
 and ketone body metabolism, \*246  
 and kidney gluconeogenesis, \*910  
 and kidney sensitivity to mineralocorticoid and glucagon, \*334  
 and lipid synthesis in rat skin, \*189  
 and lipolysis  
 and iodinated insulin, \*55  
 and liver ketogenesis, 50-52  
 and liver metabolism  
 and glucagon:insulin ratio, \*341  
 and metabolism  
 in streptozotocin diabetic rats, \*122  
 and plasma and tissue amino acids, \*179  
 and postheparin lipolytic and monoglyceridase activities, \*54  
 and tissue and islet cyclic AMP levels, \*329
- STEROIDOGENESIS**  
 in isolated adrenal cells, \*983
- STEROIDS**  
 -induced diabetic ketoacidosis, \*54
- STREPTOZOTOCIN**  
 and beta cell membrane changes, \*326

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- and carbohydrate and lipid metabolism, \*59  
 and diabetic pregnant rats, \*316  
 and glucose metabolism  
     and insulin secretion, \*1200  
 -induced beta cell toxicity  
     and nicotinamide and pyridine nucleotides, \*325-326  
 -induced diabetes  
     and fetal and placental composition, \*315  
 and islet cell carcinoma  
     and "big" insulin, \*1204  
 and islet cell tumors  
     and plasma proinsulin, \*1204  
 and pancreatic beta cells, 77-78
- STREPTOZOTOCIN DIABETES**  
 and connective tissue changes in rats, 733-743  
 and glucose and fatty acid metabolism, \*909  
 and hyperosmolar diabetic syndrome  
     and ketogenesis, \*369-370  
 and hyperphagia and polydipsia  
     and adrenalectomy and hypophysectomy, \*358-359  
 and hypertriglyceridemia  
     and diet, \*353-354  
 and islet cell changes, 129-137  
 and kidney function, \*121  
 and liver mitochondria  $\alpha$ -oxoglutarate carboxylation, \*981  
 and liver nuclear proteins, \*377  
 in *Macaca nemestrina*  
     induced by pancreatic infusion, 138-141  
 and metabolism, \*122  
 and pyridine nucleotide depletion in pancreatic islets, 789-792  
 and urine glycolate, \*372  
 and ventromedial hypothalamic destruction, \*1043
- STRESS**  
 and glucose tolerance, \*184
- SUBMAXILLARY GLAND extirpation**  
 and glucose and insulin tolerance, 722-731
- SUCCINATE**  
 and amino acid metabolism, \*56
- SUCROSE**  
 and diabetes, \*770  
 dietary  
     and blood constituents and hepatic lipids, \*1202
- oral  
     and alimentary lipemia, \*58
- SUGAR**  
 and alloxan toxicity, \*123  
 and insulin release, 559-561, 570  
 transport  
     and biguanides, \*119
- SUGAR ALCOHOL formation**  
 and nerve conduction defects, 295-300
- SULFATION FACTOR**  
 and dwarfism, \*1046
- SULFONYLUREAS**  
 and blood sugar  
     and kidney failure, \*1120-1121  
 and chemical diabetes in children, 47  
 and diabetes treatment, \*120  
 glibenclamide, \*55  
 and hypoglycemic coma, 955-962  
 and insulin release, 160-161  
     and blood sugar, \*1120  
 and labeling laws, 833  
 pharmacodynamic aspects, \*249, \*249-250  
 and plasma glucagon suppression, 216-223  
 -response test, \*913
- SURGERY**  
 adipose tissue resection  
     and diabetes and hyperinsulinism of symmetric lipomatosis, 13-15  
 adrenalectomy  
     and insulin response to hemorrhagic shock, \*364  
     and splanchnic nerve stimulation, \*770  
 and adrenalectomy and hypophysectomy  
     and diabetic hyperphagia and polydipsia, \*358-359  
 and bladder dysfunction, \*364  
 femorotibial bypass  
     and diabetes, \*322-323  
 for gangrene, \*187  
 gastrectomy  
     and intestinal glucagon and insulin responses, \*1047  
 gastric  
     and glucose homeostasis, \*1199  
 and glucagon secretion, \*313  
 hypophysectomy  
     during diabetic pregnancy, 972-974  
     and diabetic retinopathy, \*349  
     and glucagon secretion, \*375
- and tolbutamide and glybenclamide injections, \*378-379  
 and islet cell adenomas  
     and blood glucose and plasma immunoreactive insulin assays during, \*185
- pancreatectomy  
 in baboons, \*338  
     and glucose turnover, \*382-383  
 pancreatectomy and hypophysectomy  
     and diabetic ketosis in rats, 946-954  
     and liver 3-hydroxybutyrate dehydrogenase, \*184-185  
 pancreateoduodenectomy  
     and hypoglycemia following pregnancy, \*188  
 parathyroidectomy, \*773  
 partial pancreatectomy  
     and glucose tolerance and insulin response, \*339  
 portacaval shunt, \*179  
 and serum insulin levels, \*183  
 submaxillary gland extirpation  
     and glucose and insulin tolerance, 722-731  
 ventromedial hypothalamic destruction, \*1043  
     and glucose metabolism, \*1204-1205  
     and obesity, \*1206
- SYNALBUMIN, 714**

## T

- TEMPERATURE**  
 and cholesterol turnover, \*314  
 and insulin secretion, \*312-313  
 and liver enzymes activities, \*58
- TESTES**  
 and diabetic impotence, 25-26
- TESTOSTERONE**  
 and rat prostate hexokinase, \*185
- $\alpha$ -THALASSEMIA**  
 and fetal pancreas, \*253-254
- THEOPHYLLINE**  
 and calcium metabolism, \*327  
 and glucose stimulated insulin release, 559-560, 561  
 and insulin response, 1  
     in *acomys cahirinus*, 1065, 1069-1070  
 and islet cell adenoma cyclic AMP content, \*346-347  
 and norepinephrine  
     and cyclic AMP, 416-417

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## SUBJECT INDEX 1972

- and plasma insulin responses  
in subhuman primate fetus and neonate, \*180
- THROMBIN**  
and fatty acid metabolism, \*312
- THYROID FUNCTION TESTS**, 1012
- THYROID GLAND**  
and ethanol and sorbitol metabolism, \*181  
and glibenclamide, \*55  
and thyrotoxicosis  
and insulin secretion and glucose utilization, \*370-371
- THYROIDITIS**  
methyl-cholanthrene-induced and spontaneous  
and autoimmunity studies, \*253
- HYROTOXIC PERIODIC PARALYSIS**  
and immunoreactive insulin, \*1047
- THYROXINE**  
and insulin secretion, \*253  
and rat fatty liver, \*183
- TISSUE**  
adipose. *See* Adipose tissue  
amino acids  
and starvation, \*179  
and ammonia production, \*1203  
connective  
and diabetes and hyperinsulinism, 733-743  
cyclic AMP levels  
and insulin, 426  
and starvation, \*329  
epididymal fat pads  
enlargement modes, \*247  
glycosaminoglycans  
and alloxan diabetes, 1162-1166  
and jet insulin injections, 41-42  
liver  
metabolic response to injury, \*315  
liver plasma membranes  
and insulin, \*384-385, \*1200  
mouse diaphragm  
DNA content, \*184  
nervous system  
and blood sugar control, 1173-1178  
rat adipose tissue and muscle  
phosphofructokinase, \*363  
rat diaphragm  
insulin-like activity bioassays, 272-273  
rat diaphragm and epididymal fat pads  
and insulin and proinsulin, 935-938
- rat epididymal fat pads  
protein synthesis studies, \*1119  
testicular  
and diabetic impotence, 24-28
- TISSUE CULTURES**  
of isolated islets, 546-553
- TOADFISH**  
islets  
and pyridine nucleotide, \*983
- TOLBUTAMIDE**  
and adenyl cyclase activation in islet cell adenoma, \*912  
and 6-aminonicotinamide, \*1198  
anti-lipolytic action, \*836  
blood clearance  
and alcoholism, \*983  
dosage  
in UGDP study, 1037-1038  
and forearm metabolism, \*1206  
and hyperglycemia  
and arterial disease, \*122-123  
hyperresponsiveness to  
and diazoxide pretreatment, \*360  
and hypophysectomized dogs, \*378-379  
-induced hypoglycemia  
and hyperparathyroidism, \*773  
-induced insulin release, 989  
and cytochalasin B., \*327  
and iodacetate and antimycin A., \*56  
and propranolol, \*122  
in rat islets, \*1205  
and insulin immunoreactivity, \*313  
insulin response to  
and diethylstilbestrol and growth hormone, \*378  
and insulin response to glucose, 684  
and insulin secretion, \*55, \*370  
and blood sugar, \*1120  
and hypoglycemia, \*1123  
and islet cell adenoma cyclic AMP content, \*346-347  
and labeling laws, 833, 1116-1117  
and lipolysis and cyclic AMP in white fat cells, \*835  
and liver cirrhosis  
and insulinemia, \*121-122  
and microangiopathy, \*357  
and pancreas islet cell electrical activity in response to, \*345  
pharmacodynamic aspects, \*249, \*249-250  
and plasma glucagon, 216-223  
plasma insulin response to  
and diabetes, 1012  
response  
and diazoxide, \*311
- UGDP study of, 976-978, 1036-1037
- TOLBUTAMIDE TEST**  
and insulinoma, \*250, \*1206
- TOLINASE**  
and lactic acid levels  
and anoxia and exercise, \*351
- TRANSPLANTATION**  
of fetal rat pancreas into maternal hosts and insulin content study, 193-201  
kidney  
and diabetes, \*322  
of pancreas  
and diabetes, \*355
- TRAUMA**  
and liver metabolism, \*315
- TRIGLYCERIDES**  
long-chain  
and insulin secretion, 923-928  
synthesis  
and ethanol, \*769-770  
and insulin, \*351-352  
and ketogenesis, \*1203
- TRYPSIN**  
and fat cell lipolysis, 423  
-treated fat cells  
and insulin degradation, 409
- TRYPTOPHAN**  
-insulin complex  
isolation of, \*1045
- TUBERCULOSIS**  
and diabetes, 634
- TUCO-TUCO**  
diabetic syndrome in, \*1205
- TUMORS**  
adrenal  
and Cushing's syndrome in infancy, \*120  
beta cell, 535  
catecholamine-secreting  
and glucose intolerance, \*838  
endocrine adenomatosis  
and familial neosidioblastosis, \*1122  
fibrosarcoma  
insulin-like activity in, \*352-353  
and glucose metabolism  
and insulin secretion, \*1200  
and hypcholesteremic drugs in mice, \*837
- insulinoma  
diagnosis, \*1206  
and glycolytic enzymes, \*773

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

SUBJECT INDEX 1972

- islet cell  
 and blood proinsulin-like components, 665  
 and cyclic 3'5' AMP formation and degradation, \*185  
 and hypoglycemia, \*248  
 immunoreactive glucagon in, \*333  
 and insulin and glucose patterns, \*250  
 and plasma proinsulin, \*1204  
 proinsulin content, 675-676  
 and proinsulin-like component of insulin, \*313  
 and surgery, \*185  
 islet cell adenomas  
 and adenylyl cyclase activation by glucagon and tolbutamide, \*912  
 and effects of glucose, glucagon, tolbutamide and theophylline on cyclic AMP content of, \*346-347  
 and surgical procedures, \*185  
 in obese mice  
 and lipid mobilization and food uptake, \*774  
 pancreatic  
 insulin-secreting, \*1120
- TWINS  
 and chemical diabetes study, 45  
 identical  
 and diabetic retinopathy, \*321-322
- TYROSINE AMINO TRANSFERASE  
 and cyclic AMP  
 and insulin, 439-445
- U**
- UMBILICAL CORD  
 glucose  
 and infant hypoglycemia, \*1202-1203
- UNIVERSITY GROUP DIABETES PROGRAM, \*57  
 evaluation of, 976-978, 1035-1039  
 and labeling laws for oral hypoglycemic drugs, 1116-1117
- UREMIA  
 and carbohydrate tolerance, 1109-1114  
 and experimental diabetic ketosis, \*121  
 and insulin release, \*910-911
- UREOGENESIS  
 and cyclic AMP  
 and insulin, 442-443
- URIC ACID  
 excretion  
 and nicotinic acid, \*313
- URINE  
 catecholamines  
 and ouabain, \*913  
 epinephrine and norepinephrine  
 and idiopathic hypoglycemia, \*1200  
 glycolate  
 and streptozotocin diabetes, \*372  
 17-ketosteroid excretion  
 and diabetic impotence study, 24  
 sodium and potassium  
 and growth hormone, \*1046  
 tests  
 and lipoatrophic diabetes, 830
- UTERUS  
 relaxants  
 and hyperglycemia, \*1045
- V**
- VASCULAR DISEASE  
 and blood glucose control, 976-978  
 and diabetes, 678-683  
 and blood coagulation, 108-112  
 and combined hyperlipoproteinemia, \*376  
 and insulin, 633  
 and serum phospholipids, \*123  
 and diabetes duration, \*314  
 and oral hypoglycemic agents, \*57  
 peripheral  
 and insulin response to glucose, \*836-837  
 and insulin response studies, \*836
- VASCULAR SYSTEM  
 aorta  
 glycosaminoglycans, 1163-1166  
 clearance  
 and reticuloendothelial system in dogs, \*312  
 and disseminated intravascular coagulation  
 and diabetes, 108-112
- VASOPRESSIN  
 action  
 and cyclic AMP, \*251  
 and antidiuretic action of chlorpropamide, \*189
- VEIN  
 reactivity  
 and diabetes, \*909
- VENOPATHY, DIABETIC, \*909
- VINBLASTINE  
 and insulin release, 989-991, 996-997
- VIRUSES**  
 and diabetes, 713-714  
 encephalomyocarditis  
 and mouse pancreas, \*338-339  
 and insulin in late-onset diabetes, 766-767
- VITAMINS**  
**B**  
 and hemoglobin synthesis, \*311  
**K**  
 and resistance to oral anticoagulant drugs, \*183
- W**
- WEIGHT. *See also* Body, weight; Obesity  
 gain  
 and high-fat diet, \*182  
 loss  
 and calorie restriction in obese hyperglycemic mice, \*835  
 and insulin sensitivity, 6-11  
 and low calorie diet with anorectic agent, \*361  
 reduction  
 and adipose tissue lipolysis and cellularity, 754-760  
 and phenformin, \*362  
 and serum glucose  
 in *Mystromys albicaudatus*, 718, 719, 720
- X**
- XANTHOMA  
 and familial hypercholesterolemia, \*1121
- X-IRRADIATION  
 and mortality and longevity in mice, \*914
- XYLITOL  
 absorption  
 in healthy men, \*350-351  
 and insulin release, 561, 565  
 and diabetes and obesity, \*187-188  
 metabolism  
 in fasted and streptozotocin diabetic rat, \*122  
 and pancreas metabolism, 562-564
- D-XYLOSE  
 excretion  
 and metformin, \*771  
 transport  
 and biguanides, \*119
- Z**
- ZINC  
 and insulin, 487-489, 497-498, 509, 570

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

# AUTHOR INDEX 1972

In this index are the names of authors of articles that have appeared in *DIABETES* and those whose articles have been abstracted in the Journal during 1972. Entries marked with an asterisk (\*) indicate authors of material that appeared in the *ABSTRACTS* only. The Subject Index appears on page 1.

## A

- Abe, Hiroshi, 203-208  
 Abildgard, F., \*769  
 Abrams, M. E., \*980, \*1047  
 Ackerman, Eugene, \*775, \*836  
 Adams, Donald A., \*349  
 Adams, Yvonne L., \*179  
 Adelman, Neil, 1-5  
 Adibi, Siamak A., \*179  
 Adnitt, P. I., \*187, \*771  
 Agot, H., \*912  
 Ahlborg, Gunvor, \*776  
 Ahrens, E. H., Jr., \*1200-1201  
 Ahrens, Richard A., \*179  
 Aiach, M., \*776  
 Åkerblom, Hans K., \*349-350  
 Alavi, Iltifat, A., \*54  
 Alberti, K. G. M. M., \*59, \*350, \*1117  
 Alexander, James K., \*980  
 Alexander, Kenneth R., \*1123  
 Allen, Lindsay H., \*1041  
 Allen, Michael, \*772  
 Alpert, Joseph S., \*769  
 Alric, R., \*912  
 Alvarez, Enrique, \*359  
 Amherdt, Mylene, \*326, \*346, 1060-1071  
 Ammon, H. P. T., 143-148, \*350, \*365,  
     \*1198, \*1205  
 Amsterdam, Daniel, \*338-339  
 Andersen, Dana K., \*252  
 Andersen, O., \*769  
 Anderson, James H., Jr., \*311  
 Anderson, James W., \*188  
 Anderson, P. A., \*352  
 Andersson, Arne, 546-554  
 Andres, Reuben, \*347  
 Ansah, B., \*1204  
 Antoniades, Harry N., 930-934, \*1123  
 Aoki, T., \*323  
 Aranda, J. V., \*185  
 Arieff, Allen, \*774  
 Arky, Ronald A., \*54, \*334, \*772  
 Arons, Daniel L., \*54

- Asano, T., \*350-351  
 Ashcroft, Stephen J. H., 538-545  
 Ashkar, F. S., \*351  
 Ashmore, James, 426-427, 453, \*982  
 Assal, J.-Ph., \*179, \*323, \*361-362, \*366  
 Assan, Roger, 843-855, \*1120  
 Assemany, Salma R., \*1042  
 Atkin, E., 149-156  
 Atkins, T., \*179  
 Avruch, Joseph, \*1042  
 Avruskin, T. W., \*381  
 Azumi, Kazuo, \*776

## B

- Bagdade, John D., 65-70  
 Bagul, C. D., \*351-352  
 Baker, David H., \*771  
 Baker, Lester, \*189  
 Baker, Nome, \*914  
 Baker, R. W. R., 1173-1178  
 Balasse, Edmond O., 280-288  
 Baldwin, R. L., \*315  
 Ball, Michael F., \*1118  
 Balodimos, Marios C., \*118, \*769  
 Barbezat, Gilbert O., \*769  
 Barbier, P., \*123  
 Baroja, Isabel M., 289-294, \*837-838  
 Barter, Philip J., \*835  
 Bassett, John M., 538-545  
 Batalla, M. A., \*118  
 Batchelder, Timothy, \*372  
 Bates, Margaret W., \*246  
 Battaglia, Frederick C., \*187  
 Bauer, G. Eric, \*58-59  
 Bayley, T. J., \*773  
 Beall, Robert J., \*983  
 Beard, Alice, \*179-180  
 Beaser, S. B., \*370  
 Becker, Kenneth L., \*328-329, \*375-376  
 Begin-Heick, Nicole, \*912  
 Behrens, Otto K., viii Supplement 2, 685  
 Beisel, W. R., \*316

- Beitch, Janis, 506-508  
 Beliore, Francesco, 1168-1172  
 Bender, S. A., \*1046  
 Bengtsson, Calle, \*180  
 Bengtsson, Kristina, \*1198  
 Bennet, G. Vann, \*1042  
 Bennett, Peter H., \*180, \*365-366  
 Benson, Bryant, 935-938  
 Berenson, Gerald S., 733-743  
 Bergan, J., \*355  
 Bergman, E. N., \*118, \*314  
 Berkowitz, Stuart, \*980  
 Berman, Mones, \*347  
 Bernardis, Lee L., \*771, \*1043, \*1204-  
     1205  
 Bernick, Sol, \*248  
 Bernstein-Hahn, L., 23-30  
 Berridge, Michael J., \*315  
 Best, Charles H., 385-395  
 Bewsher, Peter D., \*186  
 Beyer, J., \*249, \*249-250  
 Beyer, W. R., \*370  
 Bhai, Idrees, \*311  
 Bhatia, S. K., \*365  
 Bhawanji, Jain, \*359-360  
 Bianchi, R., \*376  
 Bianchine, Joseph R., \*1121  
 Bianco, Jesus A., \*118-119  
 Bier, Dennis M., 280-288  
 Bierman, Edwin L., 65-70, \*342, \*380  
 Binkiewicz, A., \*377  
 Bitensky, Mark W., \*80, \*981, \*1117-  
     1118  
 Bitsch, Vibeke, \*186-187, \*1045  
 Bivens, C. H., \*352  
 Björntorp, Per, \*54, \*180, \*312-313, \*771,  
     \*909  
 Black, W. L., \*367  
 Blackard, William G., \*187, \*188, 311,  
     \*360  
 Blanks, M. C., \*337-338  
 Block, Marshall B., 661-672, 1013-1026  
 Blohmé, Göran, \*180

## DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

AUTHOR INDEX 1972

Blondel, B., \*346, \*368  
 Bloodworth, J. M. B., Jr., \*321, \*352  
 Bloom, A., \*120-121  
 Bloom, Gail, \*346-347  
 Blum, André L., \*54  
 Blumenthal, Stanley A., \*180-181, \*1205  
 Blundell, T. L., 492-505  
 Boberg, J., \*316  
 Boder, George B., 535-537  
 Bomboy, J. D., \*332, \*340-341  
 Bommer, G., \*911  
 Bonar, J. R., \*352-353  
 Boquist, Lennart, 1051-1059  
 Borchers, Raymond, \*980-981  
 Borek, Ernest, \*253  
 Borensztajn, J., \*344  
 Borin, Bruce M., \*837  
 Borner, E., \*769  
 Borowitz, J. L., \*184  
 Bortz, W., \*375  
 Boshell, B. R., \*351-352, \*371  
 Breur Richard I., \*1199  
 Boucher, B., \*1047  
 Boulanger, M., \*357  
 Boulter, Philip R., \*334  
 Boveris, A., \*184-185  
 Bowen, V. R., \*328-329  
 Bowers, Mary, \*325  
 Bradley, R. F., \*118  
 Brancato, Paul, \*338-339  
 Brandenburg, Dietrich, 468-475  
 Brange, J., 649-656  
 Braun, Theodor, \*60  
 Bravo, Ivan R., \*180  
 Bray, George A., \*838, \*1206  
 Bressler, Rubin, 713-715  
 Breur, Richard I., \*1199  
 Bricaire, H., \*775-776  
 Brickman, Fred, 733-743  
 Bridgeman, J. F., \*769  
 Birdgen, W. D., \*120-121  
 Brisson, Guy R., \*119, \*326-327, \*1042  
 Brock, Frances E., \*58  
 Bromer, William W., 485, 509  
 Brooks, Mary R., \*914  
 Brophy, P. D., \*1046  
 Brown, Joseph D., \*835, \*1045  
 Brunfeldt, K., \*769  
 Brunzell, John D., \*342, \*348  
 Brush, James S., \*122  
 Bruylants, J., \*59  
 Bryant, Gillean M., \*910  
 Buber, V., \*1119  
 Buchanan, Keith D., \*1122, \*1206  
 Buckman, M., \*1043  
 Burch, Thomas A., \*180  
 Burgess, J. A., \*248-249  
 Burkle, P. A., \*246

Burns, T. W., 89-100  
 Burr, I. M., \*246  
 Burrill, Karen C., \*982  
 Buse, John, \*911  
 Buse, Maria G., \*911  
 Buselmeier, T. J., \*322  
 Bussey, Dietrich, \*248  
 Butcher, Fred R., \*54  
 Butt, J., \*250-251  
 Butterfield, W. J. H., \*980  
 Buzzi, Alfredo, \*359  
 Byrd, Gerald W., \*311

C

Caccamo, Anna, \*312  
 Cahill, George F., Jr., 703-712  
 Camanni, F., \*122  
 Camerini-Davalos, R. A., \*321, \*373  
 Cameron, Donald P., 1060-1071  
 Campbell, G. D., \*250  
 Camus, J., \*59  
 Canary, John J., \*1118  
 Canever, J. V., \*120-121  
 Canfield, Robert E., \*835  
 Canivet, J., \*838  
 Cantrell, Jerald W., 872-880  
 Car, Joseph R., \*358-359  
 Caren, Raymond, \*311-312  
 Carlson, L. A., \*316, \*980  
 Carnelutti, Margherita, \*312  
 Carrera Vescio, L., \*253  
 Carroll, Carthage J., \*366-367  
 Carroll, Kevin F., \*835, 923-929  
 Carter, Edward A., \*769-770  
 Carter, James R., Jr., \*1042  
 Caspary, W. F., \*119  
 Cassar, J., \*1199  
 Castillo, E. J., \*184-185  
 Castillo, L., \*775  
 Castleman, Benjamin, \*1042  
 Cavalli-Sforza, L. L., \*1045-1046  
 Cederquist, Dena, \*983  
 Celener, David, \*359  
 Celik, Ziya, \*364  
 Cerasi, Erol, 224-234, \*312, \*323-324,  
     685-694, \*770  
 Cerchio, Gerard, \*982  
 Cerletty, James M., \*773  
 Chabot, V., \*1119  
 Chance, Ronald E., 461-467, 657-660  
 Chandler, Michael L., \*353  
 Chang, M. L. W., \*770  
 Chao, Ping-Yu, \*353  
 Chapal, J., \*1045, \*1120  
 Chapman, Betty B., \*837  
 Charles, M. Arthur, \*327

Chase, G. R., 89-100  
 Cheek, Donald B., \*1201  
 Chen, S., \*344  
 Chernick, Sidney S., 946-954  
 Cherrington, A., \*382-383  
 Cherry, Thomas, \*1204  
 Chevalier, M., \*835  
 Chez, Ronald A., 39-44, \*180  
 Chick, William L., \*1120  
 Chisholm, D. J., \*1118  
 Chiumello, Giuseppe, \*312  
 Chlouverakis, C., \*119, \*353-354, \*835  
 Chochinov, Ronald H., \*341-342, \*1199  
 Chow, Kye-Wing, \*835-836  
 Christacopoulos, P. D., \*354  
 Christensen, Halvor N., \*55-56  
 Christiansen, Aa. Hein, 649-656  
 Christlieb, A. Richard, \*354-355  
 Christophe, J., \*59, \*119, \*182  
 Cibeira, Jose B., \*359  
 Clancy, Barbara A., \*983  
 Clark, Charles M., Jr., 946-954  
 Clayton, Barbara E., \*119-120  
 Clements, Rex S., Jr., \*180-181, \*330  
 Clifford, A. J., \*184  
 Clough, G., \*913  
 Cloutier, Mark D., \*982-983  
 Cochlin, Alan, \*982  
 Coddling, J. C., \*339, \*1204  
 Coffman, Jay D., \*769  
 Cohen, A. M., \*770  
 Cohn, Major L., 39-44  
 Cole, Harold S., 16-22  
 Colinas, Rodolfo, \*359  
 Colle, E., \*185  
 Collipp, Platon J., \*366  
 Colwell, A. R., Jr., 209-215  
 Colwell, Arthur R., Sr., 839  
 Colwell, John A., 13-15, 108-113, \*355  
 Colwill, James R., \*187  
 Conly, Patricia, 175-177  
 Conn, Jerome W., \*55-56, 216-223, \*322,  
     \*324, \*331-332, \*837, \*1204  
 Constam, G. R., \*120  
 Conway, Martin, \*1043  
 Corbo, Lucille, \*311-312  
 Corkey, B. E., \*344-345  
 Cornblath, Marvin, \*179-180, \*181  
 Cornell, Robert P., \*312  
 Corredor, D. G., \*250  
 Costrini, Nicholas V., \*773  
 Court, J. M., \*1042-1043  
 Cowan, Donald H., 906-907  
 Cragan, Mary, \*1200  
 Craig, James W., \*56  
 Craig, L. S., \*254  
 Craighead, John E., \*247  
 Crawford, John S., \*182

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

AUTHOR INDEX 1972

Cremer, Guillermo M., \*836  
 Crespin, Stephen R., 1179-1184  
 Creutzfeldt, W., \*119  
 Crofford, Oscar B., \*332, \*335, \*340-341,  
 403-413  
 Crowley, Leo, \*773  
 Cruz, Sidney R., 13-15, \*355  
 Cryer, Philip E., \*181  
 Cuatrecasas, Pedro, 396-402, \*772,  
 \*1042  
 Cummings, Nancy P., \*355-356  
 Cunningham, E. J., 89-100  
 Curry, Donald L., \*55  
 Cutfield, J. F., 492-505  
 Czech, Michael P., \*336-337  
 Czerwinski, C., \*356, \*360-361  
 Czyzyk, Artur, \*121-122, \*909

**D**

Daggett, Willard M., \*118-119  
 Daikuhara, Yasushi, \*1122  
 Dalferes, Edward R., 733-743  
 D'Andrea, R. J., \*314  
 Daniel, P. M., \*247  
 Danowski, Thaddeus S., \*250, \*314,  
 \*1118  
 Dashe, Alfred M., \*349  
 Davenport, Katherine, \*378  
 Davidoff, Frank, \*367, \*376-377  
 Davidson, Mayer B., 6-12, \*335-336  
 Davis, Barbara H., \*328-329, 1173-1178  
 De Oya, Manuel, \*55  
 De Santis, R. A., \*356, 360-361, \*775  
 Deconinck, J. F., \*120  
 Deisseroth, Albert, \*376-377  
 Del Greco, F., \*355  
 Del Guercio, M. José, \*312  
 Delcher, H. K., \*336-337  
 Demers, Laurence M., 1185-1191, \*1199  
 DePalma, Ralph G., 257-270  
 Deren, Julius J., \*249  
 derKinderen, P. J., \*1046  
 Deschadt-Lanckman, M., \*59  
 Devetta, Mario, \*312  
 Devrim, Ahmet Sevim, \*356  
 Dhawer, V. P. S., \*250  
 DiGirolamo, Mario, \*247, 1151-1161  
 Diaz-Fierros, Maruxa, 289-294, \*837-838  
 Dilling, Louis A., \*1119  
 Dilman, V. M., \*55  
 Distefano, G., \*316  
 Ditzel, J., \*1120  
 Dixit, Padmakar K., \*363-364  
 Dobbie, J., \*355  
 Dodson, E. J., 492-505  
 Dodson, G. C., 492-505

Dolger, Henry, \*376  
 Domanski, Robert, \*247  
 Donabedian, Richard, \*312  
 Dornhorst, Ann, \*247-248  
 Dorris, Susan, \*57  
 Doyle, Richard E., 715-721  
 Drash, Allan L., 45-49, \*60  
 Dreizen, Samuel, \*248  
 Driscoll, John M., Jr., \*837  
 Drummond, Gladys D., \*769-770  
 Du Boistesselin, R., \*357  
 Duckworth, William C., \*122, \*355, \*356,  
 935-938  
 Duld, R. James, \*333-334, \*357  
 Duga, Judith, \*369-370  
 Duhault, J., \*357  
 Dunbar, J. C., \*344  
 Dunlop, Marjorie, \*1042-1043  
 Dupre, John, \*374-375  
 Dymock, I. W., \*1199

**E**

Earley, L. E., \*189  
 Eaton, R. Phillip, \*55, \*357, 744-753,  
 \*1043  
 Eckel, Robert E., \*56  
 Edelstein, Diane, \*56  
 Edwards, A. V., \*770  
 Edwards, Charles C., 1116-1117  
 Edwards, J. C., \*909  
 Efendic, Suad, 224-234, \*312, \*770  
 Egdaal, Richard H., \*364, \*775  
 Ehrenreich, T., \*373  
 Ehrlich, Edward N., \*57  
 Eichner, Harvey L., \*358  
 Eisenstein, Albert B., \*358  
 Ekaphanich, Sompob, \*1122  
 Ekholm, R., \*120, \*251-252  
 El-Khodary, Ashraf Z., \*1118  
 Ellerman, Jeanette, \*328, 555-569  
 Ellis, Robert A., 506-508  
 Elsa, Louis J., \*248  
 Empey, G., \*1204  
 Ensinck, John W., \*333-334, \*357  
 Epel, Rosa, 16-22  
 Epple, August, \*358-359  
 Ericson, L. E., \*120, \*251-252  
 Erlich, R. M., \*248, \*254  
 Essner, Edward, \*56  
 Ettinger, Bruce, \*189  
 Etzwiler, Donnell D., 967-971  
 Evans, D. J., 114-116  
 Evans, G. W., \*1043  
 Exton, J. H., \*254, \*339-340, 439-446  
 Ezekiel, M., \*775

**F**

Fabre, J., \*1120-1121  
 Fabre, L. F., Jr., \*313  
 Faerman, Isaac, 23-30, \*359  
 Fagerberg, S.-E., \*981  
 Fahlén, Martin, \*312-313, \*771, \*909  
 Fain, John N., 414-425, \*836  
 Fajans, Stefan S., \*55-56, 216-223, \*322,  
 \*324, \*331-332, 678-684, \*1204  
 Falch, Dagfinn, 939-945  
 Falloona, Gerald R., \*58, \*183, \*912-913,  
 \*1198-1199  
 Falorni, Adriano, \*1199-1200  
 Fariss, Bruce L., \*1047  
 Farmer, R. W., \*313  
 Farquhar, John W., \*372, \*380, \*1121  
 Fatourechi, Vahab, \*1203  
 Federlin, K., \*246  
 Fekete, M., \*1120  
 Felber, J.-P., \*1119  
 Feldman, Jerome M., \*184, \*248, \*252,  
 \*315-316, \*345, \*352, \*370-371, 779-  
 788, \*1200  
 Felig, Philip, 308-310, \*323-324, \*770,  
 771, \*776, \*1118, \*1202  
 Feller, D. D., \*836  
 Felts, James M., \*188  
 Felts, P. W., \*332, \*340-341  
 Feng, Louise Y., \*1201  
 Fernbach, Donald J., \*1119  
 Fernstrom, J. D., \*909  
 Ferris, Deward O., \*185  
 Fertel, Richard, \*359  
 Fertig, John W., \*247  
 Field, James B., \*346-347, \*980  
 Filer, L. J., Jr., \*315  
 Fineberg, S. Edwin, \*342-343, \*372,  
 \*774-775  
 Fink, C. Joan, 987-998  
 Fink, Gloria, \*329, \*359-360  
 Fischer, Edward P., \*1201  
 Fischer, Lawrence J., 71-79  
 Fischer, M., \*918  
 Fischer, U., \*909, \*911  
 Fisher, Edwin R., \*1118  
 Flatt, J. P., 50-52  
 Fleischman, D. E., \*838  
 Fleming, Gary A., \*181  
 Floyd, John C., Jr., \*55-56, 216-223,  
 \*322, \*324, \*331-332, \*1204  
 Foà, P. P., \*313, \*344  
 Foglia, V. G., \*253  
 Folling, I., 814-826  
 Fono, Peter, \*188  
 Forfang, Kolbjorn, 939-945  
 Forrest, E., \*1205-1206  
 Forrest, Jill M., \*248-249

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

AUTHOR INDEX 1972

Forsham, Peter H., \*332-333, \*358, \*982, \*1045  
 Forster, Harald, 1102-1108  
 Foster, Daniel W., \*1203  
 Foster, Richard O., 703-712  
 Fox, Dora, 23-30, \*359  
 Fox, Orlando J., 157-162, \*1044  
 Fracassini, Francesco, \*1199-1200  
 Frank, B. H., 486-491  
 Frayn, K. N., \*771  
 Fredholm, Bertil B., \*836  
 Fredrickson, Donald S., \*1044-1045  
 Freedlender, Arthur E., \*183-184  
 Freinkel, Norbert, \*340  
 Fremstad, Dag, 939-945  
 French, Frank S., \*1122  
 Fresquez, Vidal, \*982  
 Frey, Harald M. M., 939-945  
 Freychet, Pierre, \*334-335, 673-677, \*909-910, \*1200  
 Freytag, G., \*911  
 Friedmann, N., \*254  
 Fritsch, John M., 506-508  
 Froesch, E. R., \*122  
 Frohman, Lawrence A., \*771, \*1043  
 Frost, Philip, 794-796  
 Fuchs, F. S., \*913  
 Fujimoto, Wilfred Y., \*329, \*345-346, \*360  
 Furnelle, J., \*182  
 Furner, R. L., \*836  
 Fussgänger, Rolf D., \*313, 1072-1076

**G**

Cabbay, Kenneth H., 295-300, \*327, \*838  
 Gabbe, Steven G., 1185-1191, \*1199  
 Gabbiani, Giulio, \*314  
 Gagliardino, J. J., \*184  
 Calloway, John A., 637-648, 657-660  
 Gapp, D., \*370  
 Garaza Pereira, A. M., \*184-185  
 Garcia, Angel R., \*360  
 Garcia, Mariano J., \*356, \*360-361, \*375  
 Gardiner, Robert J., 946-954  
 Gardner, Lytt I., \*1042  
 Garner, Ann M., \*1204  
 Garratt, C. J., \*980  
 Gary, A., \*1046  
 Gatewood, Laël C., \*836  
 Gattner, Hans-Gregor, 468-475  
 Gaut, Z. N., \*313  
 Geever, Erving, \*773-774  
 Gentz, J., \*179-180  
 Genuth, Saul M., 1003-1012  
 Georg, Ralph H., \*56  
 George, Jack M., \*381-382, \*771

Gepts, W., \*120, \*253-254  
 Gerich, John E., \*332-333  
 Gerneth, J. A., \*314  
 Gerritsen, G. C., \*337-338  
 Gershberg, Herbert, \*361  
 Gerschenson, Lazaro E., \*335-336  
 Gertner, Melvin, \*366  
 Ghazarian, Hagop G., \*980-981  
 Gilchik, Margaret W., \*836, \*836-837  
 Gibson, G. E., \*184  
 Gillette, Paul C., \*1119  
 Gingell, Robert L., \*181  
 Ginsberg-Fellner, Fredda, \*361, 754-761  
 Giombetti, Robert, \*120  
 Gipstein, Robert M., \*349  
 Girgis, Medhat, \*369-370  
 Glasgow, Joseph L., \*352  
 Gleason, Ray E., \*354, \*361-362, \*366, \*373, \*383, \*1044-1045  
 Glennon, Joseph A., \*362  
 Glick, Seymour M., 1-5  
 Glocer, Leticia, \*359  
 Glueck, Charles J., \*1043  
 Goberna, Raimundo, \*313  
 Goeken, James A., \*1043  
 Goetz, F. C., \*322, \*350-351  
 Gold, Ernest M., \*378  
 Goldberg, M. D., \*250  
 Goldberg, Paul, \*364  
 Goldfischer, Sidney, \*56  
 Goldman, Jack K., \*1043, \*1204-1205  
 Goldman, Roger B., \*771  
 Goldstein, Jack, \*1120  
 Goldstein, Joseph L., \*1121  
 Gomez, F., \*1119  
 Gonzalez, Alejandro R., \*250, \*1118  
 Goodall, McChesney, \*1200  
 Goodman, H. Maurice, \*59-60  
 Goodman, Michael N., \*341, \*343  
 Goodner, Charles J., \*362-363, \*1200  
 Gorden, Phillip, \*313, 673-677, \*909-910, \*1043-1044  
 Gordon, Edwin E., \*369-370  
 Gordon, Hymie, \*771  
 Gordon, Walter, \*771  
 Goren, Elihu N., \*185  
 Gorman, Ronnie E., \*180, \*981, \*1117-1118  
 Gossel, Thomas A., 80-83  
 Gotlin, Ronald W., \*250  
 Gourgon, R., \*838  
 Graber, George, \*771  
 Graef, Irving, 178  
 Grande, Francisco, \*55  
 Grasso, S., \*316  
 Grauel, Ludmila, \*189  
 Grayburn, J. A., \*188

Grebin, Burton, \*837  
 Greene, Warner, 1109-1115  
 Greengard, Paul, \*773  
 Greenwood, M. R. C., \*316  
 Greenwood, Ronald D., \*249  
 Greep, Roy O., \*1199  
 Greider, M., \*355  
 Grey, Neil, \*249  
 Greze, M., \*776  
 Gries, F. Arnold, \*122, \*911-912  
 Griffiths, Anthony D., \*910  
 Grodsky, Gerold M., \*327, 584-593, 856-862, \*1045  
 Grossman, Morton I., \*252, \*789  
 Gruber, Charles, \*773-774  
 Grundy, Scott M., \*1200-1201  
 Guder, Walter, \*910  
 Guglielmi, Hans, \*1122-1123  
 Gupta, Vicrum, \*329-330  
 Gurson, C. T., \*313  
 Gustafson, Anders, \*771  
 Guthrie, Richard, 45-49  
 Gutman, Raul A., \*329, \*775  
 Gutman, Samuel Wilkins, \*359-360  
 Guy, Matthew J., \*249  
 Guyton, Robert A., \*118-119  
 Gwinup, Grant, 722-732

**H**

Habbick, B. F., \*56  
 Haeckel, H., \*910  
 Haeckel, R., \*910  
 Haft, Jacob I., \*376  
 Hagen, Thad C., \*1199  
 Hager, Diana L., 594-604  
 Hagstrom, Jack W. C., \*120  
 Hagura, Ryoko, 856-862, \*1045  
 Hahn, H. J., \*914  
 Haist, R. E., \*339, \*1204  
 Hallund, O., 649-656  
 Halpern, Alfredo, \*363  
 Hamilton, C. L., \*1201  
 Hamilton, M. A., \*70  
 Handschumacher, Robert E., \*254  
 Hann, Lucy, \*362  
 Hansky, J., \*249  
 Harano, Yutaka, 257-270  
 Hardman, Joel G., \*251  
 Hare, John W., \*340  
 Harrill, Inez, \*1202  
 Harris, Alan, \*772-773  
 Harris, Grady W., 703-712  
 Harrison, Lura A., \*250  
 Hashim, Sami A., 789-793  
 Hashimoto, Tadashi, 476-484

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

## AUTHOR INDEX 1972

Haslbeck, Manfred, 1102-1108  
 Haugen, H. N., \*123  
 Haupt, E., \*249, \*249-250  
 Havel, Richard J., 280-288  
 Haven, G. T., \*1047  
 Haworth, James C., \*179-180, \*1119  
 Hayes, K. C., \*1044  
 Hayles, Alvin B., \*982-983  
 Hazelwood, Robert L., \*59  
 Hazlett, Barbara, 906-907  
 Hazzard, William R., \*348, \*1121  
 Heath, H., \*120-121  
 Hebbelinck, M., \*119  
 Hechter, Oscar, \*60  
 Heding, L. G., 649-656  
 Hedner, Pavo, \*981  
 Hegre, Orion D., 193-202  
 Hegsted, D. M., \*60, \*1044  
 Heinemann, Martha, \*122  
 Heird, William C., \*837  
 Hellerström, Claes, 546-554, \*909  
 Hellman, Bo, \*56, \*181, \*771-772, \*837,  
     \*910-911, \*999-1002  
 Hemm, G., \*246  
 Hendler, Rosa, \*323-324, \*1118-1119  
 Hengstenberg, Fay, \*60  
 Henry, James E., Jr., \*363  
 Herberg, L., \*122  
 Herman, Clifford M., \*181  
 Hernandez, Rodolfo E., \*363  
 Herrera, M. G., \*60  
 Herrold, Joyce, \*381  
 Hertelendy, F., \*313  
 Hetenyi, G., Jr., 797-804  
 Heuser, Gunnar, \*349  
 Hiebert, John M., \*364  
 Hill, Donald E., \*1201  
 Hill, L. Leighton, \*1119  
 Hillbom, Matti E., \*181  
 Hime, J. M., \*1205-1206  
 Hinderaker, Paul H., \*187  
 Hingson, Robert A., 39-44  
 Hirsch, Allen H., \*185  
 Hirsch, Jules, \*316, \*1201  
 Hirschel, Bernhard J., \*314  
 Ho, Chen-Kung, 789-793  
 Hochman, H., \*377  
 Hockaday, T. D. R., \*350, \*1119  
 Hodge, J. S., \*1120  
 Hodgkin, Dorothy Crowfoot, 492-505,  
     1131-1150  
 Hoffman, Richard S., \*772  
 Hohenegger, M., \*121  
 Hohmann, T. C., \*314  
 Holanders, Egils, 271-279  
 Hollander, Daniel, \*1122  
 Hollinden, C. Stephen, 235-245

Holowach-Thurston, Jean, \*359  
 Holzmann, H., \*250  
 Hommel, H., \*909, \*911  
 Horiuchi, A., \*773  
 Hornbrook, K. R., \*1203  
 Hoshi, Mitsuru, 827-831  
 Howard, Charles F., Jr., 138-142  
 Howell, S. L., \*328  
 Hsia, S. L., \*189  
 Huber, V., \*246  
 Hughes, J. R., \*838  
 Hulse, Mildred, \*361  
 Humbert, James R., \*250  
 Hummeler, Klaus, \*189  
 Hunt, C. E., \*1044  
 Hunter, P. R., \*120-121  
 Hutchins, G. M., \*1201  
 Hutchinson, Donald L., \*180  
 Huttunen, Jussi K., \*314

## I

Iber, Frank L., \*362, \*983  
 Idahl, Lars-Ake, 999-1002  
 Illiano, Gennaro, \*772  
 Insel, Paul A., \*347  
 Irving, William R., \*185  
 Isenberg, Jon I., \*769  
 Issekutz, Bela, Jr., \*772  
 Isselbacher, Kurt J., \*316, \*769  
 Iversen, Johan, \*314  
 Izumi, Kanji, 827-831  
 Izzo, Joseph L., \*333  
 Izzo, Mary Jane, \*333

## J

Jackson, James A., \*983  
 Jackson, Richard L., 235-245  
 Jackson, W. P. U., \*250  
 Jacobi, H. P., \*1047  
 Jacobson, Mitchell, \*773  
 Jadzinsky, Mauricio N., \*23-30, \*359  
 Jaffé, Ernst, \*773-774  
 James, Albert L., \*121  
 Jansen, F. K., \*121  
 Jarett, Leonard, \*343, \*772, \*1119  
 Jaya Rao, Kamala S., \*1119-1120  
 Jefferson, L. S., \*341  
 Jenkins, David W., \*56  
 Jequier, E., \*1119  
 Johansen, Klaus, \*911  
 Johnsen, Ch., \*981  
 Johnson, D. G., \*329  
 Johnson, Irving S., 535-537  
 Johnson, Leonard R., \*250

Johnson, P. R., \*316  
 Johnson, R. A., \*335  
 Johnston, H. M., \*774  
 Jones, Rayford S., \*771  
 Jonsson, Anders, \*180  
 Jordan, George L., Jr., \*1201  
 Jordan, Scott W., \*837  
 Jorfeldt, Lennart, \*776  
 Jorgensen, K. H., 649-656  
 Joshua, Henry, \*57  
 Juan, C., \*381  
 Juliano, Joseph, \*376  
 Jung, Y., \*250, \*314  
 Junker, K., \*1120

## K

Kabara, J. J., \*837  
 Kachra, Zarin, \*374-375  
 Kagan, Avir, 1-5  
 Kahan, Miles, \*364  
 Kahn, Charles B., 31-37, \*365  
 Kahn, Ronald, \*334-335, 673-677, \*1200  
 Kajinuma, Hiroshi, \*332  
 Kalkhoff, Ronald K., \*365, \*773  
 Kallio, Anna-Kaarina, \*349-350  
 Kalnins, A., \*1204  
 Kamenetzky, Stephen A., \*365-366  
 Kan, Dorinne, \*773-774  
 Kanazawa, Yasunori, \*121  
 Kansal, Prakash C., \*911  
 Karabula, C., \*182  
 Karam, John H., \*332-333, \*353, \*982  
 Karasaki, Kenkichi, 203-208  
 Karjala, Robert G., 6-12  
 Karlberg, Bengt, \*1198  
 Karlsson, Kirsten, \*1201-1202  
 Kasperska, Teresa, \*121-122  
 Kato, Mikio, \*314  
 Kattamis, C., \*182  
 Katsoyannis, Panayotis G., \*772-773, \*981  
 Katz, Adrian, \*347  
 Kaufman, C. F., \*314  
 Kaufmann, R. L., \*361-362, \*365, \*366,  
     \*383  
 Kawamori, Ryuzo, 203-208, \*382  
 Kaye, Gordon I., \*835  
 Keamy, Donald G., \*185  
 Kebabian, John W., \*773  
 Keenan, William J., \*1202-1203  
 Keller, U., \*122  
 Kellum, Mike, \*179-180  
 Kelsey, J., \*120-121  
 Kemmler, Wolfgang, 572-581  
 Kendall, M. J., \*773  
 Kenny, Frederick M., \*60  
 Kerly, Margaret, \*57

## DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

AUTHOR INDEX 1972

- Kerr, Sylvia J., \*253  
 Kershner, Ann K., \*981  
 Kessler, Irving I., \*1044  
 Khan, Farida, \*348  
 Khurana, Ramesh C., \*250, \*1118  
 Kikkawa, Ryuichi, 827-831  
 Kilo, Charles, \*254, 881-905  
 Kim, Hakjoong, \*773  
 Kim, Young Jin, \*1118-1119, \*1202  
 Kim Young S., \*771  
 Kimmelstiel, Paul, \*338  
 Kimura, H., \*773  
 King, Katherine C., \*250-251  
 King, Ronald, \*180  
 Kipnis, David M., \*249, 606-616, 744-753,  
     \*1119  
 Kitabchi, Abbas E., \*122, \*355, \*356,  
     935-938, 1027-1034, 1091-1101, \*1122  
 Kitamura, T., \*773  
 Kjellmer, Ingemar, \*1201-1202  
 Kjellstrand, C. M., \*322  
 Klachko, D. M., 89-100  
 Klahr, Saulo, \*57  
 Klatt, D., \*914  
 Klayton, R., \*250  
 Kleeman, Charles R., \*774  
 Kleinman, Leonard I., \*914  
 Klimt, Christian R., \*57, 1035-1040  
 Klitgaard, Howard M., 271-279  
 Klöppel, G., \*911  
 Knatterud, Genell L., \*57, 1035-1040  
 Knittle, Jerome L., \*361, \*366, 754-761  
 Knochel, Gerald R., \*1198-1199  
 Knöfler, H., \*911  
 Knopf, Ralph F., 216-223, \*322, \*324  
 Knopp, Robert H., \*366-367  
 Knospe, S., \*182  
 Knowles, Harvey C., Jr., \*381  
 Knusmann, R., \*251  
 Koberich, W., \*249, \*249-250  
 Kogut, Maurice D., \*981  
 Kohler, William C., \*355-356  
 Komaroff, Anthony L., \*367  
 Koncz, Lajos, \*769  
 Konsek, John P., \*57  
 Korman, M. G., \*249  
 Korp, W., \*913  
 Koschinsky, Theodor, \*122, \*911-912  
 Kotler-Brajburg, Janina, \*328, \*359, 555-  
     569  
 Kourtras, Phoebus, \*1120  
 Kovacevic, Nada, \*188  
 Kozak, G. P., \*323  
 Krahl, M. E., 695-702  
 Krall, L. P., \*361-362  
 Kranz, Paul, \*376  
 Kreisberg, Robert A., 157-162, \*367,  
     \*1202  
 Kroes, J. F., \*1044  
 Krouse, H. A., \*1200  
 Krstic, M. K., \*1046  
 Kruck, F., \*769  
 Kryston, Leonard J., \*367-368  
 Kubli, F., \*1045  
 Kumar, Dinesh, \*368  
 Kuo, Peter T., \*1201  
 Kuroda, Kohei, \*60  
 Kurup, P. A., 1162-1167  
 Kurwa, Aziz, \*251  
 Kutzner, R., \*119  
 Kwann, Hau C., 108-113  
 Kyner, Joseph L., \*1044-1045
- L**
- Lacy, Paul E., \*326, \*328, 987-998  
 Lacy, W. W., \*332, \*340-341  
 Lafrance, Louise, \*912  
 Lake, Nareen, \*1202  
 Lambert, André E., \*121, \*368  
 Lan, V. V., \*356, \*360-361  
 Landau, Bernard R., \*329-330  
 Lande, Saul, \*981  
 Landey, Stephanie, \*120, \*1046  
 Landgraf, R., \*369, 555-569  
 Landgraf-Leurs, M., \*369  
 Lang, C. Max, \*338  
 Langer, L., \*981  
 Langworthy, Alice, \*324-325, \*1203  
 Larkins, R. G., \*122, \*1204  
 Larner, Joseph, 428-438  
 Larsson-Cohn, V., \*316  
 Laube, Heiner, 1072-1076  
 Laube, Heinrich, \*313  
 Lauris, V., \*70  
 Lavine, Lawrence, 257-270  
 Lavis, Victor, \*336  
 Lawecki, January, \*121-122  
 Lazarow, Arnold, 193-202  
 Lazarus, L., \*1118  
 Lazarus, Norman R., \*328-329  
 Lazarus, Sydney S., 129-137, \*325-326  
 Le Dune, Martha A., \*181  
 Leary, Peter M., \*771  
 LeBlanc, Jacques, \*912  
 Lebon, F., \*357  
 Lebovitz, Harold E., \*184, \*248, \*315-  
     316, \*345, \*352, 779-788, \*1200  
 Lecocq, Frank R., 101-107  
 LeCompte, Philip M., \*365-366, 762-768  
 Lee, J. A., \*770  
 Lee, Thomas C., \*378  
 Leef, M. R., \*254  
 Lefebvre, Pierre J., \*334, \*369  
 Leffler, Allan T., III, \*181
- Lefrak, Edward A., \*1201  
 Legg, Merle A., 762-768  
 Leitner, J. Wayne, \*56  
 Lemaire, F. R., \*366  
 Lemieux, Guy, \*251  
 Lemonnier, D., \*182  
 Leonard, Ingrid, \*1042-1043  
 Leonard, R. F., \*1042-1043  
 Leopold, Newman A., \*374, \*1121  
 Lerner, Roger L., \*348, \*773  
 Lernmark, Ake, \*910  
 Leslie, E., \*1199  
 Leveille, G. A., \*835  
 Levenson, Stanley M., \*773-774  
 Levey, Gerald S., \*912  
 Levin, Emanuel, \*774  
 Levin, Seymour R., \*327, 856-862, \*982,  
     \*1045  
 Levine, Rachmiel, \*314, \*370, 396-402,  
     454-456  
 Levitt, M. D., \*350-351  
 Lev-Ran, Arye, \*57  
 Levrat, R., \*179  
 Levy, Barnet M., \*248  
 Levy, Leonard J., \*369-370  
 Levy, Robert I., \*1044-1045  
 Lewis, A. A. G., \*55  
 Lewis, S. B., \*332, \*340-341, 439-446  
 Liddle, Grant W., \*251, \*332  
 Lie, T. H., 89-100  
 Liebelt, A. G., \*774  
 Liebelt, R. A., \*774  
 Light, Irwin J., \*914, \*1202-1203  
 Like, A., \*326, \*346, 511-534, \*1120  
 Liljenquist, J. E., \*332, \*340-341, \*347  
 Limburg, B., \*321  
 Lin, Boniface J., \*188, \*1204  
 Lindgren, Soren, \*1198  
 Lindros, Kai O., \*181  
 Lindsay, D. B., \*57-58  
 Lindsey, Al, \*331  
 Lindsey, J. R., \*1044  
 Linscheer, G. William, \*54  
 Linzell, J. L., \*57-58  
 Lione, A. P., \*775  
 Lipman, Richard L., 101-107, 175-177  
 Lippert, T. H., \*1045  
 Lipsitz-Wiesner, Rakoma, \*253  
 Little, Hunter L., \*189  
 Little, John R., \*251  
 Londono, J. H., \*376  
 Longnecker, Daniel S., 71-79  
 Lorente, P., \*838  
 Loretta, L., \*344  
 Loubatières, A., \*912, \*1045, \*1120  
 Louis, Lawrence H., \*837  
 Love, E. R., \*247

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

- |                  |                       |                     |
|------------------|-----------------------|---------------------|
| January, 1-64    | Supplement 1, 321-384 | August, 843-922     |
| February, 65-128 | Supplement 2, 385-714 | September, 923-986  |
| March, 129-192   | June, 715-778         | October, 987-1050   |
| April, 193-256   | July, 779-842         | November, 1051-1130 |
| May, 257-320     |                       | December, 1131-1210 |

AUTHOR INDEX 1972

Love, Tommy, 101-107  
 Lovrien, Fred C., \*1045  
 Lowenstein, J. M., \*1203  
 Lucke, Christoph, 1-5  
 Luft, Rolf, 224-234, \*312, \*323-324, 685-694, \*770  
 Lundquist, I., \*120, \*251-252  
 Lussier, Yolande, \*251  
 Luton, J.-P., \*775-776  
 Luyckx, Alfred S., \*334, \*369  
 Lynch, Vincent, \*1118-1119  
 Lyngsoe, Jens, \*186-187, \*1045  
 Lynn, William S., \*336-337

**M**

Macchi, I. A., \*370  
 McCormick, J. R., \*775  
 Mackay, Ian R., \*914  
 Mackay, J. S., \*253  
 Mackerer, C. R., \*981  
 Madison, Leonard L., \*331  
 Mahan, Clare M., \*183-184  
 Mahler, Richard J., \*314-315, \*370  
 Majid, P. A., \*913  
 Majno, Guido, \*314  
 Mako, Mary E., 1013-1026  
 Makowski, Edgar L., \*187  
 Makulu, David R., \*58, \*982  
 Malaisse, Willy J., \*119, \*326-327, 594-604, \*883, \*982, \*1042  
 Malaisse-Lagae, Francine, \*119, \*982, \*1042  
 Malathy, K., 1162-1167  
 Maler, Mario, \*359  
 Malherbe, Christian, \*982  
 Malins, J. M., \*186  
 Malone, John I., \*315  
 Manchester, Keith L., 447-452  
 Mandel, Emanuel E., \*364-365  
 Mann, J. I., \*58  
 Mannheimer, Shoshana, \*57  
 Manzano, F., \*323  
 Marble, Alexander, 632-636  
 Marco, Jose, \*58, 289-294, \*837-838  
 Marecek, Raymond L., \*370-371, \*1200  
 Maria, J., \*838  
 Mariani, M. M., \*912, \*1045, \*1120  
 Marine, N., \*250  
 Marinetti, G. V., \*1121-1122  
 Marliss, Errol B., \*246, 308-310, \*346, \*368  
 Marreiro Rocha, Dalva, \*324  
 Marshall, Garland R., 506-508  
 Martin, David E., \*774, \*912  
 Martin, Donald B., \*57, \*1042  
 Martin, F. I. R., \*182, \*972-975, \*1204

Martin, Pierre, \*251  
 Martin, R. J., \*315  
 Martino, Joseph A., \*772  
 Masazumi, Adachi, \*364  
 Mashiter, Keith, \*346-347, \*1047  
 Massara, F., \*122  
 Massi-Benedetti, Ferdinando, \*1199-1200  
 Masson, Georges M. C., \*253  
 Matsaniotis, N., \*182  
 Matschinsky, Franz M., \*328, \*345, \*359, 555-569  
 Matty, A. J., \*179  
 Maturo, Joseph M., III, \*1045  
 Matute, M. L., \*365  
 Maughan, G. B., \*316  
 Maxfield, L. M., \*1044  
 Mayhew, D. A., \*344-345  
 McDaniel, H. G., \*371  
 McGarry, Denis J., \*1203  
 McGee, J. H., \*376  
 McGoodwin, Michael M., \*1121  
 McKeel, Daniel W., \*772  
 McMahon, Edward M., \*252  
 McMillan, Donald E., \*371, 863-871  
 McMurray, J., \*352-353  
 McNeely, Betty, \*1042  
 McNeish, A. S., \*56  
 Meade, Robert C., 271-279  
 Mehlman, M. A., \*981  
 Mehnert, Hellmut, 1102-1108  
 Meinert, Curtis L., \*57, 1035-1040, 1197-1198  
 Meissner, H. P., \*769  
 Melani, Franco, 661-672  
 Mendlinger, Sheldon, \*247, 1151-1161  
 Meng, H. C., 149-156  
 Mennear, Jon H., 80-83, \*184  
 Menser, Margaret A., \*248-249  
 Menzel, Ruth, \*182  
 Mercola, D. A., 492-505  
 Merimee, Thomas J., \*342-343, \*372, \*774-775, \*1045-1046  
 Merin, Saul, \*182  
 Merkel, F., \*355  
 Mertz, Walter, \*1043  
 Meschia, Giacomo, \*187  
 Messaritakis, J., \*182  
 Messina, A., \*316  
 Metz, Robert, \*325  
 Metzger, Boyd E., \*340  
 Metzger, Robert P., \*372  
 Meyer, James H., \*252  
 Meyer, Richard J., \*772-773  
 Meyer, Roland K., \*774, \*912  
 Miale, A., Jr., \*351  
 Michael, Alfred F., 163-174  
 Michael R., \*182, \*909  
 Mickelsen, Olaf, \*983  
 Miller, Leona V., \*368, \*1120  
 Miller, Max, \*180, 257-270  
 Miller, R., \*351  
 Milliez, P., \*776  
 Million, Marcia, \*361  
 Mills, Lewis C., \*367-368  
 Milner, R. D. G., \*182, \*1120  
 Mintz, Daniel H., 175-177, \*180, \*912  
 Miya, T. S., \*184  
 Moffitt, Emerson A., \*185  
 Molinatti, G. M., \*122  
 Molnar, George D., \*185, \*324-325, \*775, \*836, \*1203  
 Molsted-Pedersen, Lars, \*912, \*1046  
 Moore, Jack D., \*182-183  
 Moore, T. J., \*775  
 Moorhouse, John A., \*341-342, \*1199  
 Moorhouse, S. R., \*247  
 Morgan, C. D., \*254  
 Morgan, Jean M., \*1046  
 Morganroth, Joel, \*376-377  
 Morita, K., \*773  
 Morris, A. S., \*836  
 Morrison, Anthony D., \*180-181, \*330  
 Morrison, George R., \*58  
 Morschies, B., \*250  
 Moses, Hamilton, III, \*1199  
 Moss, Gerald S., \*982  
 Motte, G., \*838  
 Motulsky, Arno G., \*1121  
 Moxness, Karen E., \*775, \*836  
 Mueller, Walter A., \*183  
 Mukherjee, N. R., 1192-1196  
 Mullen, Donald C., \*1206  
 Muller, Walter A., \*301-307, \*324, \*364, \*912-913  
 Munger, Bryce L., \*338  
 Murthy, V. K., \*982  
 Muzzo, Santiago, \*1042  
 Myers, R. D., \*1046

**N**

Nabarro, J. D. N., \*187, \*188, \*379  
 Nafz, Mary Ann, \*353  
 Najarian, J. S., \*322  
 Nakao, Komei, \*773-774  
 Nankin, Howard, \*909-910  
 Napoli, Elena, 1168-1172  
 Narrod, Stuart A., \*247  
 Nath, M. C., \*311  
 Nath, N., \*311  
 Needham, L. B., \*337-338  
 Nemerson, Yale, \*312  
 Nestel, Paul J., \*835, 923-929  
 Neubauer, B., \*252  
 Neufeld, Arthur H., \*180, \*1117-1118

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

AUTHOR INDEX 1972

Neville, David M., Jr., \*334-335, \*1200  
 Neville, E. D., \*836  
 New, Maria I., \*120, \*1046  
 Newman, G. B., \*188  
 Newton, N. E., \*1203  
 Newton, R. H., \*314  
 Nielsen, Poul Ebbe, \*186-187  
 Nijjar, M. S., \*183  
 Nishikawa, Mitsuo, \*60  
 Nitzan, M., \*315  
 Nobis, H., \*913  
 Noda, Katuhiko, \*183  
 Noe, Bryan D., \*58-59  
 Nonaka, K., \*313  
 Norman, Nils, 814-826, 939-945  
 Novak, J., \*314  
 Novak, Ladislav P., \*982-983

**O**

Oakley, W. G., \*321-322, \*1199  
 Ockner, Robert K., \*121  
 O'Dell, Boyd L., \*59  
 Odén, A., \*312-313  
 Ogilvie, James T., \*362-363  
 Ogilvie, R. I., \*1206  
 Ohira, S., \*1204  
 Ojl, N., \*252  
 Okada, Akira, 203-208  
 Oldendorf, William H., \*315  
 Olefsky, Jerrold, \*372, \*380, \*1121  
 Olsen, Ward A., \*252-253  
 Olsson, A. G., \*980  
 Ono, Masayoshi, \*1122  
 Opperman, W., \*321, \*373  
 Orci, Lelio, \*121, \*326, \*346, \*368, 511-534, 594-604, \*838, 1060-1071  
 O'Reilly, Robert A., \*183  
 Ornsholt, Jorgen, \*911  
 Orö, L., \*980  
 Osborne, Robert K., \*57  
 Oschman, James L., \*315  
 Osterby, R., \*913  
 Ostheimer, Gerald W., \*118-119  
 Ostrowski, K., \*909  
 O'Sullivan, John B., \*183-184  
 Ouyang, Ann, \*247-248  
 Overack, Daniel E., \*182-183  
 Oweiss, Ibrahim M., \*1118  
 Owen, Charles A., Jr., \*775  
 Owen, O., \*375  
 Owen, W. Crawford, 157-162, \*1202

**P**

Paasikivi, J., \*122-123  
 Pace, Caroline S., \*345

Packer, James T., 715-721, \*1043  
 Palazzolo, M., \*336  
 Pallotta, Johanna, \*367, \*376-377  
 Pallotta, M. G., \*253  
 Pandos, P., \*775-776  
 Pannbaker, R. G., \*838  
 Park, B. N., \*373  
 Park, C. R., \*254, \*335, 439-446  
 Parker, Donal C., \*913  
 Parks, Gary A., \*1046  
 Parrilla, Roberto, \*341  
 Parrish, James E., \*980  
 Partridge, John W., \*1204  
 Passa, P., \*838  
 Passy, Victor, 722-732  
 Patel, D., \*373  
 Patel, Tehmi N., \*350, \*1205  
 Paul, P., \*375  
 Peabody, Robert R., \*189  
 Pearson, Donald, \*184  
 Pearson, Margaret J., \*182, \*1204  
 Pek, Sumer, \*55-56, 216-223, \*324, \*331-332, \*1204  
 Pekar, A. H., 486-491  
 Pekarek, R. S., \*316  
 Pellizzari, E. D., \*313  
 Penhos, Juan C., \*356, \*360-361, \*375, \*775  
 Perez Lloret, A., 23-30  
 Perley, Michael J., \*837  
 Perry, W. F., \*183  
 Persson, Bengt, \*179-180  
 Pestana, Angel, \*187  
 Peterson, Daniel T., \*339  
 Peterson, James D., 572-581  
 Peterson, Kirk L., \*980  
 Petersson, B., \*909  
 Petipierre, B., \*1120-1121  
 Pfeiffer, Ernst F., \*313, \*369, \*913, 1072-1076  
 Phillips, Gerald B., \*184  
 Pilks, S. J., \*335  
 Pillay, Veerasamy, K. G., \*54  
 Pimstone, Bernard L., \*58, \*771  
 Pingel, M., 805-813  
 Pinto, J. E. B., \*253  
 Pirart, J., \*123  
 Pi-Sunyer, F. X., \*373-374  
 Pitkin, R. M., \*315  
 Pitot, Henry C., \*187  
 Pittman, Robert P., \*59  
 Plank, C. J., \*315  
 Plante, Gérald E., \*251  
 Plavidal, Ferdinand, 733-743  
 Pocelinko, R., \*313  
 Podolsky, Stephen, \*374, \*1121  
 Poffenbarger, Philip L., \*1120

Pollock, J., \*120-121  
 Pond, Wilson G., \*835-836  
 Porch, James, \*338  
 Porte, Daniel, Jr., 65-70; \*342, \*348, \*773, \*1123  
 Posner, Barry I., \*374-375  
 Potter, Van R., \*54  
 Potvliege, P. R., \*120  
 Powell, William John Jr., \*118-119  
 Pratt, O. E., \*247  
 Price, Steven, \*345  
 Prigge, William F., \*55  
 Prior, R. L., \*184  
 Proakis, A. G., \*184  
 Prout, Thaddeus E., 1035-1040  
 Pruitt, Kenneth M., 872-880  
 Pyke, D. A., \*321-322, \*1199

**Q**

Quibrera, Ricardo, \*55-56  
 Quickel, Kenneth E., Jr., \*184, \*315-316, 779-788, \*1200

**R**

Rackley, C. E., \*367  
 Radhakrishnamurthy, B., 733-743  
 Ragab, Abdelsalam H., 906-907  
 Raghuramulu, N., \*1119-1120  
 Raheja, Krishan L., \*1046  
 Räihä, Niels, \*250-251  
 Raines, P. L., \*775  
 Raivio, K., \*250-251  
 Ramey, Estelle R., \*375  
 Rand, Robert W., \*349  
 Randle, Philip J., 538-545  
 Rao, K. Visweswara, 1192-1196  
 Rao, Kamal S. Jaya, 1192-1196  
 Rappaport, A. M., \*1204  
 Raptis, S., \*913  
 Rasio, Eugenio A., \*330  
 Raskin, Philip, 101-107  
 Rauls, Tyler J., \*189  
 Reaven, Eve P., \*339  
 Reaven, Gerald M., \*84-88, \*339, \*372, 794-796, 1109-1115, \*1121  
 Recant, Lillian, \*329, \*359-360, \*775  
 Reddy, W. J., \*351-352, \*371  
 Reddy, Bandaru S., \*775  
 Redetzki, H. M., \*838  
 Redetzki, J. E., \*838  
 Reed, D. W., \*838  
 Reed, Peter C., \*982  
 Regen, D. M., \*775  
 Reichard, G. A., Jr., \*375

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64  
 February, 65-128  
 March, 129-192  
 April, 193-256  
 May, 257-320

Supplement 1, 321-384  
 Supplement 2, 385-714  
 June, 715-778  
 July, 779-842

August, 843-922  
 September, 923-986  
 October, 987-1050  
 November, 1051-1130  
 December, 1131-1210

AUTHOR INDEX 1972

- Reichle, Frederick A., \*322-323  
 Reiffen, Barney, \*367  
 Reinke, U., \*1204  
 Reitano, G., \*316  
 Renauld, A., \*253  
 Renner, Rolf, \*1122-1123  
 Renold, Albert E., \*179, \*246, \*326,  
     \*368, 510, 619-631, 1060-1071  
 Retzlaff, K., \*911  
 Reuter, Melanie, \*772  
 Reza, Michael J., \*330  
 Ribes, G., \*912, \*1120  
 Ricketts, Henry T., 648, 660, 677, 684  
 Riemann, J. F., \*352  
 Rifenberick, David, \*247  
 Rimoin, D. L., \*1045-1046  
 Rishi, Surendra, \*375-376  
 Rivarola, M. A., 23-30  
 Rivera-Calimlim, Leonor, \*1121  
 Robb, Jean R., 967-971  
 Robberecht, P., \*59  
 Roberts, Philip, \*251  
 Robertson, J. W., \*341  
 Robertson, R. Paul, \*348  
 Robitaille, Pierre, \*251  
 Robolledo, O. R., \*184  
 Rodman, Harvey M., \*329-330  
 Roe, Thomas F., \*981  
 Rogala, Henry K., \*121-122  
 Rogers, Lydia, \*252-253  
 Rogers, Marsha, \*328  
 Rogers, Nancy L., 403-413  
 Roginski, E. E., \*1043  
 Roheim, Paul S., \*56  
 Roldan, A. G., \*184-185  
 Roncone, Angela, \*333  
 Root, Mary A., 637-648, 657-660  
 Rose, Herbert G., \*376  
 Rose, Noel R., \*253  
 Rose, Shelby D., \*1043  
 Rosen, Ora M., \*185  
 Rosenberg, I. H., \*983  
 Rosenberg, Leon E., \*248, 414-425  
 Rosenbloom, Arlan L., 45-49, \*355-356,  
     376, \*776  
 Rosenfeld, Paul S., \*378  
 Rosenthal, Judith W., \*836  
 Rosevear, John W., \*185, \*775, \*836  
 Rosner, J. M., 23-30  
 Ross, Iain S., \*186  
 Rossi, Livia, \*312  
 Rossman, Lawrence G., \*913  
 Rössner, S., \*316, \*980  
 Roth, Jesse, \*313, \*334-335, 673-677,  
     \*1200  
 Roth, Nathan H., \*349  
 Rottiers, R., \*914  
 Rousseau, Suzanne, \*912  
 Roux, J., \*250-251  
 Rowe, John W., \*376-377  
 Rubenstein, Arthur H., \*57, \*344, \*347,  
     572-581, 661-662, 1018-1026  
 Rubin, Emanuel, \*838  
 Rudas, B., \*121  
 Ruderman, Neil B., \*341, \*343  
 Rudo, N. D., \*983  
 Ruegamer, W. R., \*1047  
 Ruiz, Harold, 733-743  
 Russell, R. O., \*367  
 Russell, Wilson G., 403-413  
 Russo, R. E., \*361-362, \*366  
 Ruttgers, H., \*1045  
 Ryan, Graeme B., \*314  
 Ryan, Jerome R., \*188
- S**
- Saba, Thomas M., \*312  
 Sadeghi-Nejad, A., \*377  
 Safrit, Henry F., \*184  
 Saito, Tokuko, \*1047  
 Sakagami, Masanori, 476-484  
 Sakai, Tsunesada, \*336  
 Sakura, Naoki, 476-484  
 Salen, Gerald, \*1200-1201  
 Saliternik, R., \*770  
 Salvatierra, Cairo, \*914  
 Sandler, Richard, \*185  
 Saner, G., \*313  
 Santeusonio, Fausto, \*324  
 Santti, Risto S., \*185  
 Saraceni, D., 23-30  
 Sau, K., \*381  
 Saudek, Christopher D., \*334  
 Sauerherber, Richard D., \*372  
 Savory, J., \*376  
 Sax, Daniel S., \*374, \*1121  
 Saxton, C., \*913  
 Sayers, George, \*983  
 Schanberg, Saul M., \*252  
 Schauder, Peter, \*377-378  
 Schedl, Harold P., \*59, \*983  
 Scheid, C., \*370  
 Schein, P. S., \*59  
 Scheynius, A., \*123  
 Schiff, D., \*185  
 Schimmel, Richard J., \*59-60  
 Schlein, Edward M., \*1198-1199  
 Schlichtkrull, J., 649-656  
 Schmidt, William M. I., \*912  
 Schnatz, J. David, \*353-354, \*1043  
 Schneeloch, B., \*187-188  
 Schneider, Louis E., \*983  
 Schnelle, Norbert, \*185  
 Schnure, Joel J., 101-107  
 Schöffling, K., \*249, \*249-250  
 Scholtz, Michael C., \*914  
 Schreibman, Paul H., \*54, \*1200-1201  
 Schroder, Karl E., 1072-1076  
 Schrott, Helmut G., \*1121  
 Schteingart, David E., \*331-332  
 Schullinger, John N., \*837  
 Schwartz, Ernst, \*1046  
 Schwartz, Robert, \*60, \*250-251  
 Schwarz, F., \*1046  
 Schwarz, K., \*369  
 Scorpio, Ralph M., \*247  
 Scott, David F., \*54  
 Scow, Robert O., 946-954  
 Scriba, P., \*369  
 Scully, Robert, \*1042  
 Seelig, Steven, \*983  
 Segal, Stanton, \*315  
 Sechlin, Jahove, \*56, \*181, \*771-772,  
     \*837, \*910-911  
 Seifter, Eli, \*773-774  
 Seiler, M. W., \*60  
 Selawry, Helena, \*329, \*359-360  
 Seltzer, Holbrooke S., 955-966, 976-980  
 Senior, B., \*377  
 Serafini, A. N., \*351  
 Service, F. John, \*836  
 Setchell, B. P., \*57-58  
 Sethi, S. S., \*373-374  
 Shah, Madhukar N., \*983  
 Shanahan, E. Anne, \*118-119  
 Shapiro, Stanley H., 129-137, \*325-326  
 Sharma, Bal K., \*54  
 Sharma, Opendra K., \*253  
 Shaw, Ralph A., \*367-368  
 Shaw, Walter N., viii Supplement 2  
 Sheikhislam, Bagher M., \*378  
 Sheldon, W. H., \*1201  
 Sheridan, B., \*253  
 Sherman, Barry M., \*313, \*1043-1044,  
     \*1204  
 Sherman, Herbert, \*367  
 Sherwin, Robert S., \*347  
 Shetty, Kaup R., \*378  
 Shichiri, Motoaki, 203-208  
 Shier, Nathan William, \*983  
 Shigeta, Yukio, 203-208, 827-831  
 Shih, Vivian, \*316  
 Shima, Kenji, \*60  
 Shimizu, Taeko, \*1047  
 Shishiba, Yoshimasa, \*1047  
 Shizume, Kazuo, \*1047  
 Shlatz, L., \*1121-1122  
 Shrader, Ruth E., \*1047  
 Shreeve, W. W., \*252  
 Shroyer, Lois A., \*382

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
March, 129-192	June, 715-778	October, 987-1050
April, 193-256	July, 779-842	November, 1051-1130
May, 257-320		December, 1131-1210

AUTHOR INDEX 1972

- Shuangshoti, Samruay, \*1122  
 Shuman, Charles R., \*322-323  
 Sidbury, James, \*1200  
 Siegal, Alan M., 157-162, \*1202  
 Siegel, Donald C., \*982  
 Sieracki, J. C., \*250  
 Siltanen, Irmeli, \*349-350  
 Silver, Donald, \*1206  
 Silverman, David A., \*253  
 Simmons, R. L., \*322  
 Simon, James D., 930-934  
 Simons, N., \*770  
 Simopoulos, Artemis, \*1043-1044  
 Sinclair-Smith, B. C., \*332, \*340-341  
 Sirek, Ann M., \*378-379  
 Sirek, Anna, \*378-379  
 Sirek, O. V., \*378-379  
 Sjöström, Lars, \*54, \*180  
 Skyler, J. S., \*352  
 Slack, Warner V., \*367  
 Slaunwhite, W. Roy, III, \*1204-1205  
 Slavinski, R. H., \*252  
 Slesinger, Marvin H., \*771  
 Sloan, J. M., \*253  
 Slusher, Norman, 843-855  
 Smith, Desmond F., \*327, 856-862, \*1045  
 Smith, Leslie F., 457-460  
 Smith, Robert M., \*343, \*1119  
 Snarr, J. F., \*1123, \*1206  
 Snider, Joel J., 295-300  
 Snodgrass, G. J. A. I., \*1047  
 Snook, Jean Twombly, \*185-186  
 Sobel, R. E., \*376  
 Sode, Jonas, \*181  
 Soeldner, J. Stuart, \*354, \*373, \*383,  
     703-712, \*769, \*775, \*1044-1045  
 Soifer, David, \*60  
 Soler, N. G., \*186  
 Solomon, H. M., \*313  
 Solomon, Solomon S., \*336, \*363, 1027-  
     1034  
 Song, Sun K., \*838  
 Sonksen, Peter H., \*379, \*775  
 Soveny, C., \*249  
 Spalding, J. F., \*914  
 Spargo, Benjamin H., \*338  
 Spark, Richard F., \*334  
 Spathis, G. S., \*186  
 Spergel, Gabriel, \*348  
 Sperling, Mark A., \*60  
 Spingola, Laurence J., \*252  
 Spitzer, John J., \*251  
 Sprague, Randall G., 632  
 Spruyt, Joy E. L., \*57  
 Srinivasan, Sathanur R., 733-743  
 Srivastava, M. C., \*379  
 Stacpoole, Peter W., \*358  
 Stadtler, F., \*769  
 Stanley, A. W., \*367  
 Starling, Kenneth A., \*1119  
 Starman, Barbara, \*377-378  
 Starr, Jerome I., \*347, 661-672  
 Stauffacher, Werner, \*179, \*246, \*326,  
     1060-1071  
 Stearns, Frank, \*247  
 Steele, Ann A., \*835, \*1045  
 Steele, Forest A., \*835  
 Stein, Janet M., \*186  
 Steinberg, Daniel, 1179-1184  
 Steinberg, Terry, 722-732  
 Steiner, Alton L., \*1119  
 Steiner, Donald F., \*347, 572-581, 661-  
     672, 1013-1026  
 Steiner, George, \*982  
 Steinke, Jurgen, 143-148, \*247, 350,  
     \*365, \*379, \*838, \*1198, \*1205  
 Stenberg, J., \*909  
 Stephenson, J. B. P., \*56  
 Sterky, G., \*980-981  
 Stern, Judith, \*316  
 Stern, L., \*185  
 Stern, Michael P., \*380  
 Stilz, John G., 235-245  
 Stimmmer, L., \*1047  
 Stoll, Ralph W., \*1047, \*1122  
 Stone, Daniel B., \*1045  
 Stoppani, A. O. M., \*184-185  
 Storwick, Waldemar O., 235-245  
 Stout, Clarke, \*338  
 Stout, Robert W., \*186, \*380  
 Strack, I., \*385  
 Strandgaard, Svend, \*186-187  
 Strauch, G., \*775-776  
 Strickland, Alva L., \*1122  
 Stroeh, Lowell E., 235-245  
 Stromberg, P., \*329  
 Strong, Leroy E., \*382  
 Stroud, Robert M., 872-880  
 Strul, Anna, \*348  
 Strumia, E., \*122  
 Stuhlman, Robert A., 715-721, \*1043  
 Stukowski, Barbara, \*910  
 Stunkard, Albert J., \*1205  
 Sudilovsky, Oscar, \*187  
 Sulev, J. C., \*254  
 Sun, A. M., \*339  
 Sussman, Karl E., \*56  
 Sussman, Leonard, \*336  
 Sutherland, James M., \*914, \*1202-1203  
 Suwanwela, Nibha, 108-113, \*355  
 Suzuki, Fujio, \*1122  
 Swenson, Donna E., \*55  
 Swenson, Robert S., 1109-1115  
 Sverdlik, R. C., \*253  
 Sybulski, S., \*316
- Szabo, Andrew J., \*337, \*380-381  
 Szabo, Olga, \*314-315, \*337, \*380-381  
 Szulman, Aron E., 39-44

T

- Tacus, Leonardo, \*359  
 Taft, P., 972-975  
 Takeda, Yoshiro, \*1122  
 Talaric, K. S., \*836  
 Talbert, O. Rhett, \*911  
 Täjedal, Inge-Bert, \*56, \*123, \*181,  
     \*771-772, \*837, \*910-911  
 Tallman, Carter B., \*185  
 Tanaka, Kay, \*316  
 Tanner, J. M., \*119-120  
 Tarpley, H. L., \*775  
 Tarui, Sehchiro, \*60  
 Tateishi, Hiroshi, \*253  
 Tattersall, R. B., \*321-322  
 Taylor, Andrew L., 175-177  
 Taylor, Enid, \*187  
 Taylor, G. W., \*187  
 Taylor, J. Bradley, 1109-1115  
 Taylor, K. W., \*909  
 Taylor, L. M., \*187  
 Taylor, S. H., \*913  
 Taylor, William F., \*324-325, \*775, \*836,  
     \*1203  
 Tcherdakoff, P., \*776  
 Teitelbaum, A., \*770  
 Tepperman, Jay, \*1046  
 Teramo, K., \*250-251  
 Thijssen, J. H. H., \*1046  
 Thomas, G. B., \*313  
 Thompson, Clara W., \*1204  
 Thuy, Le Phuc, \*1047  
 Tibblin, Elisabeth, \*180  
 Tibblin, Gösta, \*180, \*312-313  
 Tildon, J. Tyson, \*181  
 Tobin, R. B., \*981  
 Toews, C. J., \*341  
 Tomita, Tatsuo, \*326  
 Tomkin, Gerald H., \*381  
 Tompkins, C. V., \*379  
 Torno, N., \*381  
 Toseland, P. A., \*187  
 Tragl, Karl H., 84-88  
 Traisman, Howard S., \*249  
 Trap-Jensen, Jens, \*1045  
 Treasure, T., \*187  
 Triebwasser, John, 101-107  
 Trimmer, Michael, 39-44  
 Trout, David L., \*179  
 Truswell, A. S., \*58  
 Tsang, Reginald C., \*914, \*1043  
 Tseng, Chiu H., \*338  
 Tsoulos, Nicholas G., \*187

DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

- |                  |                       |                     |
|------------------|-----------------------|---------------------|
| January, 1-64    | Supplement 1, 321-384 | August, 843-922     |
| February, 65-128 | Supplement 2, 385-714 | September, 923-986  |
| March, 129-192   | June, 715-778         | October, 987-1050   |
| April, 193-256   | July, 779-842         | November, 1051-1130 |
| May, 257-320     |                       | December, 1131-1210 |

## AUTHOR INDEX 1972

Turner, Paul, \*771  
 Turner, R. C., \*187-188  
 Tweel, Harry K., \*188  
 Tyler, Jean M., \*332  
 Tyrrell, J. B., \*188  
 Tyson, R. Robert, \*322-323  
 Tzagournis, Manuel, \*381-382  
 Tze, Wah Jun, \*327

### U

Ullygot, G., \*1199  
 Underwood, Louis E., \*776, \*1122  
 Unger, Roger H., \*58, \*60, \*183, 301-  
 307, \*324, \*912-913, \*1198-1199

### V

Valverde, Isabel, 289-294  
 van Assche, F. A., \*253-254  
 Vance, James E., 570-571, 581-583,  
 \*1047, \*1122  
 Van Herle, Andre J., \*335-336  
 Van Itallie, T. B., \*374  
 Van Lan, Vo, \*375  
 van Marthens, Edith, \*189  
 vanRiet, H. G., \*1046  
 vanWayjen, R. G. A., \*1046  
 VanWoert, Maureen, \*1119  
 Van Wyk, Judson J., \*1122  
 Vanderlaan, Eileen F., \*913  
 Varandani, Partab T., \*353, \*382  
 Vasil'eva, I. A., \*55  
 Vecchio, Luigi Lo, 1168-1172  
 Veneziale, Carlo M., \*330-331  
 Vermeulen, A., \*914  
 Veros, A. J., 486-491  
 Vilar, O., 23-30  
 Villanueva, Maria L., 289-294, \*837-838  
 Villee, Claude A., \*185, \*1199  
 Vinay, Patrick, \*251  
 Vince, F. P., \*119-120  
 Vining, Keats K., Jr., \*382  
 Visek, W. J., \*184  
 Vogler, Nancy J., \*254, 881-905  
 Voight, Karl H., \*313  
 Voigt, K. D., \*1204  
 Voina, Sandra J., \*776, \*1122  
 Volk, Bruno W., \*338-339  
 Volund, Aa., 805-813  
 Voyles, Nancy, \*329  
 Vranic, Mladen, \*188, \*382-383

### W

Wade, Angel, \*329  
 Wahl, Georgia, \*772

Wahlberg, F., \*122-123  
 Wahren, John, \*323-324, \*770-771, \*776  
 Wajchenberg, Bernardo L., \*363  
 Walaas, E., \*123  
 Walker, G., \*379  
 Walker, Mary M., 987-998  
 Walter, Robert M., \*333-334  
 Wannemacher, R. W., Jr., \*316  
 Wapnir, Raul A., \*181  
 Ward, J. D., 1173-1178  
 Ward, Walter F., \*836  
 Wasserman, R. C., \*314  
 Watkins, Dudley T., \*983  
 Waxler, S. H., \*254  
 Weber, B., \*1205  
 Weidemann, Eckehart, \*1046  
 Weinges, K., \*769  
 Weinstock, Murray, \*376  
 Weir, B. J., \*1205-1206  
 Weisinger, Jose, 1109-1115  
 Weissman, Peter N., \*324  
 Weitzel, Gunther, \*1122-1123  
 Wellmann, Klaus F., \*338-339  
 Wells, Henry J., \*315  
 Wells, Lemen J., 193-202  
 West, Kelly M., \*338  
 West, Susan B., \*835  
 Westall, Janet R., \*372  
 Westberg, N. Gunnar, 163-174  
 Westfall, David N., \*776  
 Wexler, B. C., \*1123  
 Whayne, Thomas F., Jr., \*188  
 White, Priscilla, 31-37, \*361-362, \*366  
 White, Raleigh R., \*1120  
 Whitehead, Richard, \*251  
 Whitfield, Margaret, \*328  
 Whittingham, Senga, \*914  
 Wichelow, M. J., \*980  
 Wick, Arne N., \*372  
 Wieland, Otto, \*910  
 Wiesner, Wolfgang, \*910  
 Wildenhoft, K. E., \*1205  
 Wilder, B. J., \*355-356  
 Wiley, J. H., \*835  
 Wilhelmsen, Lars, \*180  
 Wilke, W., \*182  
 Wilkinson, J. S., \*352-353  
 Wille, L., \*123  
 Williams, R., \*1199  
 Williams, Robert E., \*183-184  
 Williams, Robert H., \*329, \*360, \*377-  
 378, \*1047, \*1122  
 Williams, T. F., \*254  
 Williamson, D. H., \*59  
 Williamson, Joseph R., \*254, 881-905  
 Wilmshurst, E. G., \*365, \*366, \*383  
 Wilson, Helen D., \*59

Wilson, John E., \*1205  
 Wilson, Penelope, \*247  
 Winand, J., \*119, \*182  
 Winegrad, Albert I., \*180-181, \*330  
 Winters, Robert W., \*837  
 Wise, P. H., \*1205  
 Wissler, R. W., \*344  
 Witters, Lee, \*376-377  
 Wittman, James S., III, \*188-189  
 Wold, John S., 71-79  
 Wolf, Richard C., \*774, \*912  
 Wolfe, Walter G., \*1206  
 Wolff, J. E., \*118  
 Wolff, M. Kirsch, \*56  
 Wolff, Peter H., \*254  
 Wollheim, C. B., \*346  
 Woods, James S., \*254  
 Woods, Stephen C., \*1123  
 Wrenshall, G. A., \*382-383  
 Wright, Peter H., \*58, 605, 617-618  
 Wright, R., \*189  
 Wurtman, R. J., \*909

### Y

Yakovac, William C., \*189  
 Yamaguchi, N., \*775  
 Yamaguchi, K., \*250-251  
 Yanaihara, Chizuko, 476-484  
 Yanaihara, Noboru, 476-484  
 Yeung, C. Y., \*1123  
 York, David A., \*838, \*1206  
 Young, J. D., \*1118  
 Young, Margaret C., \*120  
 Younger, Donna, 31-37  
 Yudilevich, David L., \*180  
 Yunis, Eduardo, \*60

### Z

Zahn, Helmut, 457, 468-475  
 Zalut, Clyde, \*772-773, \*981  
 Zamenof, Stephen, \*189  
 Zandomeneghi, R., \*1206  
 Zatzman, Marvin L., \*182-183  
 Zeman, Frances J., \*1041, \*1047  
 Zetterström, Rolf, \*179-180  
 Ziboh Vincent A., \*189  
 Ziegler, M., \*182, \*909, \*914  
 Zingg, W., \*254  
 Zinman, B., \*1206  
 Zivin, J. A., \*1123, \*1206  
 Zor, Uriel, \*346-347  
 Zucker, Louis M., \*316, \*1123  
 Zuckerman, Leon, 209-215, \*1199  
 Zweig, S. M., \*89  
 Zweng, H. Christian, \*189

### DIABETES: VOLUME 21 (1972) PAGE NUMBERS BY ISSUE

January, 1-64	Supplement 1, 321-384	August, 843-922
February, 65-128	Supplement 2, 385-714	September, 923-986
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May, 257-320		December, 1131-1210

## **Opposite Kinetics of L-Leucine and L-Phenylalanine Induced Insulin Release Studied with the Perfused Rat Pancreas**

R. LANDGRAF, M. LANDGRAF-LEURS,  
P. SCRIBA, and K. SCHWARZ (Introduced by  
E. F. PFEIFFER\*), Munich, Germany

Little is known about the dynamics of insulin release provoked by amino acids. Therefore isolated pancreases were perfused with saline-dextran buffer, containing leucine or phenylalanine, without recycling. Samples were taken at short intervals and the amount of insulin was measured by an immunoassay. In the absence or presence of substimulatory levels of glucose, 10 and 20 mM leucine caused a biphasic pattern of insulin secretion, comparable to that of 20 mM glucose. When leucine was perfused together with 20 mM glucose no significant additive effect could be observed. However when glucose plus leucine were perfused after an initial stimulatory period with leucine alone, a typical biphasic response was again observed and the additive effect was more pronounced. In contrast, phenylalanine provoked no insulin release in the absence of glucose. In the presence of 2.5 mM glucose, a burst of insulin output occurred after removal of the phenylalanine from the perfusate. When phenylalanine (10 or 20 mM) was added during the second phase of the glucose-induced insulin release, it potentiated the glucose effect after an initial inhibition.

These data suggest the existence of more than one receptor for amino acids for the stimulation of insulin secretion, comparable to, but not necessarily identical with the carbohydrate receptors. Assuming that leucine and phenylalanine use the same transport system (D.L. Oxender, and H. N. Christensen, *J. Biol. Chem.* 238: 3686, 1963) our data indicate that the receptor sites for the stimulation of insulin secretion by amino acids may not be transport sites.