

# Hormone and Metabolic Research

Editors-in-Chief:

E. F. Pfeiffer, Ulm

J. E. Rall, Bethesda

Assistant-Editors:

W. D. Hetzel, Ulm

B. Weintraub, Bethesda

**Volume 11/1979**

384 Figures

in 485 Single figures

and 258 Tables



**1979**

**Georg Thieme**

**Publishers**

**Stuttgart**

## TABLE OF CONTENTS

No. 1 (January 1979) page 1-84	No. 7 (July 1979) page 415-454
No. 2 (February 1979) page 85-186	No. 8 (August 1979) page 455-492
No. 3 (March 1979) page 187-260	No. 9 (September 1979) page 493-532
No. 4 (April 1979) page 261-322	No. 10 (October 1979) page 533-588
No. 5 (May 1979) page 323-378	No. 11 (November 1979) page 589-646
No. 6 (June 1979) page 379-414	No. 12 (December 1979) page 647-700
<i>Wicklmayr, M., G. Dietze</i> Effect of Metaproterenol on Ketone Body Metabolism of the Forearm in Healthy and Diabetic Subjects . . . . .	1
<i>Rath, R., K. Vondra, A. Bass, J. Teisinger, V. Vitek</i> Energy Metabolism Enzymes in Adipose Tissue and in Muscle in Obesity . . . . .	6
<i>Lombardo, Y.B., L.A. Menahan</i> Gluconeogenesis in Perfused Livers of Genetically Obese-Hyperglycemic (ob/ob) Mice . . . . .	9
<i>Kukulansky, T., G. Yagil</i> On the Effect of Insulin on Glucose-6-Phosphate Dehydrogenase and Fatty Acid Synthetase Activity in Mouse Liver . . . . .	14
<i>O'Connor, F.A., J.M. Conlon, K.D. Buchanan, R.F. Murphy</i> The Use of Perfused Rat Intestine to Characterise the Glucagon-Like Immunoreactivity Released into Serosal Secretions Following Stimulation by Glucose . . . . .	19
<i>Taniguchi, H., M. Hasegawa, T. Kobayashi, Y. Watanabe, M. Murakami, M. Seki, A. Tsutou, M. Utsumi, H. Makimura, M. Sakoda, S. Baba</i> Enhancement of Leucine-Induced Insulin Secretion by Somatostatin Antiserum Pretreatment . . . . .	23
<i>Kubek, M.J., J.F. Wilber, J.E. Leesthma</i> The Identification of Gonadotropin-Releasing Hormone (GnRH) in Hypothalamic and Extrahypothalamic Loci of the Human Nervous System . . . . .	26
<i>May, P., J. Mittler, A. Manougian, N. Ertel</i> TSH Release-Inhibiting Activity of Leucine-Enkephalin . . . . .	30
<i>Faber, J., T. Friis, C. Kirkegaard, I.B. Lumholtz, J. Møkhholm-Hansen, K. Siersbaek-Nielsen, L. Skovsted, P. Theilade</i> Serum T <sub>4</sub> , T <sub>3</sub> and Reverse T <sub>3</sub> During Treatment with Propranolol in Hyperthyroidism, L-T <sub>4</sub> Treated Myxedema and in Normal Man . . . . .	34
<i>Mobley, P.W., P.U. Dubuc</i> Thyroid Hormone Levels in the Developing Obese-Hyperglycemic Syndrome . . . . .	37
<i>Sorimachi, K., J. Robbins</i> Effects of Propylthiouracil and Methylmercaptoimidazol on Metabolism of Thyroid Hormones by Cultured Monkey Hepatocarcinoma Cells . . . . .	39
<i>Darwish, S.A.E., B.L. Furman</i> Effects of Levodopa and Doapmine on Plasma 11-Hydroxycorticosteroid Concentrations in Mice . . . . .	44
<i>Radó, J.P., T. Simatupang, P. Boer, E.J. Dorhout Mees</i> Increase of Serum Potassium in the Upright Posture in Selective Hypoaldosteronism . . . . .	47
<i>Wood, W.G., B.J. Britton, M.H. Irving</i> Effects of Adrenergic Blockade on Plasma Catecholamine Levels During Adrenaline Infusion . . . . .	52
<i>Barlet, J.-P., M.-J. Davicco, J. Lefavre, B.J. Carrillo</i> Fetal Blood Calcium Response to Maternal Hypercalcemia Induced in the Cow by Calcium Infusion or by Solanum Glaucophyllum Ingestion . . . . .	57
<i>Maurer, W., W. Braendle</i> Evidence for Different Forms of Human Chorionic Gonadotropin Receptor Complex in Pseudopregnant Rat Ovaries <sup>1,2</sup> . . . . .	60
<i>Lakshmaiah, N., M.S. Bamji</i> Effect of Oral Contraceptives on Folate Economy - a Study in Female Rats . . . . .	64
<i>Morley, J.E., L.A. Distiller, S. Epstein, M. Katz, C. Gold, J. Sagel, K. Kaye, M. Pokroy, J. Kalk</i> Menstrual Disturbances in Chronic Renal Failure . . . . .	68
<i>Holló, I., L. Gerö, F. Szalay, L. Korányi, K. Steczek</i> Insulin-, Glucagon- and Calcitonin-Induced Early Decrease in Serum Calcium . . . . .	72
<i>Owens, D.R., K.G. Wragg, K.J. Shetty, P.I. Biggs, C.D. Davies</i> Acute and Chronic Effect of Chlorpropamide in M.O. Diabetes . . . . .	77
<i>Macnab, M., R.B. Goldberg, B.I. Joffe, A. Botha, H.C. Sefitel</i> Carnitine and Experimental Ketotic and Non-Ketotic Diabetic Stupor . . . . .	78
<i>Shapiro, B., S. Kronheim, B. Pimstone</i> The Presence of Immunoreactive Somatostatin in Rat Retina . . . . .	79
<i>Giannetto, B.O., M.D. Griswold</i> Hormone-Supplemented Medium Enhances Androgen Binding Protein Secretion in Sertoli Cell Cultures . . . . .	80

<i>Garmendia, F., E. Urdanivia, E. Kesserü</i> Carbohydrate Metabolism in Women Receiving d-Norgestrel for Postcoital Contraception . . .	81	<i>Livesey, J.H., R.S. Scott, R.A. Donald</i> Urinary Growth Hormone in Diabetic Keto- acidosis . . . . .	142
<i>Havelka, S., A. Babický, J. Musilová, D. Rohožko- vá, B. Tesárek</i> Effect of Osteotropic Hormones on Cartilage Metabolism . . . . .	83	<i>Sara, V.R., R. Rutherford, G.A. Smythe</i> The Influence of Maternal Somatostatin Ad- ministration on Fetal Brain Cell Proliferation and its Relationship to Serum Growth Hor- mone and Brain Trophin Activity . . . . .	147
Congress-Announcements . . . . .	84	<i>Fraser, W.M., H.St. Tucker, S.R. Grubb, J.P. Wigand, W.G. Blackard</i> Effect of L-Tryptophan on Growth Hormone and Prolactin Release in Normal Volunteers and Patients with Secretory Pituitary Tumors . . . . .	149
<i>Hansen, B., S. Linde, K. Kϕlendorf, F. Jensen</i> Absorption of Protamine-Insulin in Diabetic Patients I. Preparation and Characterization of Protamine- <sup>125</sup> I-Insulin . . . . .	85	<i>Curbelo, H.M., E.C. Karliner, A.B. Houssay</i> Effect of Acute Hypoxia on Blood TSH Levels . . . . .	155
<i>Jacoby, J.H., G.F. Bryce</i> The Acute Effects of 5HTP, Fluoxetine and Quipazine on Insulin and Glucagon Release in the Intact Rat . . . . .	90	<i>Hartmann, F., F. Jentzen</i> Effect of Chlorphentermine on Hormone Con- tent and Function of the Adrenal Cortex in Rats . . . . .	158
<i>Loubatières-Mariani, M.M., R. Alric, J.P. Blayac, G. Valette</i> Is Lactate Involved in Phenformin-Induced Insulin Secretion? . . . . .	95	<i>Calvo, J.C., L. Biella de Souza Valle, J.L. Baraño, M. Tesone, E.H. Charreau</i> NADPH Generating Enzymes in Leydig Cells from Diabetic Rats . . . . .	161
<i>Pontiroli, A.E., P. Micossi, P.P. Foà</i> Effects of Histamine, of Histadine and of Anti- Histaminic Agents on the Release of Glucagon and Insulin from the Rat Pancreas . . . . .	100	<i>Puett, D., R. Benveniste, A. Kenner, D. Rabi- nowitz</i> The Carbohydrate Moiety of Human Chorion- ic Gonadotropin: Lack of Competition with HCG for Testicular Receptors and Anti-HCG- Serum . . . . .	165
<i>Joost, H.G.</i> Effects of a Possible Beta-Cell Membrane Label, Metahexamide-Isothiocyanate, on Insulin Re- lease . . . . .	104	<i>Haas, H.G., M.A. Dambacher, J. Guncaga, T. Lauffenburger, B. Lämmle, J. Olah</i> 1,25 (OH) <sub>2</sub> Vitamin D <sub>3</sub> in Osteoporosis – A Pilot Study . . . . .	168
<i>Guzdek, A., M. Sarnecka-Keller, A. Dubin</i> The Activities of Perfused Livers of Control and Streptozotocin Diabetic Rats in the Syn- thesis of Some Plasma Proteins and Peptides . . . . .	107	<i>Hayek, A., C. Kuehn</i> Adrenalectomy Does not Prevent Ketoacidosis in Streptozotocin-Diabetic Rats . . . . .	172
<i>Honey, R.N., S. Price</i> The Determinants of Insulin Extraction in the Isolated Perfused Rat Liver . . . . .	111	<i>Palmieri, G.M.A., J. Hawrylko</i> Enhancement by Propranolol of the Insulin Induced Hypoglycemia in the Chick . . . . .	173
<i>Kalopissis, A.D., A. Girard, S. Griglio</i> Diurnal Variations of Plasma Lipoproteins and Liver Lipids in Rats Fed Starch Sucrose or Fat . . . . .	118	<i>Cohen, R., J.P. Luzio</i> Hormonal Effects on [ <sup>3</sup> H] Leucine Incorpora- tion into Rat Adipocyte Plasma Membrane . . . . .	174
<i>Sitbon, G., P. Mialhe</i> Pancreatic Hormones and Plasma Glucose: Regulation Mechanisms in the Goose under Physiological Conditions. IV-Effects of Food Ingestion and Fasting on Pancreatic Hormones and Gut GLI . . . . .	123	<i>Kather, H., R. Mordasini, P. Oster, G. Schlierf, B. Simon</i> Synergistic Effects of Adrenaline and Prosta- glandin E <sub>1</sub> on the Human Fat Cell Adenylate Cyclase . . . . .	176
<i>Schleiffer, R., C. Mialhe, B. Briaud, B. Lutz- Bucher, B. Koch</i> Effects of Adrenalectomy and Hypercorticism on the ACTH Content of the Anterior and the Posterior Pituitary in Rats with Inherited Diabetes Insipidus (Brattleboro Strain) . . . . .	130	<i>Le Roith, D., H. Bark, S.M. Glick</i> Somatostatin and Antidiuretic Hormone Secre- tion in Dogs . . . . .	177
<i>Birnbaum, R.S., H.M. Goodman</i> Comparison of Several Insulin-Like Effects of Growth Hormone . . . . .	136	<i>Hainer, V., L. Krejčík, L. Stárk, J. Urbánek</i> Glucagon-Induced Fall of Serum Cortisol Levels: Effect of Cyproheptadine Pretreat- ment . . . . .	178

<i>Follenius, M., G. Brandenberger, M. Simeoni, B. Reinhardt</i> Plasma Aldosterone, Prolactin and ACTH: Relationships in Man during Heat Exposure . . .	180	<i>Vigouroux, E., J. Clos, J. Legrand</i> Uptake and Metabolism of Exogenous and Endogenous Thyroxine in the Brain of Young Rats . . . . .	228
<i>Doerr, P.</i> Relationship between Saturation of LH Receptors and Steroidogenic Response in Isolated Rat Granulosa Cells . . . . .	181	<i>Sorimachi, K., H.J. Cahnmann</i> Formation and Metabolism of 3', 5'-Diiodothyronine and 3,5-Diiodothyronine by Cultured Monkey Hepatocarcinoma Cells . . . . .	233
<i>Sobrino, F., E. Pintado, J.C. Prieto, G. Ruiz, R. Goberna</i> Plasma-cAMP Concentration in Fasting Rats. . .	183	<i>Jones, C.T.</i> Normal Fluctuations in the Concentration of Corticosteroid and Adrenocorticotrophin in the Plasma of Foetal and Pregnant Sheep . . . . .	237
<i>Yamada, Y., S. Ito, R. Kayamori, A. Shibata</i> The Effects of Vitamin D <sub>2</sub> on the Somatostatin and Calcitonin Concentration in the Rat Thyroid . . . . .	184	<i>Horký, K., J. Šrámková, J. Lachmanová, R. Tomášek, J. Dvořáková</i> Plasma Concentration of Antidiuretic Hormone in Patients with Chronic Renal Insufficiency on Maintenance Dialysis . . . . .	241
Congress-Announcements . . . . .	186	<i>Blum, J.W., W. Biancy, F. Näf, P. Kunz, J.A. Fischer, M. Da Prada</i> Plasma Catecholamine and Parathyroid Hormone Responses in Cattle during Treadmill Exercise at Simulated High Altitude . . . . .	246
<i>Kansal, P.C., M.S. Bandisode, B.R. Boshell</i> Determination of Insulin Antibodies . . . . .	187	<i>Solter, M., M. Sekso</i> Increased Posthyperglycemic Insulin Secretion Area in Obese Subjects with Asymptomatic Reactive Hypoglycemia . . . . .	252
<i>Renauld, A., R.C., R.C. Sverdlik, R.R. Rodriguez</i> Actions of Aminophylline on the Blood Sugar, Serum Insulin and Serum-free Fatty Acid Responses to Glucose in Hyperthyroid Dogs . . .	190	<i>Terpstra, J., L.W. Hessel, C.M. van Gent, P.H. van Reine</i> Postprandial Insulin Response and Diurnal Triglyceride Pattern . . . . .	253
<i>Tober, C., U. Krause, J. Beyer, L. Herberg</i> Studies with Crystalline Insulin from Obese and Lean Mice of the BL/6J Strain . . . . .	195	<i>Frayn, K.N., P.F. Maycock</i> Apparent Effect of Octan-1-ol on Glycogen Metabolism in Muscle in Vitro . . . . .	255
<i>Bretzel, R.G., Ch. Breidenbach, J. Hofmann, K. Federlin</i> Islet Transplantation in Experimental Diabetes of the Rat. VI. Rate of Regression in Diabetic Kidney Lesions after Isogeneic Islet Transplantation: Quantitative Measurements . . . . .	200	<i>Hayek, A.</i> Unimpaired Gluconeogenesis in Congenital Hypothyroidism . . . . .	256
<i>Davidson, M.B., D. Casanello-Ertl</i> Insulin Antagonism in Cultured Rat Myoblasts Secondary to Chronic Exposure to Insulin . . .	207	<i>Pontiroli, A.E., G. Pellicciotta, M. Alberetto, A. De Pasqua, A.M. Girardi, G. Pozza</i> Cimetidine and L-Dopa in the Control of Prolactin Secretion in Man . . . . .	257
<i>Olefsky, J.M.</i> Comparison of the Effects of Insulin and Insulin-like Agents on Different Aspects of Adipocyte Metabolism . . . . .	209	<i>Wambach, G., J. R. Higgins</i> Effect of Progesterone on Serum and Tissue Electrolyte Concentration in Doca-treated Rats . . . . .	258
<i>Matsuyama, T., R. Tanaka, K. Shima, S. Tarui</i> Anomeric Specificity in the Response of Gut Glucagon-like Immunoreactive Materials to Glucose . . . . .	214	Congress-Announcements . . . . .	260
<i>Baxter, R.C., A.S. Brown, J.R. Turtle</i> Decrease in Serum Receptor-Reactive Somatomedin in Diabetes . . . . .	216	<i>Krause, U., G. Faisst, U. Cordes, J. Beyer</i> Secretory B-Cell Activity in Insulin Dependent Maturity-Onset Diabetic . . . . .	261
<i>Barber, S.G., A.M. Hoare</i> Cimetidine Effects on Prolactin Release and Production . . . . .	220	<i>Renauld, A., L.L. Andrade, R.C. Sverdlik, R. R. Rodriguez, D.M. Lindental</i> Serum Insulin and Free Fatty Acid Responses to Slow and Quick Graded Hyperglycaemias in Hypothyroid Dogs . . . . .	265
<i>Poland, R.E., M.E. Weichsel, Jr., R.T. Rubin</i> Postnatal Maturation Patterns of Serum Corticosterone and Growth Hormone in Rats: Effect of Chronic Thyroxine Administration . . .	222		

<i>Herndon, Ch.M., D.S. Schade, R.Ph. Eaton</i> The Differential Effect of Insulin in Vivo on the Peripheral Utilization of Glucose and Ketone Bodies in the Rat . . . . .	270	Congress-Announcements . . . . .	322
<i>Uranga, J., R. Fuenzalida, A.L. Rapoport, E. del Castillo</i> Effect of Glucagon and Glomerulopressin on the Renal Function of the Dog . . . . .	275	<i>Herberg, L.</i> Spontaneously Hyperglycemic Laboratory Ani- mals – Models of Human Diabetes-Syndrome? . . . . .	323
<i>Taylor, W.M., R.B. Goldrick, T. Ishikawa</i> Glycerokinase in Rat and Human Adipose Tissue: Response to Hormonal and Dietary Stimuli . . . . .	280	<i>Nattrass, M., L. Hinks, P. Smythe, P.G. Todd, K.G.M.M. Alberti</i> Metabolic Effects of Combined Sulphonylurea and Metformin Therapy in Maturity-Onset Dia- betics . . . . .	332
<i>Paetzke-Brunner, I., G. Löffler, O.H. Wieland</i> Activation of Pyruvate Dehydrogenase by Insulin in Isolated Brown Fat Cells . . . . .	285	<i>Harano, Y., S. Ohgaku, H. Hidaka, K. Takatsuki, Y. Shigeta</i> Efficacy of Combined Insulin and Somato- statin Infusion for the Treatment of Experi- mental Diabetic Ketoacidosis . . . . .	338
<i>Buse, M.G., R. Atwell, V. Mancusi</i> In Vitro Effect of Branched Chain Amino Acids on the Ribosomal Cycle in Muscles of Fasted Rats . . . . .	289	<i>Valverde, I., M. Ghiglione, R. Matesanz, S. Casado</i> Chromatographic Pattern of Gut Glucagon- Like Immunoreactivity (GLI) in Plasma be- fore and during Glucose Absorption . . . . .	343
<i>Okuno, A., T. Taguchi, K. Nakayama, M. Takimoto</i> Kinetic Analysis of Plasma TSH Dynamics after TRH Stimulation . . . . .	293	<i>Simoës Nunes, C., T. Corring</i> Pancreatic Exocrine Secretion in the Pig Fol- lowing Test Meals of Different Composition and Intra-Duodenal Loads of Glucose and Maltose . . . . .	346
<i>Hagino, N.,</i> Effect of Nembutal on LH Release in Baboons . . . . .	296	<i>Bieger, W., H. Weicker, A. Haymovits</i> Amino Acid Transport in the Exocrine Pan- creas. IV. Do Glucagon or Insulin Mediate the In Vivo Effect of Caerulein on Amino Acid Transport and Incorporation? . . . . .	352
<i>Bastomsky, C.H., K. Banovac, F. Skreb, M. Sekso</i> Similar Serum Concentrations of Thyroid Hor- mones in Two Geographically Separate Popula- tions on Disparate Iodine Intake . . . . .	301	<i>Hagino, N., T. Koyama</i> Luteotrophic Capacity of TRH in the Baboon . . . . .	358
<i>Courtright, J.B., R.H. Fitts</i> Effects of Thyrotoxicosis on Mitochondrial Enzymes of Rat Soleus . . . . .	304	<i>Hendrich, Ch.E., S.P. Porterfield, V.A. Galton</i> Pituitary-Thyroid Function of Fetuses of Hy- pothyroid and Growth Hormone Treated Hypothyroid Rats . . . . .	362
<i>Schöneshöfer, M., B. Schefzig, W. Oelkers</i> Evidence of Adrenal 18-Hydroxylase Inhibi- tion by Metyrapone in Man . . . . .	306	<i>van Noorden, C.J.F., W.M. Wiersinga, J.L. Touber</i> Propranolol Inhibits the In Vitro Conversion of Thyroxine into Triiodothyronine by Isolat- ed Rats Liver Parenchymal Cells . . . . .	366
<i>Wood, W.G., I. Marschner, P.C. Scriba</i> Tests on Three Antisera and Subsequent De- velopment of Radioimmunoassay for Diffe- rent Regions of Human Parathyrin . . . . .	309	<i>Wernze, H., H. Weiß</i> Plasma Renin, Renin Substrate and Angioten- sin II Changes Following Experimental Endo- toxinaemia . . . . .	371
<i>Ambrosi, B., M. Gaggini, F. Secchi, G. Faglia</i> Lack of Effect of Antiserotonergic and/or Dopaminergic Treatment in Patients with Pituitary-Dependent Cushing's Syndrome . . . . .	318	<i>Streibl, W., H. Minne, F. Raue, R. Ziegler</i> Radioimmunoassay for Human Parathyroid Hormone for Differentiation between Pa- tients with Hypoparathyroidism, Hyperpara- thyroidism and Normals . . . . .	375
<i>Spitz, I.M., B. Gonen, R. Luboshitzky, E. Ro- sen, O. Shemesh</i> The Prolactin Response to Repeated Intra- venous Stimuli . . . . .	319	<i>Thomasset, M., P. Cuisinier-Gleizes, H. Mathieu</i> Renal CaBP and Calcium Excretion in Phos- phorus Depleted Rats . . . . .	377
<i>Shima, K., A. Tanaka, N. Sawazaki, J. Hamabe, R. Tanaka, Y. Kumahara, N. Yanaihara</i> Hypernatremia in Chronic Renal Failure . . . . .	320		

<i>Washko, Ph.W., R.J. Cousins</i>	
Effect of Parathyroid Hormone on the Uptake of Orally Administered Cadmium . . . . .	378
Review	
<i>Rosenthal, J.</i>	
An Appraisal of the Role of Aldosterone and the Sympathetic Nervous System in Essential Hypertension . . . . .	379
<i>Verdy, M.</i>	
Sodium Sparing Effect of Alanine in Fasting Obese Females . . . . .	382
<i>Arnqvist, H.J., H.H. Dahlkvist</i>	
Effect of Experimental Diabetes on the Incorporation of Amino Acids into Protein in Rat Aorta . . . . .	384
<i>Schönberger, W., W. Grimm, R. Ziegler</i>	
The Effect of (6-D-(o-tert-B)-Ser)-Gonadoliberein-(1-9) Nonapeptide-Ethylamide on Gonadotropin Release in Prepubertal Boys . . . . .	389
<i>Tharandt, L., H. Schulte, G. Benker, K. Hackenberg, D. Reinwein</i>	
Binding of Luteinizing Hormone Releasing Hormone to Human Serum Proteins – Influence of a Chronic Treatment with a More Potent Analogue of LH-RH . . . . .	391
<i>Buckman, M.T., G.T. Peake, S. Srivastava</i>	
Indomethacin Fails to Alter Basal or Phentiazine-Induced Prolactin Concentrations in Man . . . . .	395
<i>Karlsson, F.A., P.A. Dahlberg</i>	
Human Thyrotropin Receptors are Expressed Independently of the State of Thyroid Hormone Production in Thyroid Tissue . . . . .	399
<i>Pinto, J.E.B.</i>	
The Blocking Effect of Magnesium on the Secretion of Adrenal Catecholamines Induced by the Omission of Sodium from the Extracellular Medium . . . . .	404
<i>Weiß, M., M. Nagelschmidt, H. Struck</i>	
Relaxin and Collagen Metabolism . . . . .	408
<i>Owens, D.R., K.G. Wragg, K.T. Shetty, P.I. Biggs, C.D. Davies</i>	
Glibenclamide, Acute/Long-Term Response in M.O. Diabetics . . . . .	411
<i>Eversmann, T., R. Landgraf, W. Londong, K. von Werder</i>	
Effect of Cimetidine on Prolactin-Secretion and Glucose Tolerance in Men . . . . .	412
<i>Dash, R.J., B. Kumar, R. Sialy, G.K. Rastogi</i>	414
LH, FSH Responses to GnRH in Lepromatous Leprosy . . . . .	413
Congress Announcements . . . . .	414
Review	
<i>Luft, R., S. Efendić</i>	
Low Insulin Response – Genetic Aspects and Implications . . . . .	415
<i>Johansen, K., O. Munck</i>	
The Relationship between Maximal Oxygen Uptake and Glucose Tolerance/Insulin Response Ratio in Normal Men . . . . .	424
<i>Richardson, D.K., M.P. Czech</i>	
Diminished Activities of Fatty Acid Synthesis Enzymes in Insulin-Resistant Adipocytes from Spontaneously Obese Rats . . . . .	427
<i>Gorray, K.C., W.B. Quay, R.B.L. Ewart</i>	
Effects of Pinealectomy and Pineal Incubation Medium and Sonicates on Insulin Release by Isolated Pancreatic Islets In Vitro . . . . .	432
<i>Larsson-Cohn, U., L. Wallentin, G. Zador</i>	
Plasma Lipids and High Density Lipoproteins during Oral Contraception with Different Combinations of Ethinyl Estradiol and Levonorgestrel . . . . .	437
<i>Ciavatti, M., S. Renaud</i>	
Modification by Oral Contraceptives in Rat of <sup>14</sup> C Acetate Incorporation into Platelet Lipids . . . . .	441
<i>Porterfield, S.P.</i>	
The Effects of Growth Hormone, Thyroxine and Insulin on the Activities of Reduced Nicotinamide Adenine Dinucleotide Phosphate Dehydrogenase, Glucose-6-Phosphatase and Glycogen Phosphorylase in Fetal Rat Liver. . . . .	444
<i>Cusack, D., C. Cannon, P. Skrabanek, D. Powell</i>	
Substance P Plasma Levels in Pregnancy and in Various Clinical Disorders . . . . .	448
<i>Shima, K., R. Tanaka, N. Sawazaki, Y. Kumahara</i>	
Relationship between Secretory Capacity of Pancreatic A Cell and of B Cell . . . . .	451
<i>Werner, S.</i>	
Human Pituitary Adenomas with Hypersecretion of TSH and Prolactin. Evidence that Receptor Sites for Dopamin may be Absent on TSH Producing while Present on Prolactin Producing Cells . . . . .	452
<i>Gilman, S., R. Thornton, D. Miller, R. Biersner</i>	
Effects of Exercise Stress on Parotid Gland Secretion . . . . .	454
<i>Aaby, P.</i>	
Concentration of Porcine Proinsulin-Like Material in Plasma of Insulin-Treated Diabetics in Relation to Purity of Insulin Preparations . . . . .	455
<i>Schusdziarra, V., V. Harris, R. Unger</i>	
Response of Plasma Somatostatin-Like Immunoreactivity to the Administration of Alloxan in Dogs . . . . .	457

<i>Nooijen, W.J., H.J. Kempen</i> Immunogenicity and Bioactivity of Glucagon, Modified at Methionine-27 . . . . .	459	<i>Laurberg, P., J. Weeke</i> rT <sub>3</sub> Production in Normal Man, Assessed from Variations in Serum rT <sub>3</sub> during Short-Term rT <sub>3</sub> Infusion . . . . .	506
<i>Ohneda, A., K. Watanabe, M. Wakimatsu, M. Fujino</i> Production of a Specific Antiserum by Syn- thetic C-Terminal Fragment of Glucagon . . . . .	463	<i>Nwosu, U.C., M.M. Kaplan, R.D. Utiger, M. Delivoria-Papadopulos</i> Plasma Triiodothyronines in Fetal Sheep: Effects of Illness and Thyroidectomy . . . . .	509
<i>Zawalich, W.S., E.S. Dye, F.M. Matschinsky</i> Nicotinamide Modulation of Rat Pancreatic Islet Cell Responsiveness In Vitro . . . . .	469	<i>Uranga, J., E. Del Castillo</i> Effect of Glomerulopressin on Ovarian Blood Flow in Dogs . . . . .	513
<i>Nutting, D.F., J.C. Zollinger, L.J. Coats</i> In Vitro Effects of Fatty Acids on the Actions of Serum on Rat and Pig Cartilage . . . . .	472	<i>Hodgkinson, A.</i> Effects of Calcium Deprivation and Orchidecto- my on Bone Composition in the Rat . . . . .	516
<i>Sowers, J.R., B.F. Rice, S. Blanchard</i> Effect of Dexamethasone on Luteinizing Hor- mone and Follicle Stimulating Hormone Re- sponses to LHRH and to Clomiphene in the Follicular Phase of Women with Normal Menstrual Cycles . . . . .	478	<i>Corradino, R.A.</i> Hydrocortisone and Vitamin D <sub>3</sub> Stimulation of <sup>32</sup> P <sub>i</sub> -Phosphate Accumulation by Organ-Cultured Chick Embryo Duodenum . . . . .	519
<i>Hagino, N.</i> Effect of Estrogen on Postovulatory LH Surge in Baboons . . . . .	481	<i>Peters, J.R., J. Rhodes, D.R. Owens</i> Metabolic Effects of Altered Meal Frequency in Man . . . . .	524
<i>Osterman, J., J.M. Hammond</i> Effects of Epidermal Growth Factor, Fibro- blast Growth Factor and Bovine Serum Albumin on Ornithine, Decarboxylase Acti- vity of Porcine Granulosa Cells . . . . .	485	<i>Steele, N.C., R.J. Martin, C.A. Baile</i> Insulin Receptor Characteristics and Insulin Degradation by Zucker Lean and Obese Rats . . . . .	525
<i>Hamaji, M., K. Nakao, K. Kiso</i> Pancreatic Glucagon and Insulin Response during Surgery . . . . .	488	<i>Mulloy, A.L., W.J. Visek</i> Arginine-Induced Secretion of Insulin and Glucagon in Rats with Experimental Hyper- ammonemia . . . . .	527
<i>Rodway, R.G., H. Galbraith</i> Effects of Anabolic Steroids on Hepatic En- zymes of Amino Acid Catabolism . . . . .	489	<i>Spencer, G.S.G., M.B. Enser</i> Plasma Somatomedin Activity in Obese- Hyperglycemic Mice . . . . .	528
<i>Pils, P., P. Schmid, P. Schmidt, W. Schlick, J. Zazgornik, H. Kopsa, B. Balcke, E. Deutsch</i> Continuous Body Weight Loss in Chronic Uraemia . . . . .	491	<i>Malmquist, J., B. Israelsson, U. Ljungqvist</i> Inhibition of Human Liver Membrane Adenyl- ate Cyclase by Zinc Ions . . . . .	530
<i>Bolli, G., M.G. Cartechini, P. Compagnucci, S. Malvicini, P. De Feo, F. Santeusano, G. Angeletti, P. Brunetti</i> Effect of Metabolic Control on Urinary Excre- tion and Plasma Levels of Catecholamines in Diabetics . . . . .	493	<i>Jubelin, J., G. Lam Van, J. Boyer</i> Effect of Estrogen on Heparin-Releasable Liver Lipases . . . . .	531
<i>Taketomi, S., H. Iwatsuka</i> Effects of a Synthetic Hexapeptide (β-Ala- Arg-Gly-Phe-Tyr-NH <sub>2</sub> ) on Insulin Binding and Glucose Metabolism of Rat Adipocytes . . . . .	498	Congress Announcements . . . . .	532
<i>Mondola, P., L. Coscia Forrazzi, C. Falconi</i> Cholesterol and Triglycerides of the Liver after Administration of a Chromatographic Fraction of Thymus: Variations in Tissue and Blood . . . . .	503	<i>Bohnet, H.G., A.S. McNeilly</i> Prolactin: Assessment of its Role in the Human Female . . . . .	533
		<i>Greco, A.V., A.G. Rebutzi, L. Altomonte, R. Manna, A. Bertoli, G. Ghirlanda</i> Glucose, Insulin and Somatostatin Infusion for the Determination of Insulin Resistance in Liver Cirrhosis . . . . .	547
		<i>Saito, H., T. Ogawa, K. Ishimaru, I. Oshima, S. Saito</i> Effect of Pentobarbital and Urethane on the Release of Hypothalamic Somatostatin and Pituitary Growth Hormone . . . . .	550

<i>Billaudel, B., B.Ch.J. Sutter</i> Direct Effect of Corticosterone upon Insulin Secretion Studied by Three Different Tech- niques . . . . .	555	<i>Pschera, H., I. Björkhem, K. Carlström, O. Lantto, N.O. Lunell, B. Persson, C. Somell, M. Stangenberg, J. Wager</i> Total Cortisol and L/S-Ratio in Amniotic Fluid in Late Pregnancies Complicated by Diabetes Mellitus . . . . .	612
<i>Kaciuba-Uścilko, H., Z. Brzezińska</i> Effect of Thyroxine Treatment on Metabolic Responses to a Single Insulin Injection . . . .	561	<i>Blossey, H.Chr.</i> Studies on the Molecular Architecture and the Composition of the GH Receptor from Rabbit Liver . . . . .	616
<i>Feldman, J.M., S.A. Welss Jr.</i> Adrenal-Cortical Function in Patients with Medullary Carcinoma of the Thyroid and Pheochromocytoma . . . . .	567	<i>Hopf, U., T.H. Hütteroth, P. Kotulla</i> Demonstration of Circulating Immune Comple- xes in Graves' Disease by the Raji Cell Tech- nique and their Relation to Different Thyroid Autoantibodies . . . . .	622
<i>Siebenschin, R., W. Vetter, R.Leinert, W. Sie- genthaler, H. Vetter</i> Night-Day Variations of Renin-Activity in Pri- mary Aldosteronism . . . . .	570	<i>Llobera, M., A. Muniesa, E. Herrera</i> Effects of Hypo- and Hyperthyroidism on In Vivo Lipogenesis in Fed and Fasted Rats. . . .	628
<i>Lin, T., J. Marchwinski, H. Nankin</i> In Vitro Studies of the Testis: The Effect of LH on Cyclic Nucleotides . . . . .	573	<i>Schweikert, H.U.</i> Conversion of Androstenedione to Estrone in Human Fibroblasts Cultured from Prostate, Genital and Nongenital Skin . . . . .	635
<i>Broulík, P.D., V. Pacovský</i> The Chloride Phosphate Ratio as the Screen- ing Test for Primary Hyperparathyroidism . .	577	<i>Petralito, A., M. Lunetta, A. Liuzzo, R.A. Mangiafico, C.E. Fiore</i> Effects of Salmon Calcitonin on Insulin- Induced Growth Hormone Release in Man . .	641
<i>Damgaard, U., J. Markussen</i> Analysis of Insulins and Related Compounds by HPLC . . . . .	580	<i>Rizza, R., C. Verdonk, J. Miles, F.J. Service, M. Haymond, J. Gerich</i> Somatostatin does not Cause Sustained Fast- ing Hyperglycemia in Man . . . . .	643
<i>Flatt, P.R., S.K. Swanston-Flatt</i> Rapid Production of Potent Glucagon Anti- sera in the Guinea Pig . . . . .	581	<i>Olsen, R.F., W.H. Patton, R.J. Martin, P.J. Wangsness</i> Serum Somatomedin and Fibroblast Prolifera- tive Activity with Growth Hormone Injection in Hypophysectomized and Sham-Operated Rats . . . . .	645
<i>Le Roith, D., M. Shapiro, K. Jabotinsky, I.M. Spitz</i> Prolactin Nonresponsiveness to Arginine in Diabetes Mellitus . . . . .	583	<i>York, D.A., V. Godbole</i> Effect of Adrenalectomy on Obese 'Fatty' Rats . . . . .	646
<i>Gecse, A., A. Ottlecz, M. Faragó, T. Forster, G. Telegdy</i> The Effect of ACTH and its Fragments on the In Vitro Metabolism of Prostaglandins . .	585	<i>Bray, G.A., W.T. Dahms, R.L. Atkinson, J. Rodin, I. Taylor, C. Frame, A. Schwartz</i> Metabolic and Behavioral Differences be- tween Dieting and Intestinal Bypass . . . . .	648
<i>Spencer, G.S.G.</i> Circadian Variation of Somatomedin and Cortisol in Pigs . . . . .	586	<i>Schwedes, U., P.H. Althoff, I. Klempa, U. Leuschner, L. Mothes, S. Raptis, J. Wdowinski, K.H. Usadel</i> Effect of Somatostatin on Bile-Induced Acute Hemorrhagic Pancreatitis in the Dog . . . . .	655
<i>Girndt, J., H.V. Henning, G. Delling</i> Correlation of Calcium and Acid-Base Metabolism . . . . .	587	<i>Nosadini, R., F. Ursini, C. Garotti, A. Tiengo, C. Gregolin</i> Perfused Liver Carnitine Palmitoyl-Transferase Activity and Ketogenesis in Streptozotocin Treated and Genetic Hyperinsulinemic Rats. Effect of Glucagon . . . . .	661
Congress Announcements . . . . .	588		
<i>Grube, D., W.G. Forssmann</i> Morphology and Function of the Entero- Endocrine Cells . . . . .	589		
<i>Haeckel, R., M. Oellerich</i> Hydrazonopropionic Acids, a New Class of Hypoglycemic Substances. I. Hypoglycemic Effect of 2-(Phenylethyl-hydrazono)- and 2-(2-Cyclohexyl-ethylhydrazono)-Propionic Acid . . . . .	606		



<i>Laczi, F., J. Julesz, T. Janáky, F.A. László</i> Growth Hormone Reserve Capacity in Turner's Syndrome . . . . .	664	<i>Caviezel, E., M. Poli, M. Murari, A.M. Girardi, G. Pozza</i> Influence of Therapeutic Doses of Vincristine on the Arginine-induced Insulin and Growth Hormone Secretions in Man . . . . .	692
<i>Geierhaas, B., M. Herrmann</i> About the Relationship between Adrenal Cortex and Thyroid Gland of Rats (Shift-Effect) . . . . .	666	<i>Susini, C., M. Lavau, J. Herzog</i> Insulin Effect In Vivo on the Activity of Acetyl-Coenzyme A Carboxylase in Adipose Tissue of Rats Fed a Low or a High-fat Diet . . . . .	694
<i>Stephan, F., Ph. Reville, F. de Laharpe, M.J. Compagnie</i> Influence of Nutritional Factors on the Renotropic Action of ACTH in the Uninephrectomized Rat . . . . .	669	<i>de Mendoza, S.G., H. Nucete, E. Salazar, A. Zerpa, M.L. Kashyap</i> Plasma Lipids and Lipoprotein Lipase Activator Property during the Menstrual Cycle . . . . .	696
<i>Brzezińska, Z., H. Kaciuba-Uścilko</i> Low Muscle and Liver Glycogen Contents in Dogs Treated with Thyroid Hormones . . . . .	675	<i>Passia, D., B. Hilscher, H.G. Goslar, W. Hilscher, N. Hofmann</i> Thiamine Pyrophosphatase – TPPase – as a "Marker Enzyme" of the Germ Cells in the Rat . . . . .	697
<i>Morley, J.E., L.A. Distiller, I. Lissos, R. Lipschitz, G. Kay, D.L. Searle, M. Katz</i> Testicular Function in Patients with Spinal Cord Damage . . . . .	679	<i>Hope-Gill, H.F., V. Nanda</i> Stimulation of Calcium ATPase by Insulin, Glucagon, Cyclic AMP and Cyclic GMP in Triton X-100 Extracts of Purified Rat Liver Plasma Membrane . . . . .	698
<i>Hannappel, E., U. Drews</i> Mosaic Character of Spermatogenesis in Carriers of the Sex Reversed Factor in the Mouse . . . . .	682		
<i>Csaba, G., O. Dobozy, G. Kaizer</i> Study of FSH-TSH Functional Overlap by Cockerel Testicle Test . . . . .	689		

## AUTHOR'S INDEX

- A**  
Aaby, P. 455  
Alberetto, M. 257  
Alberti, K.G.M.M. 332  
Alric, R. 95  
Altomonte, L. 547  
Althoff, P.H. 655  
Ambrosi, B. 318  
Andrade, L.L. 265  
Angeletti, G. 493  
Arnqvist, H.J. 384  
Atkinson, R.L. 648  
Atwell, R. 289
- B**  
Baba, S. 23  
Babický, A. 83  
Baile, C.A. 525  
Balcke, P. 491  
Bamji, M.S. 64  
Bandisode, M.S. 187  
Banoyac, K. 301  
Baranao, J.L. 161  
Barber, S.G. 220  
Bark, H. 177  
Barlet, J.-P. 57  
Bass, A. 6  
Bastomsky, C.H. 301  
Baxter, R.C. 216  
Benker, G. 391  
Benveniste, R. 165  
Bertoli, A. 547  
Beyer, J. 195, 261  
Bianca, W. 246  
Bieger, W. 352  
Biersner, R. 454  
Biella de Souza Valle, L. 161  
Biggs, P.I. 77, 411  
Billaudel, B. 555  
Birnbäum, R.S. 136  
Björkhem, I. 612  
Blackard, W.G. 149  
Blanchard, S. 478  
Blayac, J.P. 95  
Blossey, H.Ch. 616  
Blum, J.W. 246  
Boer, P. 47  
Bohnet, H.G. 533  
Bolli, G. 493  
Boshell, B.R. 187  
Botha, A. 78  
Boyer, J. 531  
Braendle, W. 60  
Brandenberger, G. 180  
Bray, G.A. 647  
Breidenbach, Ch. 200  
Bretzel, R.G. 200  
Briaud, B. 130  
Britton, B.J. 52  
Broulík, P. D. 577  
Brown, A.S. 216  
Brunetti, P. 493  
Bryce, G.F. 90  
Brzezińska, Zofia 561, 675  
Buchanan, K.D. 19  
Buckman, M.T. 395  
Buse, Maria G. 289
- C**  
Cahnmann, H.J. 233  
Calvo, J.C. 161  
Cannon, D. 448  
Carlström, K. 612  
Carrillo, B.J. 57  
Cartechini, Maria G. 493  
Casado, S. 343  
Casanello-Ertel, Delia 207  
Caviezal, E. 692  
Charreau, E.H. 161  
Ciavatti, M. 441  
Clos, J. 228  
Coats, Linda J. 472  
Cohen, R. 174  
Compagnie, M.J. 669  
Compagnucci, P. 493  
Conlon, J.M. 19  
Cordes, U. 261  
Corradino, R.A. 519  
Corring, T. 346  
Coscia Porrazzi, L. 503  
Courtright, J.B. 304  
Cousins, R.J. 378  
Cuisinier-Gleizes, Paulette 377  
Curbelo, H.M. 155  
Cusack, D. 448  
Csaba, G. 689  
Czech, M.P. 427
- D**  
Dahlberg, P.A. 399  
Dahlkvist, H.H. 384  
Dahms, W.T. 647  
Dambacher, M.A. 168  
Dangaard, U. 580  
Da Prada, M. 246  
Darwish, Suzan A.E. 44  
Dash, R.J. 413  
Davicco, Marie Jeanne 57  
Davidson, M.B. 207  
Davies, C.D. 77, 411  
De Feo, P. 493  
Del Castillo, E. 275, 513  
Delivoria-Papadopoulos, M. 509  
Delling, G. 587  
Deutsch, E. 491  
Dietze, G. 1  
Distiller, L.A. 68, 679  
Dobozy, O. 689  
Doerr, P. 181  
Donald, R.A. 142  
Dorhout Mees, E.J. 47  
Drews, U. 682  
Dubin, A. 107  
Dubuc, P.U. 37  
Dvořáková, J. 241  
Dye, Evelyn S. 469
- E**  
Eaton, R. 270  
Efendić, S. 415  
Enser, M.B. 528  
Epstein, S. 68  
Ertel, N. 30
- Eversmann, T. 412**  
Ewart, R.B.L. 432  
Faber, J. 34  
Faglia, G. 318  
Faber, J. 34  
Faglia, G. 318  
Falconi, C. 503  
Faisst, G. 261  
Faragó, M. 585  
Federlin, K. 200  
Feldman, J.M. 567  
Fiore, C.E. 641  
Fischer, J.A. 246  
Fitts, R.H. 304  
Flatt, P.R. 581  
Foà, P.P. 100  
Follenius, M. 180  
Forssmann, W.G. 589  
Forster, T. 585  
Frame, C. 648  
Fraser, W.M. 149  
Frayn, K.N. 255  
Friis, T. 34  
Fuenzalida, Rebeca 275  
Fujino, M. 463  
Furman, B.L. 44
- G**  
Gaggini, M. 318  
Galbraith, H. 489  
Galton, Valerie A. 362  
Garmendia, F. 81  
Garotti, C. 661  
Geese, A. 585  
Geierhaas, B. 666  
Gent, C.M. van 253  
Gerich, J. 643  
Gerö, L. 72  
Ghiglione, Margarita 343  
Ghirlanda, G. 547  
Giannetto, B.O. 80  
Gilman, Sara 454  
Girard, Anik 118  
Girardi, A.M. 257, 691  
Girndt, J. 587  
Glick, S.M. 177  
Goberna, R. 183  
Godbole, V. 646  
Gold, C. 68  
Goldberg, R.B. 78  
Goldbrick, R.B. 280  
Gonen, B. 319  
Goodman, H.M. 136  
Gorray, K.C. 432  
Goslar, H.G. 697  
Greco, A.V. 547  
Gregolin, C. 660  
Griglio, S. 118  
Grimm, W. 389  
Griswold, M.D. 80  
Grubb, S.R. 149  
Grube, D. 589  
Guncaga, J. 168  
Guzdek, A. 107
- H**  
Haas, H.G. 168  
Hackenberg, K. 391
- Haeckel, R. 606**  
Hagino, N. 296, 358, 481  
Hainer, V. 178  
Hamabe, J. 320  
Hamaji, M. 488  
Hammond, J.M. 485  
Hannapel, Elisabeth 682  
Hansen, B. 85  
Harano, Y. 338  
Harris, Virginia 457  
Hartmann, F. 158  
Hasegawa, M. 23  
Havekka, S. 83  
Hayek, A. 172, 256  
Haymond, M. 643  
Haymovits, A. 352  
Hawrylko, J. 173  
Herberg, Lieselotte 195, 323  
Hendrich, Ch. E. 362  
Henning, H.V. 587  
Herndon, Ch. M. 270  
Herrera, E. 628  
Herrmann, M. 666  
Herzog, J. 694  
Hessel, L.W. 253  
Hidaka, H. 338  
Higgins, J.R. 258  
Hilscher, B. 697  
Hilscher, W. 697  
Hinks, L. 332  
Hoare, A.M. 220  
Hodgkinson, A. 516  
Hofmann, J. 200  
Hofmann, N. 697  
Holló, I. 72  
Honey, R.N. 111  
Hopf, U. 622  
Hoppe-Gill, H.F. 698  
Horký, K. 241  
Houssay, A.B. 155  
Hütteroth, T.H. 622
- I**  
Irving, M.H. 52  
Ishikawa, T. 280  
Ishimaru, K. 550  
Israelsson, B. 530  
Ito, S. 184  
Iwatsuka, H. 498
- J**  
Jabotinsky, K. 583  
Jacoby, J.H. 90  
Janáky, T. 664  
Jensen, Frida 85  
Jentzen, F. 158  
Joffe, B.I. 78  
Johansen, K. 424  
Jones, C.T. 237  
Joost, H.G. 104  
Jubelin, J. 531  
Julesz, J. 664
- K**  
Kaciuba-Uściłko, Hanna 561, 675

- Kaizer, G. 689  
 Kalk, J. 68  
 Kalopissis, A.D. 118  
 Kansal, P.C. 187  
 Kaplan, M.M. 509  
 Karliner, E.C. 155  
 Karlsson, F.A. 399  
 Kashyap, M.L. 696  
 Kather, H. 176  
 Katz, M. 68, 679  
 Kay, G. 679  
 Kaye, G. 68  
 Kayamori, R. 184  
 Kempen, H.J. 457  
 Kenner, A. 165  
 Kessler, E. 81  
 Kirkegaard, C. 34  
 Kiso, K. 488  
 Klempa, I. 655  
 Kobayashi, T. 23  
 Koch, B. 130  
 Kølendorf, K. 85  
 Kopsa, H. 491  
 Korányi, L. 72  
 Kotulla, P. 622  
 Koyama, T. 358  
 Krause, U. 195, 261  
 Krejčík, L. 178  
 Kronheim, S. 79  
 Kubek, M.J. 26  
 Kuehn, Cynthia 172  
 Kukulansky, Tova 14  
 Kumahara, Y. 320, 451  
 Kumar, B. 413  
 Kunz, P. 246
- L**
- Lachmanová, J. 241  
 Laczi, F. 664  
 Lämmle, B. 168  
 Laharpe, F. de 669  
 Lakshmaiah, N. 64  
 Lam Van, G. 531  
 Landgraf, R. 412  
 Lantto, O. 612  
 Larsson-Cohn, U. 437  
 László, F.A. 664  
 Lavau, M. 694  
 Lauffenburger, T. 168  
 Laurberg, P. 506  
 Leesthma, J.E. 26  
 Lefavre, J. 57  
 Legrand, J. 228  
 Leinert, R. 570  
 Le Roith, D. 583  
 Le Roith, D. 177  
 Leuschner, U. 655  
 Lin, T. 573  
 Linde, Susanne 85  
 Lindental, D.M. 265  
 Lipschitz, R. 679  
 Lissoos, I. 679  
 Liuzzo, A. 641  
 Liversey, J.H. 142  
 Ljungquist, U. 530  
 Llobera, M. 628  
 Löffler, G. 285  
 Lombardo, Y.B. 9  
 Londong, W. 412  
 Loubatières-Mariani, M.M. 95
- Luboshitzky, R. 319  
 Luft, R. 415  
 Lumholtz, I.B. 34  
 Lunell, N.O. 612  
 Lunetta, M. 641  
 Lutz-Bucher, B. 130  
 Luzzio, J.P. 174
- M**
- Macnab, M. 78  
 Makimura, H. 23  
 Malmquist, J. 530  
 Malvicini, S. 493  
 Mancusi, V. 289  
 Mangiafico, R.A. 641  
 Manna, R. 547  
 Manougian, A. 30  
 Marchwinski, J. 573  
 Markussen, J. 580  
 Marschner, I. 309  
 Martin, R.J. 525, 643  
 Matesanz, R. 343  
 Mathieu, H. 377  
 Matschinsky, F.M. 469  
 Matsuyama, T. 214  
 Maurer, W. 60  
 May, P. 30  
 Maycock, Paula, F. 255  
 Mc Neilly, A.S. 533  
 Menahan, L.A. 9  
 Mendoza, S.G. de 695  
 Mialhe, C. 130  
 Mialhe, P. 123  
 Micossi, P. 100  
 Miles, J. 643  
 Miller, D. 454  
 Minne, H. 375  
 Mittler, J. 30  
 Mobley, P.W. 37  
 Møllholm Hansen, J. 34  
 Mondola, P. 503  
 Mordasini, R. 176  
 Morley J.E. 68, 679  
 Mothes, L. 655  
 Mulloy, A.L. 527  
 Munck, O. 424  
 Muniesa, A. 628  
 Murakami, K. 23  
 Murari, M. 691  
 Murphy, R.F. 19  
 Musilová, J. 83
- N**
- Näf, F. 246  
 Nagelschmidt, M. 408  
 Nakao, K. 488  
 Nakayama, K. 293  
 Nanda, V. 698  
 Nankin, H. 573  
 Natrass, M. 332  
 Nooijen, W.J. 459  
 Noorden, C.J.F. van 366  
 Nosadini, R. 661  
 Nucete, H. 696  
 Nutting, D.F. 472  
 Nwosu, U.C. 509
- O**
- O'Connor, F.A. 19  
 Oelkers, W. 306  
 Oellerich, M. 606  
 Ogawa, T. 550  
 Ohgaku, S. 338  
 Ohneda, A. 463  
 Okuno, Akimasa 293  
 Olah, J. 168  
 Olefsky, J.M. 209  
 Olsen, R.F. 645  
 Oshima, I. 550  
 Oster, P. 176  
 Osterman, J. 485  
 Ottlecz, A. 585  
 Owens, D.R. 77, 411, 524
- P**
- Pacovsky, V. 577  
 Paetzke-Brunner, I. 285  
 Palmieri, G.M.A. 173  
 Pasqua, A. De 257  
 Passia, D. 697  
 Patton, W.H. 643  
 Peake, G.T. 395  
 Pellicciotta, G. 257  
 Persson, B. 612  
 Peters, J.R. 524  
 Petralito, A. 641  
 Pils, P. 491  
 Pimstone, B. 79  
 Pintado, E. 183  
 Pinto, J.E.B. 404  
 Pokroy, M. 68  
 Poland, R.E. 222  
 Poli, M. 691  
 Pontiroli, A.E. 100, 257  
 Porterfield, Susan, P. 362, 444  
 Powell, D. 448  
 Pozza, G. 257, 691  
 Prieto, J.C. 183  
 Price, S. 111  
 Pschera, H. 612  
 Puett, D. 165
- Q**
- Quay, W.B. 432
- R**
- Rabinowitz, D. 165  
 Radó, J.P. 47  
 Rapoport, Ana Lía 275  
 Raptis, S. 655  
 Rastogi, G.K. 413  
 Rath, R. 6  
 Raue, F. 375  
 Rebuzzi, A.G. 547  
 Reine, P.H. van 253  
 Reinhardt, B. 180  
 Reinwein, D. 391  
 Renaud, Aurora 265  
 Renaud, Aurora 190  
 Renaud, S. 441  
 Reville, Ph. 669  
 Rhodes, J. 524  
 Rice, B.F. 478  
 Richardson, D.K. 427  
 Rizza, R. 643  
 Robbins, J. 39  
 Rodin, J. 648  
 Rodríguez, R.R. 190, 265  
 Rodway, R.G. 489  
 Rohožková, D. 83
- Rosen, E. 319  
 Rosenthal, J. 379  
 Rubin, R.T. 222  
 Ruiz, G. 183  
 Rutherford, R. 147
- S**
- Sagel, J. 68  
 Saito, H. 550  
 Saito, S. 550  
 Sakoda, M. 23  
 Salazar, E. 696  
 Santeusanio, F. 493  
 Sara, Vicki, R. 147  
 Sarnecka-Keller, M. 107  
 Sawasaki, N. 320, 451  
 Schade, D.S. 270  
 Schefzig, B. 306  
 Schleiffer, R. 130  
 Schlick, W. 491  
 Schlierf, G. 176  
 Schmid, P. 491  
 Schmidt, P. 491  
 Schöneberger, W. 389  
 Schönhöfer, M. 306  
 Schulte, H. 391  
 Schusdziarra, V. 457  
 Schwartz, A. 648  
 Schwedes, U. 655  
 Schweikert, H.U. 635  
 Scott, R.S. 142  
 Scriba, P.C. 309  
 Searle, D.L. 679  
 Secchi, F. 318  
 Seftel, H.C. 78  
 Seki, M. 23  
 Sekso, M. 252, 301  
 Service, F.J. 643  
 Shapiro, B. 79, 583  
 Shemesh, O. 319  
 Shetty, K.J. 77  
 Shetty, K.T. 411  
 Shibata, A. 184  
 Shigeta, Y. 338  
 Shima, K. 214, 320, 451  
 Sialy, R. 413  
 Siebenschein, R. 570  
 Siegenthaler, W. 570  
 Siersbaek-Nielsen, K. 34  
 Simatupang, T. 47  
 Simeoni, M. 180  
 Simoes, Nunes, C. 346  
 Simon, B. 176  
 Sitbon, G. 123  
 Skovsted, L. 34  
 Skrabanek, P. 448  
 Skreb, F. 301  
 Smythe, G.A. 147  
 Smythe, P. 332  
 Sobrino, F. 183  
 Solter, M. 252  
 Somell, C. 612  
 Sorimachi, K. 39, 233  
 Sowers, J.R. 478  
 Spencer, G.S.G. 528, 528, 586  
 Spitz, I.M. 319, 583  
 Šrámková, J. 241  
 Srivastava, S. 395  
 Stangenberg, M. 612

Stárka, L. 178  
 Steczek, Katalin 72  
 Steele, N.C. 525  
 Stephan, F. 669  
 Streibl, W. 375  
 Struck, H. 408  
 Susini, C. 694  
 Sutter, B.Ch.J. 555  
 Sverdlík, R.C. 190, 265  
 Swanston-Flatt, S.K. 581  
 Szalay, F. 72

**T**

Taguchi, T. 293  
 Takatsuki, K. 338  
 Taketomi, S. 498  
 Takimoto, M. 293  
 Tanaka, A. 320  
 Tanaka, R. 214, 320, 451  
 Taniguchi, H. 23  
 Tarui, S. 214  
 Taylor, I. 648  
 Taylor, W.M. 280  
 Teisinger, J. 6  
 Telegdy, G. 585

Terpstra, J. 253  
 Tesárek, B. 83  
 Tesone, M. 161  
 Tharandt, L. 391  
 Theilade, P. 34  
 Thomasset, Monique 377  
 Thornton, R. 454  
 Tiengo, A. 661  
 Tober, C. 195  
 Todd, P.G. 332  
 Tomášek, R. 241  
 Touber, J.L. 366  
 Tsutou, A. 23  
 Tucker, H.St. 149  
 Turtle, J.R. 216

**U**

Unger, R. 457  
 Uranga, Julia 275, 513  
 Urbánek, J. 178  
 Urdanivia, E. 81  
 Ursini, F. 661  
 Usadel, K.H. 655  
 Utiger, R.D. 509  
 Utsumi, M. 23

**V**

Valette, G. 95  
 Vaverde, Isabel 343  
 Verdonk, C. 643  
 Verdy, M. 382  
 Vetter, H. 570  
 Vetter, W. 570  
 Vigouroux, E. 228  
 Visek, W.J. 527  
 Vitek, V. 6  
 Vondra, K. 6

**W**

Wager, J. 612  
 Wakimatsu, M. 463  
 Wallentin, L. 437  
 Wambach, G. 258  
 Wangness, P.J. 645  
 Washko, Ph. W. 378  
 Watanabe, K. 463  
 Watanabe, Y. 23  
 Weeke, J. 506  
 Weichsel, M.E. Jr. 222  
 Weicker, H. 352  
 Weiss, H. 371

Weiss, Marija 408  
 Wells, S.A., Jr. 567  
 Werder, K. von 412  
 Werner, Sigbritt 452  
 Wernze, H. 371  
 Wdowinski, J. 655  
 Wicklmayr, W. 1  
 Wieland, O.H. 285  
 Wiersinga, W.M. 366  
 Wigand, J.P. 149  
 Wilber, J.F. 26  
 Wood, W.G. 52, 309  
 Wragg, K.G. 77, 411  
 Yagil, G. 14  
 Yanaihara, N. 320  
 Yamada, Y. 184  
 York, D.A. 646

**Z**

Zador, G. 437  
 Zawulich, W.S. 469  
 Zazgornik, J. 491  
 Zerpa, A. 696  
 Ziegler, R. 375, 389  
 Zollinger, Jane C. 472

**SUBJECT INDEX****A**

Absorption of Insulin 85  
 A Cell (Pancreatic) Reactivity,  
 Juvenile Diabetics 451  
 Acetyl Coenzyme A Carboxy-  
 lase 427, 693  
 Acid-Base Metabolism, Calcium 587  
 ACTH 158, 318  
 – Anterior and Posterior Pituitary  
 130  
 – Effect on Prostaglandins in vitro  
 585  
 – Heat Exposure 180  
 – Renotrophic Action 669  
 Acute Pancreatitis 655  
 Adenylate Cyclase, Human Fat  
 Cells 176  
 – Liver, Zinc Ions 530  
 Adipocytes, Insulin Resistance 427  
 – Metabolism 209  
 Adipocyte Plasma Membrane 174  
 Adipocytes, Rat, Insulin Binding  
 and Glucose Metabolism 498  
 Adipose Tissue 136  
 – Enzymes of Energy Metabolism 6  
 – Fat Diet 694  
 – Glycerokinase 280  
 – Obese Mice 195  
 – (subcutaneous) 176  
 Adrenal Catecholamines, Na-Depriva-  
 tion, Magnesium 404  
 Adrenal Cortex 666  
 Adrenal-Cortical Function, Medullary  
 Carcinoma of the Thyroid and  
 Pheochromocytoma 567  
 Adrenalectomy, Obese "Fatty" Rats  
 646  
 Adrenalectomized Rats 172

Adrenalectomy 130, 261  
 Adrenal Function, Prolactin 540  
 Adrenal, 18-Hydroxylation 306  
 Adrenaline, Fat Cells 176  
 Adrenaline Thyroxine Treatment  
 561  
 Adrenergic Blockade, Plasma Ca-  
 techolamine Levels 52  
 Adrenergic Receptor Blockade 90  
 Adrenocorticotrophin, Fluctuations  
 in Sheep 237  
 African white tailed rat 327  
 Alanine, Obesity 382  
 – Sulfonylureas and Metformin 332  
 Aldosterone 379, 570  
 – Plasma Heat Exposure 180  
 Aldosteronism, Primary Renin-Acti-  
 vity 570  
 Alloxan, Somatostatin-Like Immuno-  
 reactivity 457  
 Altitude 246  
 – TSH Levels 155  
 Amino Acids, Branched Chain 289  
 – Catabolism, Anabolic Steroids  
 489  
 – Exocrine Pancreas 352  
 Aminophylline 190  
 Amniotic Fluid, Diabetic Pregnancy  
 612  
 Amylase, Pancreatitis 655  
 Anabolic Steroids, Hepatic Enzymes  
 489  
 Androgen Binding Protein 80  
 Androstenedione, Conversion to  
 Estrone 635  
 Angiotensin II 371  
 Anomer, Glucose 214  
 Antidiuretic Hormone 241

Antidiuretic Hormone, Secretion,  
 Somatostatin 177  
 AntiHCG-Serum 165  
 Antihistaminic Agents, Gluca-  
 gon and Insulin Release 100  
 Antiserotonergic Treatment,  
 Cushing's Syndrome 318  
 Aorta, Rat, Protein Synthesis,  
 Experimental Diabetes 384  
 Arginine-Induced Insulin and  
 Growth Hormone Secretion  
 692  
 Arginine, Insulin and Glucagon  
 Secretion 527  
 – Plasma 241  
 – Prolactin Release 583  
 A System, Amino Acid Trans-  
 port 352

**B**

Baboon 296  
 Baboons 358, 481  
 BB rat 324  
 Beta-Cell Membrane 104  
 B Cell (Pancreatic) Reactivity,  
 Juvenile Diabetics 451  
 – Residual Secretion 261  
 BHE rat 328  
 Blood Glucose, Sulfonylureas and  
 Metformin 332  
 Blood Sugar, Hyperthyroidism 190  
 – Hypothyroid Dogs 266  
 Body Weight Loss, Chronic Uraemia  
 491  
 Bone Disease, Calcium 516  
 Brain, Developing Thyroxine 228  
 – Growth-Promoting Activity 147  
 Brattleboro Rats 130

XIV Subject Index

Bromocriptine, Pituitary Adenoma 452  
 Brown Adipose Tissue 285  
 Bypass, Intestinal 648

**C**

<sup>115m</sup>Cadmium 378  
 Cadmium Uptake 378  
 Caerulein 352  
 Calcitonin 184, 567  
   – Calcium Levels 73  
   – Growth Hormone Release in Man 641  
 Calcium 73  
   – Absorption 168  
   – Acid-Base Metabolism 587  
   – ATPase 698  
   – Balance 168  
   – -Binding Protein, Renal 377  
   – – 519  
   – Diet 378  
   – Dietary 516  
   – Excretion 377  
   – Levels in Fetal Blood 57  
 Canrenoate-K 258  
 Carbohydrate Metabolism, Contraception 81  
 Carbohydraterich Diet 253  
 Carnitine 78  
   – Palmitoyl Transferase (CPT) 661  
 Cartilage, Fatty Acids 472  
   – Metabolism 83  
 Castration, Bone Composition 516  
 Catecholamines, Adrenal, Magnesium, Sodium deprivation 404  
   – Diabetes 493  
   – Exercise 246  
   – Plasma 52  
 CCK, Pancreatitis 655  
 Childhood, Prolactin 534  
 Chinese Hamster 326  
 Cholesterol 118  
   – Liver 503  
 Chloride Phosphate Ratio, Primary Hyperparathyroidism 577  
 Chloride Reabsorption 275  
 Chlorphentermine 158  
 Chlorpropamide, Diabetes 77  
 Chromatography, Insulin 580  
 Chronic Uræmia, Continuous Body Weight Loss 491  
 Cimetidine, Effects on Prolactin 220  
   – Glucose Tolerance 412  
   – Prolactin 257  
   – – Secretion 412  
 Clomiphene, Gonadotropins 478  
 Collagen Metabolism, Relaxin 408  
 Conjugase 64  
 Contraceptives, Platelet Lipids 441  
 Contraception, Postcoital, Carbohydrate Metabolism 81  
 Corticosteroid in Plasma, Sheep 237  
 Corticosterone 222  
   – Insulin Secretion 555  
   – Urinary, Blood and Adrenal 158  
 Cortisol 318  
   – Circadian Variations 586  
   – Cyproheptadine Pretreatment 178  
   – Diabetic Pregnancy 612

Cortisol, Free, in Urine 567  
 C-Peptide, Diabetics 261  
 C-Regional Fragments, Parathyrin 309  
 Culture, Hepatocarcinoma Cells 233  
 Cultured Monkey Hepatocarcinoma Cells 39  
 Cushing's Syndrome 318, 567  
 Cyclic AMP, Calcium ATPase 698  
   cyclic AMP, Plasma 183  
   – Relaxin 408  
   – Testis 573  
 Cyclic GMP, Calcium ATPase 698  
   – Testis 573  
 Cyclic Nucleotides, Testis 573  
 2-(2-Cyclohexyl-Ethylhydrazono)-Propionic Acid 606  
 Cyproheptadine, Cushing's Syndrome 318  
   – Pretreatment, Serum Cortisol Levels 178  
 Cytogenesis, Maturation, and Cell Cycle, Entero-Endocrine Cells 600

**D**

2-Deoxy Glucose, Adipocytes 209  
 Desoxycorticosterone-acetat 258  
 Dexamethasone, Gonadotropins and LHRH 478  
 Dexchlorpheniramine 100  
 Diabetes, Catecholamines 493  
   – Chlorpropamide 77  
   – Experimental 200  
   – Glomerulopressin 513  
   – Ketone Body Metabolism 1  
   – Leydig Cell Enzymes 161  
   – Mellitus, Acute/Long-Term Response to Glibenclamide 411  
   – – Prolactin Nonresponsiveness 583  
   – Mouse 323  
   – Pregnancy 612  
   – Somatomedin 216  
 Diabetic Animals 606  
   – Insulin Dependent Maturity Onset 261  
   – Juvenile Pancreatic A and B Cell Reactivity 451  
   – Ketoacidosis 142  
   – Purity of Insulin Preparations 455  
   – Stupor 78  
 Diamide 209  
 Diet, Exocrine Pancreas 346  
 Diiodothyronines 233  
 Diurnal Fluctuation, ACTH and Corticosteroids in Sheep 237  
 Diurnal Rhythm, Plasma Lipoproteins and Liver Lipids 118  
 Djungarian hamster 327  
 Dog 177, 214  
   – Hyperthyroidism 190, 266  
   – Pancreatitis 655  
 Dopaminergic Treatment, Cushing's Syndrome 318  
 Dopamine, 11-Hydroxy-corticosteroids 44  
   – Pituitary Adenoma 452  
 Duodenum, Organ-Cultured 519

**E**

Electron Microscopy, Entero-Endocrine Cells 591  
 Endocrine Cells, Gut 589  
 Endotoxinaemia 371  
 Energy Metabolism Enzymes 6  
 Entero-Endocrine Cells 589  
 Enzymes, Energy Metabolism 6  
 Epidermal Growth Factor 485  
 Epinephrine, Diabetes 493  
 Estradiol, Ethinyl- 437  
 Estrogen, Lipase Activity 531  
   – Nembutal 296  
   – Postovulatory LH Surge 481  
 Estrone Formation 635  
 Evisceration, Rat 270  
 Exercise Stress, Parotid Secretion 454  
   – Treadmill 246  
 Exocrine Pancreas 346  
   – Amino Acid Transport 352  
 Experimental Diabetes, Protein Synthesis, Rat Aorta 384

**F**

Fasting 270  
   – Muscle 289  
   – Obesity 382  
   – Rats, Plasma c-AMP Concentration 183  
 Fat 270  
   – Cell Adenylate Cyclase 176  
   – Cells, Isolated Pyruvate Dehydrogenase 285  
   – Diet 14, 118, 694  
 Fatty Acids, Cartilage 472  
   – Plasma Non-Esterified, Sulfonylureas and Metformin 332  
   – – Synthesis, Insulin-Resistance 427  
   – – Synthetase, Effect of Insulin on 14  
 Fetal Distress, Sheep 509  
 Fetal Growth 147  
 Fetal Rat Liver Enzymes, Growth Hormone Thyroxine and Insulin 444  
 Fetus, Calcium Levels 57  
 FFA Somatostatin 338  
 Fibroblast Growth Factor 485  
   – Proliferative Activity 645  
   – Culture 635  
 Fluoxetine 90  
 Folate Metabolism 64  
   – Methyl 64  
   – Non-Methylated 64  
 Forearm, Ketone Body Metabolism 1  
 Forskin 635  
 Free Fatty Acids Hyperthyroidism 190  
   – – Serum, Hypothyroid Dogs 266  
   – – Thyroxine Treatment 561  
 Fructose Oxidation, Rat Adipocytes 498  
 FSH 68  
 FSH-TSH-Receptor Maturation 689

**G**

Galactorrhea 68  
 Gastrin, Pancreatitis 654  
 Genetic Aspects, Low Insulin Response 415  
 Genetic Obesity (Zucker Rat) 661  
 Geographical Differences, Iodine Intake 301  
 Germ Cells, Rat 697  
 Glibenclamide, Acute/Long-Term Response 411

- GLI/IRI 123  
 Glomerular Filtration Rate 275  
 Glomerulopressin 275, 513  
 Glucagon Antiserum Production in Guinea Pigs 581  
 Glucagon Bioactivity 457  
 – Calcium Levels 73  
 – C-Terminal Antiserum 463  
 – Derivative (Methionine-27) 457  
 – Glucagon, Fragment 463  
 – Hyperinsulinemic Rats 661  
 – IRI 123  
 – -Like Immunoreactivity 19  
 – – (GLI) 343  
 – – Material 214  
 – Liver Cirrhosis 547  
 – Porcine 457  
 – Release 90  
 – – Histamine and Histidine 100  
 – Renal Function 275  
 – Secretion, Hyperammonemia 527  
 – Somatostatin 338  
 – Surgery 488  
 Gluconeogenesis, Hypothyroidism 256  
 – Liver of ob/ob Mice 9  
 – Sulfonylureas and Metformin 332  
 Glucoreceptors, Diabetics 261  
 Glucose Absorption, GLI in Plasma 343  
 – Anomer 214  
 – Infusion Test, Hypothyroid Dogs 266  
 – Metabolism, Islet Transplantation 200  
 – – Nicotinamide 469  
 – Oxidation, Adipocytes 209  
 – – Rat Adipocytes 498  
 – -6-Phosphate Dehydrogenase Effect of Insulin on 14  
 – Posthyperglycemic 252  
 – Stimulation, Glucagon-Like Reactivity 19  
 – Tolerance, Cimetidine 412  
 – – Maximal Oxygen Uptake 424  
 – Transport, Adipocytes 209  
 – – Rat Adipocytes 498  
 – Utilization, Insulin 270  
 Glucuronides 275  
 Glycerokinase 280  
 Glycerol, Sulfonylureas and Metformin 332  
 Glycogen 118  
 – Liver and Muscle 675  
 Glycoprotein, GH Receptor 616  
 Glycogen Metabolism Muscle 255  
 – Synthesis, Cultured Muscle Cells 207  
 Glycopeptides 165  
 Gonadotropin Receptors 61  
 – Release 389  
 – -Releasing Hormone 27  
 – Prolactin 538  
 – Clomiphene 478  
 – Dexamethasone 478  
 – Spinal Cord Damage 679  
 Gonads, Cimetidine 220  
 Goose, Feeding, Fasting, Oral Glucose 123  
 Granulose Cells (Rat) 181  
 Graves' Disease, Raji Cell Test 622  
 Growth Hormone 222, 362  
 – – Fetal Rat Liver Enzymes 444  
 – – Injection, Somatomedin 645  
 – – Insulin-Like Effects 136  
 – – L-Tryptophan 149  
 – – Pentobarbital and Urethane 550  
 – – Receptor, Rabbit Liver 616  
 – – Release in Man, Insulin-Induced, Calcitonin 641  
 – – Reserve 664  
 – – Secretion, Vincristine 692  
 – – Somatostatin 147  
 – – – Antiserum 550  
 – – Sulfonylureas and Metformin 332  
 Guinea Pigs 606  
 Gut, Entero-Endocrine Cells 589  
 – GLI Secretion 123  
 – Glucagon-like Immunoreactive Materials 214
- H**  
 Heat Exposure, Plasma Hormone Levels 180  
 Hemodialysis 241  
 – Hypermotilinemia 320  
 – Menstrual Disturbances 68  
 Hepatic Enzymes, Anabolic Steroids 489  
 Hepatocarcinoma Cells 39  
 – – Monkey 233  
 Hexose Metabolism, Intracellular 498  
 High Density Lipoproteins, Oral Contraception 437  
 High Insulin Responders 415  
 Histamine, Glucagon and Insulin Release 100  
 Histidine, Glucagon and Insulin Release 100  
 Histochemistry, Entero-Endocrine Cells 592  
 HPLC, Insulin Analysis 580  
 5-HTP 90  
 Human Chorionic Gonadotropin 165  
 – – – Receptor Complex 61  
 Hydrocortisone, CaBP 519  
 11-Hydroxycorticosteroids 44  
 Hyperammonemia, Insulin and Glucagon Secretion 527  
 Hyper- and Hypothyroidism, Lipogenesis, Liver 628  
 Hypercalcemia 57, 577  
 Hypercorticism 130  
 Hyperglycemia 669  
 – Somatostatin 643  
 Hyperglycemic Laboratory Animals 323  
 Hyperinsulinism 669  
 – Obese Mice 195  
 Hyperkalemia 669  
 Hyperparathyroidism 375  
 Hyperparathyroidism, Primary, Chloride Phosphate Ratio 577  
 – – Screening Test 577  
 Hyperprolactinaemia 536  
 Hypersecretion, Glucose-Independent Insulin 432  
 Hypertension, Essential 379  
 Hypothyroidism 222, 622  
 – Aminophylline 190  
 – Fetal 362  
 – T<sub>4</sub>, T<sub>3</sub>, reverse T<sub>3</sub> 34  
 Hypoaldosteronism, Selective 47  
 Hypo- and Hyperthyroidism, Lipogenesis, Liver 628  
 Hypocaloric Diet 648  
 Hypoglycaemia 44  
 – Asymptomatic reactive 252  
 – Enhancement by Propranolol 173  
 Hypoglycemic Compounds 606  
 – Substances 606  
 Hypoparathyroidism 375  
 Hypophysectomized Rats 136  
 Hypophysectomy, Somatomedin 645  
 Hypothalamic Hormones 27  
 Hypothyroid Infants, Gluconeogenesis 256  
 Hypothyroidism, Dogs 266  
 Hypothyroidism, Maternal 362  
 Hypoxia, TSH Levels 155
- I**  
 Immune Complex, Circulating, Graves' Disease 622  
 Immunogenicity, Glucagon 457  
 Immunoreactive Growth Hormone Plasma and Urine 142  
 Indomethacin, Glomerulopressin 513  
 – Prolactin Release 395  
 – Sex Steroids 395  
 Insulin 118, 289  
<sup>125</sup>I-Insulin 85  
 Insulin Action, Adipocytes 209  
 – Adipocyte Metabolism 209  
 – Antagonism, Cultured Muscle Cells 207  
 – Antibodies 187  
 – Calcium ATPase 698  
 – – Levels 73  
 –  $\beta$ -chain Fragment B21–26 498  
 – Chromatography 580  
 – Degradation, Zucker Rats 525  
 – Effect on Adipose Tissue Enzymes 694  
 – – Mouse Liver Enzymes 14  
 – Extraction, Liver 111  
 – Fetal Rat Liver Enzymes 444  
 – Glucose and Ketone Body Utilization 270  
 – Glycerokinase 280  
 – Highly Purified 455  
 – Hypoglycemia, Prolactin Response 319  
 – Induced Hypoglycaemia, C-Peptide 261  
 – Injection-Adrenaline 561  
 – – Free Fatty Acids 561  
 – – Lactate 561  
 – Antagonism 207  
 – Levels, Liver Extraction 111  
 – -Like Activity, Rat Adipocytes 498  
 – -Like Agents 209  
 – – Effects, Growth Hormone 136  
 – Pancreatitis 655  
 – Postprandial Response 253  
 – Potentiating Activity Rat Adipocytes 498

- Insulin, Pyruvate Dehydrogenase 285  
 – Rats 661  
 – Receptor, Zucker Rats 525  
 – Release 90  
 – – Beta Cell Membrane 104  
 – – Histamine and Histidine 100  
 – – Nicotinamide 469  
 – Resistance 187  
 – – Adipocytes, Fatty Acids 427  
 – – Liver Cirrhosis 547  
 – Response, Maximal Oxygen Uptake 424  
 – Secretion, Corticosterone 555  
 – – Enhancement by Somatostatin Antiserum 23  
 – – Hyperammonemia 527  
 – – in vitro 95  
 – – Posthyperglycemic 252  
 – – Vincristine 692  
 – Sensitivity, Obese Mice 195  
 – Serum Immunoreactive, Hypothyroid Dogs 266  
 – – Sulfonyleureas and Metformin 332  
 – Somatostatin 338  
 – Surgery 488  
 – Insulin, Total and Free 187  
 Intestinal Bypass 648  
 – Loop, Dog 214  
 Intra-duodenal Carbohydrate Load, Exocrine Pancreas 346  
 Iodine Intake 301  
 Iodothyronine Metabolism 506  
 IRI/IRG molar ratio 183  
 Islets of Langerhans 100  
 – – Corticosterone 555  
 – Transplantation, Intra-portal 200  
 Isolated Perfused Pancreas 95  
 Isolated Islets, Insulin Secretion 23  
 Juvenile Diabetics, Pancreatic A and B Cell Reactivity 451  
  
**K**  
 Kalium, Progesterone 258  
 Ketoacidosis 172, 270  
 – Diabetic, Treatment 338  
 Ketogenesis 661  
 – Somatostatin 338  
 Ketone Bodies, Somatostatin 338  
 – – Metabolism, Muscle 1  
 – – Utilization, Insulin 270  
 Ketotic Diabetic Stupor 78  
 KK mice 328  
 Koletzky rat 329  
  
**L**  
 Laboratory Animals 323  
 Lactate, Insulin Secretion 95  
 – Sulfonyleureas and Metformin 332  
 – Thyroxine Treatment 561  
 – Alanine 256  
 L-Dopa, Prolactin 257  
 Lean Littermates, Mice Thyroid Hormone Levels 37  
 Lecithin/Sphingomyelin Ratio, Diabetic Pregnancy 612  
 Lepromatous Leprosy, LH/FSH Responses 413  
 Leucine 289  
 Leucine-Enkephalin, Inhibition of TSH-Release 30  
 (<sup>3</sup>H) Leucine Incorporation, Rat Adipocytes 174  
 Leucine-Induced Insulin Secretion 23  
 Levodopa, 11-Hydroxycorticosteroids 44  
 Levonorgestrel 437  
 Leydig Cells, Diabetic Rats 161  
 LH, 68  
 LH-Effect on Cyclic Nucleotides in the Testis 573  
 LH/FSH Responses, Lepromatous Leprosy 413  
 LH Receptors 181  
 LH Release, Critical Period of 296  
 – – Nembutal 296  
 – – Surge, Postovulatory Estrogen 481  
 LHRH 358  
 LH-RH Analogue 389, 391  
 – – Dexamethasone 478  
 – – Serum Protein Binding 391  
 Lipase Activity, Liver, Estrogen 531  
 Lipase, Pancreatitis 655  
 Lipidic Metabolism 503  
 Lipids, Plasma Oral Contraception 437  
 – – Menstrual Cycle 696  
 – – Platelets 441  
 Lipid Storage 158  
 Lipogenesis, Hypo- and Hyperthyroidism 628  
 Lipolysis, Adipocytes 209  
 Lipoproteins 118  
 – Lipase 696  
 Liver Cells, Isolated 366  
 – Cholesterol and Triglycerides 503  
 – Cirrhosis, Glucagon 547  
 – – Insulin resistance 547  
 – Enzymes, Effect of Insulin 14  
 – – Fetal Rat 444  
 – Gluconeogenesis 9  
 – Glycogen 675  
 – Insulin Extraction 111  
 – Membrane Adenylate Cyclase 530  
 – Perfusion 107  
 – Plasma Membrane, Rat 698  
 – Rabbit, Growth Hormone Receptor 616  
 Low-Insulin Responders 415  
 LRH 68  
 – Spinal Cord Damage 679  
 Luteinization 358  
  
**M**  
 Magnesium, Adrenal Catecholamines 404  
 – Progesterone 258  
 Maturity-Onset Diabetes 77  
 – – Sulfonyleureas and Metformin 332  
 Meal Frequency, Altered Metabolic effects 524  
 Medullary Carcinoma of Thyroid, Adrenal-Cortical Function 567  
 Menstrual Cycle, Prolactin 534  
 – – Plasma Lipids 696  
 – Disturbances, Chronic Renal Failure 68  
 Metabolic and Behavioral Difference 648  
 Metabolic Consequences, Low Insulin Response 415  
 – Effects, Altered Meal Frequency 524  
 Metaproterenol 1  
 Metergoline, Cushing's Syndrome 318  
 Metformin 332  
 Methylmercaptoimidazol 39  
 Methysergide 90  
 Metoclopramide, Prolactin 537  
 – – Response 319  
 Metyrapone 306  
 Mineralocorticoid Hormones 379  
 Mitochondrial Enzymes, Thyrotoxicosis 304  
 Mongolian gerbil 329  
 Monkey 233  
 Monoamino Oxidase 606  
 Morphology 655  
 Motilin 320  
 Mouse, Spermatogenesis 682  
 Muscle Cells, Cultured 207  
 – Glycogen 675  
 – – Metabolism 255  
 – Insulin Antagonism 207  
 – Ketone Body Metabolism 1  
 – Obesity 6  
 – Rat Soleus, Thyrotoxicosis 304  
 Myxedema, T<sub>4</sub>, T<sub>3</sub> reverse T<sub>3</sub> 34  
  
**N**  
 Na<sup>+</sup> Deprivation-Adrenal Catecholamine 404  
 NADPH-Enzymes, Leydig Cells 161  
 Natrium, Progesterone 258  
 NEFA 118  
 Nembutal LH Release 296  
 Neurons, Isolated 228  
 New Zealand Obese Mouse 328  
 Nicotinamide, Glucose Metabolism and Insulin Release 469  
 Nialamide 44  
 Norepinephrine, Diabetes 493  
 d-Norgestrel 81  
 NPH-Iodoinsulin 85  
  
**O**  
 Obesity, Enzymes of Energy Metabolism 6  
 Obese "Fatty" Rats 646  
 – Females 382  
 – –Hyperglycemic Mice, Somatomedin 528  
 – Mice, Insulin 195  
 – Mouse 329  
 – Rats, Insulin Resistance 427  
 – Subjects, Reactive hypoglycemia 252  
 ob/ob Mice, Gluconeogenesis 9  
 – – Thyroid Hormone Levels 37  
 Octan-1-ol 255  
 Oestrogen Treatment 664  
 Oral Contraception, High Density Lipoproteins 437  
 – – Plasma Lipids 437  
 – Contraceptives, Folate Metabolism 64  
 Ornithine Decarboxylase Activity 485  
 Osteoporosis 516  
 – Vitamin D<sub>3</sub> 168  
 Osteotropic Hormones 83  
 Osmolality, Plasma 241  
 Osmoregulation, Prolactin 540  
 Ovarian Blood Flow 513  
 Ovary 485

- Oxygen Uptake, Maximal, Glucose Tolerance and Insulin Response 424
- P**
- Pancreas Perfusion, Corticosterone 555
- Pancreatic Hormone Feed-back 123
- Pancreatitis, Acute 655
- Paraplegia 679
- Parathormone, see also Parathyrin
- Parathyrin Antisera 309
- C- and N-Regional Fragments 309
- Parathyroid Hormone, Cadmium Uptake 378
- Exercise 246
- – RIA 375
- Parotid Secretion, Exercise Stress 454
- PBB/Ld Mouse 328
- Peptides, Serum 107
- Perfused Intestine, Glucagon-Like Immunoreactivity 19
- Perfused Pancreas 104
- Perfusion, Liver 9
- Perphenazine 100
- Phenformin 95
- Phenothiazine, Prolactin Release 395
- Sex Steroids 395
- Phenoxybenzamine 52
- 2-(Phenylethylhydrazono)-Propionic Acid 606
- Pheochromocytoma, Adrenal-Cortical Function 567
- pH, Insulin Antibodies 187
- Phosphate Levels, Blood, 57
- Plasma 577
- Transport 519
- Phosphorus Depleted Rats 377
- Physical Exercise 675
- Pig, Exocrine Pancreas 346
- Pinealectomy, Isolated Islets 432
- Pineal Incubation Medium 432
- Pituitary, Effects of Cimetidine on 220
- Platelet Lipids Contraceptives 441
- Postnatal Maturation, Rats 222
- Postprandial Insulin Response 253
- Potassium Excretion 275
- Serum 47
- Prediabetes, Low-Insulin Responders 415
- Pregnancy, Diabetic, Amniotic Fluid 612
- Prolactin 534
- Substance P 448
- Prepuberty 389
- Progesterone 181
- Electrolyte Concentration 258
- Progestin, Plasma 358
- Proinsulin-Like Material 455
- Prolactin 68, 533
- Adrenal Function 540
- Cimetidine 220, 257
- Gonadotropine 538
- Heat Exposure 180
- L-Tryptophan 149
- Metoclopramide 537
- Nonresponsiveness to Arginine in Diabetes Mellitus 583
- Osmoregulation 540
- Prolactin Producing Adenoma, Dopamin, Bromocriptine, TRH 452
- Puerperal infertility 536
- Release, Indomethacin 395
- – Phenothiazine 395
- Response to TRH, Metoclopramide and Hypoglycemia 319
- Secretion, Cimetidine 412
- Propranolol 34, 52
- Conversion of T<sub>4</sub> to T<sub>3</sub> 366
- Hypoglycemia 173
- Propylthiouracil 39
- Prostaglandins, ACTH Effect 585
- Prostaglandin E<sub>1</sub>, Fat Cells 176
- Prostatic Carcinoma 635
- Hyperplasia, Benign 635
- Protamine-<sup>125</sup>I-Insulin 85
- Protein Biosynthesis, Streptozotocin Diabetic Rats 107
- Synthesis In Vitro, Exocrine Pancreas 352
- Synthesis, Muscle 289
- Plasma 107
- Synthesis, Rat Aorta 384
- Proteohormone Receptors 60
- Pyruvate Dehydrogenase, Fat Cells 285
- Sulfonylureas and Metformin 332
- Q**
- Quipazine 90
- R**
- Radioreceptor Assay, Somatostatin 216
- Raji Cell Test, Thyroid Antibodies 622
- Rat Hemipituitaries, TSH-Release 30
- Rats 222
- Receptor Overlap, FSH-TSH 689
- Receptors, Human Chorionic Gonadotropin 60
- Relaxin, Collagen Metabolism 408
- Cyclic AMP 408
- Renal Changes Diabetes 200
- Compensatory Hypertrophy 669
- Failure, Chronic, Motilin 320
- Changes, Regression Rate of 200
- Insufficiency, Chronic, Antidiuretic Hormone 241
- Renin 371
- -Activity, Night-Day Variations 570
- – Primary Aldosteronism 570
- -Substrate 371
- Retina, Somatostatin 79
- Reverse T<sub>3</sub> 34
- reverse T<sub>3</sub> 506
- Reverse Triiodothyronine, Fetal Sheep 509
- Ribosomal Profiles, Muscle 289
- S**
- Salt Intake, Hypertension 379
- Sand rat 327
- Secretin, Pancreatitis 655
- Seromuroid 107
- Serotonin 149
- Sertoli Cell Cultures 80
- Serum Insulin, Hyperthyroidism 190
- Protein Binding -LH-RH 391
- Sex Difference, Prolactin 534
- “Sex Reversed” Factor 682
- Sex Steroids, Indomethacin 395
- – Phenothiazine 395
- Sheep, Pregnant and Foetal 237
- Shift-Effect 666
- Silicone 255
- Sodium Dichloroacetate 95
- Obesity 382
- Reabsorption 275
- Solanum Glaucophyllum 57
- Somatomedin 645
- Activity Obese-Hyperglycemic Mice 528
- Circadian Variations 586
- Diabetes 216
- (Sulfation Factor) 472
- Somatostatin 23
- Antidiuretic Hormone Secretion 177
- Antiserum 550
- – Insulin Secretion 23
- Fetal Brain Cells 147
- Hyperglycemia in Man 643
- -Like Immunoreactivity, Alloxan 457
- Liver Cirrhosis 547
- Pentobarbital and Urethane 550
- Plasma 457
- Rat Retina 79
- Thyroid 184
- Treatment 655
- – Diabetic Ketoacidosis 338
- Spermatogenesis 682
- Spermine 209
- Sphingomyelin, Diabetic Pregnancy 612
- Spiny mouse 324
- Starvation 669
- Stereospecificity GH Receptor 616
- Streptozotocin Diabetes 107, 200, 661
- Diabetic Rats 172
- Substance P, Pregnancy 448
- Various Clinical Disorders 448
- Sucrose Diet 118
- Sulfation Factor (Somatomedin) 472
- Sulfonylurea 104
- Sulphonylureas, Combined with Metformin 332
- Surgery, Insulin and Glucagon Response 488
- Sympathetic Nervous System 379
- System, Diabetes 493
- T**
- Testicular Function, Spinal Cord Damage 679
- Receptors 165
- Testis, Hormone Receptors 689
- Incubation in Vitro 573
- Testosterone Effect Cyclic Nucleotides in the Testis 573
- Thiamine Pyrophosphatase 697
- Pyrophosphate 95
- Thymus, Liver 503
- Thyroid Auto-antibodies, Graves’ Disease 622
- – Raji Cell Test 622
- Cimetidine 220
- Gland, Relationship to Adrenal Cortex 666



## XVIII Subject Index

- Thyroid Hormone Levels, Obese-Hyperglycemic Syndrome 37  
– – Metabolism 39  
– – Production, Human Thyrotropin Receptors 399  
– Rat 184
- Thyrotoxicosis, Mitochondrial Enzymes 304
- Thyrotropin 362  
– Receptors (Human) Thyroid Hormone Production 399
- Thyroxine 222  
– Analogs, Metabolism of 233  
– Conversion of 366  
– Fetal Rat Liver Enzymes 444  
– Fetal Sheep 509
- Thyroxine, Glycogen 675  
– Iodine Intake 301  
– Treatment, Metabolic Response to Insulin Injection 561  
– Uptake and Metabolism 228
- Total Ketone Bodies, Sulfonylureas Metformin 332
- Translation, Protein Synthesis in Muscle 289
- Transplantation, Islets 200  
– Kidney 68
- TRH, Luteotrophic Activity 358  
– Prolactin Response 319  
– Stimulation, TSH Dynamics 293
- Triglycerides 118  
– Diurnal Pattern 253  
– Liver 503
- Triiodothyronine 366  
– Fetal Sheep 509  
– Glycogen 675  
– Iodine Intake 301
- Triton X-100 Extracts, Liver Plasma Membrane 698
- Tryptophan 149
- TSH, Blood Acute Hypoxia 155  
– Dynamics after TRH 293  
– Producing Adenoma, TRH, Dopamine, Bromocriptine 452  
– Receptor 689  
– -Secretion 30
- T<sub>4</sub>-T<sub>3</sub> 34
- Tuco-Tuco 328
- Turner's Syndrome 664
- U**
- Urethane, Growth Hormone Release 550  
– Somatostatin Release 550
- Urine Immunoreactive Growth Hormone 142
- Upright Posture, Serum Potassium 47
- V**
- Vascular Smooth Muscle 384
- Vasopressin, Chronic Renal Failure 241
- Vincristine, Insulin and Growth Hormone Secretion 692
- Vitamin D<sub>2</sub> 184
- Vitamin D<sub>3</sub> 377, 519  
– CaBP 519  
– 1,25(OH)<sub>2</sub> 168  
– Osteoporosis 168
- W**
- Water Intake 130
- Weight Loss 648
- Y**
- Yellow obese mouse 328
- Z**
- Zinc Ions, Adenylate Cyclase 530
- Zucker rat 329, 525

## Tests on Three Antisera and Subsequent Development of Radioimmunoassay for Different Regions of Human Parathyrin

W.G. Wood, I. Marschner and P.C. Scriba

Laboratorien für Klinische Chemie und Endokrinologie, Medizinische Klinik Innenstadt der Universität München, Germany

### Summary

Three antisera (Ab), two raised in sheep and one in a goat, with determinants for different parts of the human parathyrin (hPTH) molecule have been tested. One sheep antibody (Ab S-469 VI) recognised only C-regional fragments of hPTH (C-hPTH), the other (Ab S-478 VI) both C- and N-regional fragments (C+N-hPTH), whilst the goat antibody, raised against 1-34 hPTH (Ciba) was specific for N-regional fragments (N-hPTH). Kinetic studies showed that the differing affinities of Ab S-469 VI and Ab S-478 VI antibodies for bovine PTH (bPTH) and C-hPTH made it possible to develop sensitive assays giving results in as little as 8 hr after receipt of blood, and a routine assay giving results within 30 hr. Although the numerical PTH levels from the assay were different, their ability to distinguish between normals and patients with hyperparathyroidism (HPT) was similar. Studies on the labelling and separation of  $^{125}\text{I}$ -bPTH led to a tracer with a shelf life exceeding 3 months. Correlation between assays using Ab S-469 and Ab S-478 was good, although exceptions occurred, which may have been due to the differing specificity of the antisera.

Comparison of the original 7-day assay with the 24 hr assay using Ab S-469 VI in 109 patients gave a correlation coefficient  $r = 0.957$ , and using Ab S-478 in the 24 hr assay in 81 patients a correlation coefficient  $r = 0.934$ . The results in the 24 hr assay with Ab S-469 VI were 3 times higher and those from the 24 hr assay with Ab S-478 VI 20% higher than in the 7 day assay. The normal ranges in the 7 day and both 24 hr assays were also different.

The clinical value of the N-hPTH assay has not been fully established but is useful in explaining some anomalous results obtained in the C- and C+N-hPTH assays, in which the non-biologically active PTH fragments were within the normal range for the assay, but in which the N-hPTH level, i.e. the biologically active part of the PTH molecule, was significantly elevated.

**Key-Words:** Human Parathyrin Antisera – RIA – C-Regional Fragments – N-Regional Fragments – C- and N-Regional Fragments

### Introduction

The main disadvantage of many published PTH assays is the long incubation time required (Arnaud, Tsao and Littledike 1971; Berson and Yalow 1963; Mallet and Brunelle 1975; Almqvist, Hjern and Wästhed 1975; Sinha, Queener and DeMoor 1975; Hehrmann, Wilke, Nordmeyer and Hesch 1976). This study was undertaken to examine the possibility of assay for

C-hPTH, C+N-hPTH and N-hPTH which would give results in the minimum time without endangering their clinical value. The introduction of a "same-day-results" assay was envisaged only to help clinicians in emergency cases in which HPT was suspected and such an assay, when combined with an angiographic study of the thyroid region would assist in localizing an adenoma if present, thus helping the surgeon.

As the antisera were raised against undefined preparations of non-human PTH in the case of S-469 VI and S-478 VI, studies were made with human and bovine PTH to characterise the binding kinetics for these assays.

### Materials and Methods

#### 1) Antibodies used

Ab S-469 with C-regional activity and S-478 VI with C+N-regional activity were raised in sheep against a mixture of bPTH and pPTH and have been described in detail elsewhere (Hehrmann, Wilke, Nordmeyer and Hesch 1976; Hehrmann, Nordmeyer, Wilke and Hesch 1977). Both were obtained from Dr. R. Hehrmann and Prof. R.D. Hesch in Hannover.

Ab "Pinkey" was raised in a goat against the 1–34 hPTH synthetic peptide from Ciba, Basel, Switzerland, and was obtained from the European Parathyroid Study Group (EPSG) via Prof. R. Ziegler in Ulm, Germany.

All Ab were diluted with 0.05 M Barbital Buffer, pH 7.5 containing 1% human serum albumin and 12.5 Antiplasmin Units (APU) of Aprotinin/ml (Trasylo<sup>®</sup>-Bayer or Antagosan<sup>®</sup>-Behringwerke) (Buffer 2).

#### 2) Standards and Tracers

bPTH (Inolex, Chicago) was used as standard (Lot No. 1508 B 002) and for labelling (Lot. No. 1515 A 001). A further lot (Lot. No. 1515 B 001) proved to be unsuitable for tracer preparation, due to a high unspecific binding. Standard and tracer for the N-regional assay was prepared from the 1-34 hPTH synthetic peptide from Ciba.

"C-hPTH Standards" consisted of serial serum dilutions from a patient with a secondary HPT calibrated against the S-469 50Q assay described below. All standard curves were made up in PTH-free serum (PTHFS) obtained from a parathyroidectomised patient.

Tracer was prepared by a modification of the method described by Greenwood et al. (Wood and Marschner 1978).

Desalting of the tracer was carried out at room temperature a Sephadex G-10 column and further purification was carried out at 4 °C on Ultragel (LKB) AcA-54 (Wood, Marschner and Scriba 1978).

Received: 12 Dec. 1977

Accepted: 25 Aug. 1978

Table 1 Main characteristics of 7 assays described

Characteristic	Assay						
	S-469 50 CL	S-469 50 L	S-469 50Q	S-478 90Q	S-469 50SQ	S-478 90SQ	N-90Q
Antibody initial dilution 1:	20,000	20,000	14,000	2,400	14,000	2,400	25,000
Serum volume $\mu$ l	50	50	50	90	50	90	90
Incubation time pre- + tracer-incubation hr.	96 + 72	96 + 72	18 + 6	18 + 6	0 + 6	0 + 6	18 + 6
Tracer Bq/tube	50	170	330	330	500	500	330
100.Bo/T	30-35	30-35	15-20	15-20	12-17	12-17	55-65
Normal range ng eq/ml	< 0.28-0.5	< 0.28-0.5	< 0.66-1.5	< 0.24-1.0	+ - - -	+ - - -	< 0.05-0.15
Standard curve range ngbPTH/ml	0.19-12.5	0.19-12.5	0.19-12.5	0.19-12.5	++0.15-10.0	++0.15-10.0	+++0.07-10.0

+ Not determined

++ng eq hPTH/ml

+++ng/ml 1-34 hPTH

The fractions from the AcA 54 column with the highest maximum binding ( $B_0$ ) and lowest unspecific binding (N) were diluted to give about 10 KBq/ml, with Buffer 2. These tracer solutions had a useable shelf-life of more than three months; rather longer than the 9 days reported elsewhere (Almquist, Hjerm and Wästhed 1975).

The elution pattern from the AcA-54 column was stable, the variation of the position of the immunoreactive peak being over a 12 month period  $183 \pm 3.0$  ml, using the same column ( $n = 18$  column-runs).

### 3) Assay Systems

#### a) Assay Codes

The following code system is used in the rest of this paper. Each assay consisted of a 3-part code. The first letter and number denoted the antiserum used e.g. S-469 xxx, the second figure the volume of serum used e.g. S-469 50x and the final letter(s) the separation method and length of assay, C for charcoal separation, L for 7 day assay Q for 24hr-assay and SQ for same-day-assay. The latter 3 assays all used polyethylene glycol for separation of bound free hormone. As an example S-478 90Q - assay with Ab S-478, 90  $\mu$ l serum separated with polyethylene glycol and having a 24 hr total incubation.

#### b) Original Assay - S-469 50 CL (Table 1)

This was the original assay in routine use. 50  $\mu$ l serum and 200  $\mu$ l Ab were preincubated for 4 days at 4 °C. 1000  $\mu$ l dextran charcoal (2.5 g Dextran T-70 (Pharmacia) + 25 g Norit-A (Sigma) in 1000 ml Buffer 2) was added, and after centrifugation (2500 g, 15 min) the supernatant transferred to a clean tube and counted for 5 min in a gamma-counter. The results in this and all subsequent assays were then worked out using a spline function (Marschner, Erhardt and Scriba 1975; Marschner, Dobry, Erhardt, Landersdorfer, Popp, Ringel and Scriba 1974) and off-line techniques by computer (Siemens 404/3). The range of the standard curve was 0.19 - 12.5 ng bPTH/ml,  $B_0$  was measured 10 times and the standard curve points and sera 5 times.

#### c) Modified Long Assay - S-469 50L (Table 1)

The assay was identical with S-469 50CL but more radioactive tracer was added to each tube and polyethylene glycol (PEG) (12% solution in 0.18 M NaCl) was used to separate the bound and free hormone. The resulting precipitate was counted for two min.

#### d) Quick Assay - S-469 50Q, S-478 50Q and S-478 90Q (Table 1)

These assays all had a preincubation of 18 hr and after addi-

tion of tracer, a second 6 hr incubation before separation with PEG and counting.

e) Same-day Assays - S-469 50SQ and S-478 90SQ (Table 1) These assays only had one incubation step where Ab, tracer and serum were incubated together at 4 °C for 6 hr. Only a C-hPTH standard curve could be used due to the binding kinetics of the Ab with bPTH and C-hPTH (see below for results of the kinetic studies). Other details were the same as for the Quick assays.

#### f) N-regional Assay - N-90Q (Table 1)

The details for this assay are identical with those for the S-478 90Q assay except that the standard curve used the 1-34 hPTH Ciba peptide.

In all assays using PEG separation, 100  $\mu$ l carrier serum was added to each tube directly before the PEG in order to smooth-out the unspecific binding in each serum.

### 4) Kinetic Studies

Kinetic studies were carried out with S-469 VI and S-478 VI to investigate the different affinity to bPTH and C-hPTH with time.  $B_0$ , bovine standards of 1 and 3 ng/ml and human sera with 1 and 3 ng/ml (measured by the S-469 50L assay) were used in this study. Bovine standards were made up in PTHFS. The kinetics were studied with and without a preincubation of 18 hr before tracer addition and were carried out over a 7 or 10 day period.

### 5) Establishment of Normal Range and Correlation Studies

Normal ranges were obtained for the following 4 assays: S-469 50L, S-469 50Q, S-478 90Q and N-90. Correlations were made between the first three, and their ability to differentiate between normal collective and patients with HPT tested. The stability of binding of tracer at each point on the standard curve was tested for each of the above assay as well as for S-469 50L. In these studies no correction was made for the age of the tracer which was from 1 to 110 days old.

## Results

### 1) Tracer Preparation

#### a) $^{125}$ I-bPTH

Figure 1a shows the elution-profiles of the iodination mixture desalted on a Sephadex G-10 column. Here the protein:iodide count-ratio was usually between 3:1 and 4:1.

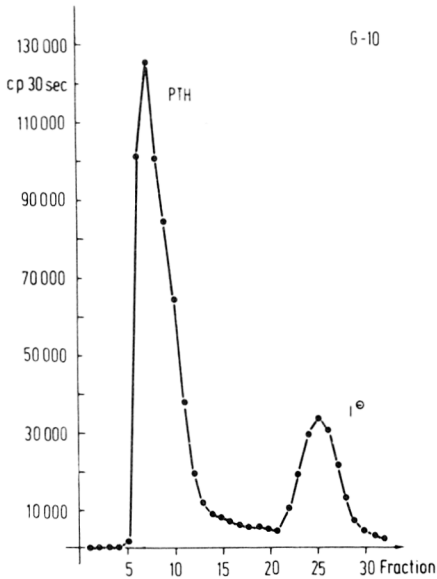


Fig. 1a Elution profile of Sephadex G-10 column using buffer 2 as eluant. Fractions contained 500  $\mu$ l. The protein peak eluted with the void volume

Only the first of the two closely separated peaks has any immunoreactivity. The  $B_0$  of the material from the first major peak (Peak 3) was 52% in this example and in the second peak (Peak 4) only 5%. The unspecific binding was under 3% in both cases. Peak 4 showed no immunoreactivity with the "Pinkey" Ab thus ruling out an N-regional peptide. The tracer so produced, had a shelf-life exceeding 3 months. The

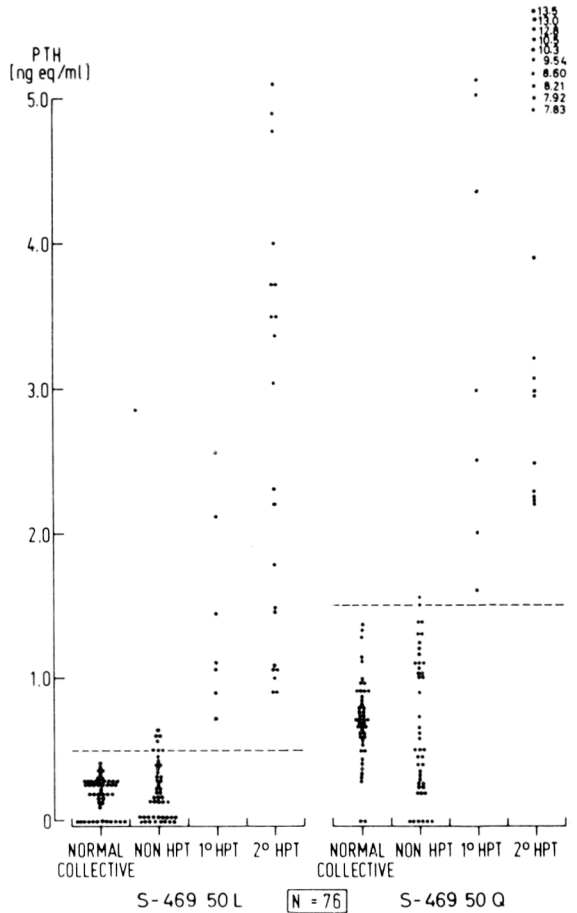


Fig. 2a Correlation between S-469 50L and S-469 50Q assays in 109 patients

decrease in  $B_0$  was under 3% as was the increase in N. The quantity and quality of the tracer appears to be greater than reported elsewhere (Hehrmann, Wilke, Nordmeyer and Hesch 1976).

b)  $^{125}$ I-1-34 hPTH

The elution profile of the iodinated 1-34-hPTH on the Sephadex G-10 desalting column was similar to Fig. 1a. The iodide:protein count-ratio was normally between 1:1 and 1.5:1. The rechromatography on Ultrogel AcA-54 gave a damage-peak at the void volume and a single immunoreactive peak appearing at approximately the same place as human calcitonin and  $\beta$ -endorphine indicating an iodinated monomeric form of the peptide.

2) Assays

a) Characteristics

The results given by the S-469 50CL and S-469 50L assays were the same, but the addition of higher tracer amounts abolished the "hook-effect" (Joel, Schönberg, Ilg and Keller 1974) often seen in the S-469 50-CL assay. Addition of tracer in excess of 350  $B_q$ /tube

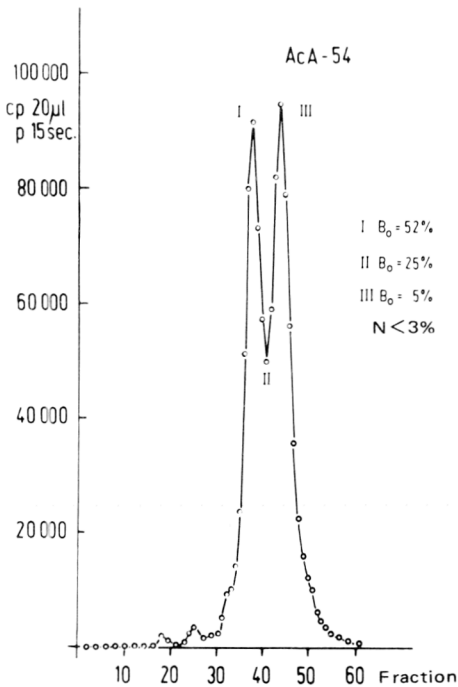


Fig. 1b Further purification of the protein peak from 1a on Ultrogel AcA-54 column

Table 2 Results of an angiographic study measured in 7 assay systems of a patient with 2.HPT. Control sera show the variation in the absolute values in the different assay systems

Control Sera	Assay						
	S-469 50 L	S-469 50Q	S-469 50SQ	S-478 50Q	S-478 90Q	S-478 90SQ	N-90Q
	ng eq/ml						
RKS 1771	0.41	1.11	0.12	0.27	0.21	0.17	- - -
RKS 1772	0.79	1.94	0.40	0.66	0.55	0.53	- - -
RKS 1773	3.04	7.83	4.25	4.33	3.35	4.80	- - -
<b>Angiography Patient Bo</b>							
r. int. jug. vein upper	0.90	2.12	0.45	1.54	1.27	1.28	0.06
l. int. jug. vein upper	0.95	2.20	1.00	1.67	1.38	1.21	0.05
r. int. jug. vein lower	0.75	2.22	0.82	1.86	1.42	1.46	0.09
l. int. jug. vein lower	1.05	2.28	0.95	1.58	1.26	1.39	0.11
thyroid ima vein	4.89	7.97	3.02	6.92	5.98	5.24	0.29
int. thyroid vein	4.05	7.90	2.13	6.00	5.95	4.32	0.28
l. subclavian vein	1.16	2.11	0.91	1.67	1.42	1.61	0.12

(freshly labelled tracer) caused little increase in  $B_0$  but significantly increased the unspecific binding, thus flattening the standard curve, seen in the increasing value of the 50% intercept. The range covered by the standard curve was the same for both S-469 50CL and S-469 50L assay. PEG separation in-

creased precision thus making it possible to set up the sera in triplicate instead of in pentuplicate as in S-469 50CL. In all patients who had disproteinemia an unspecific binding was necessary to correct the bound counts. In effect, this was seen in about 10% of all patients.

The values from the S-469 50Q assay were 3 times higher than those from the S-469 50L assay. This effect was seen throughout the concentration range. Fig. 2a shows the correlation between these two assays on 109 patients. The S-478 50Q assay was soon abandoned for the S-478 90Q assay as the latter gave better precision. The values from the S-478 90Q assay were around 20% higher than those from the S-469 50L assay (Fig. 2b). The correlation between these assays was highly significant. The results used in the correlation studies were taken from parallel assays set up at the same time, 3 or 4 such assays being used in the construction of Figures 2a and 2b. The same-day assay S-469 50SQ and S-478 90SQ were developed for emergency use. The characteristics of the 4 main assays are shown in Table 1.

*b) Diagnostic Use*

Table 2 shows the results in 7 assays of an angiographic study of a patient with suspected secondary HPT, together with values from precision control sera. The clinical value of the results is the same in all cases. Although the numerical values are often very different.

The N-regional assay was performed routinely on over 300 samples which came into the laboratory for "hPTH" assay to assess its clinical usefulness. Certain patients were found who had normal or only slightly elevated parathyrin levels when assayed in the S-469 50L or S-478 90Q assays, but who had definite clinical signs of HPT. Many of these patients showed an elevated N-90Q assay value between 3 and

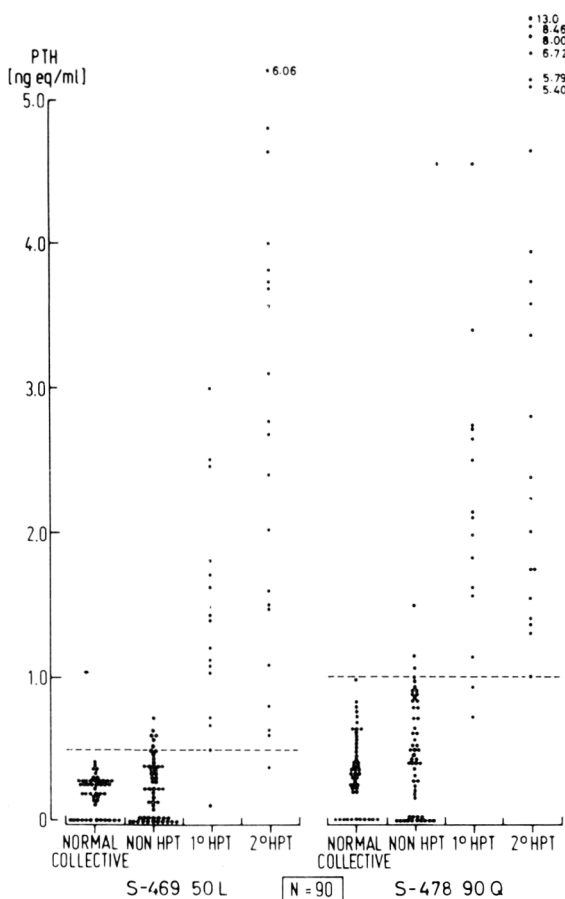


Fig. 2b Correlation between S-478 90Q and S-478 50L assay in 81 patients

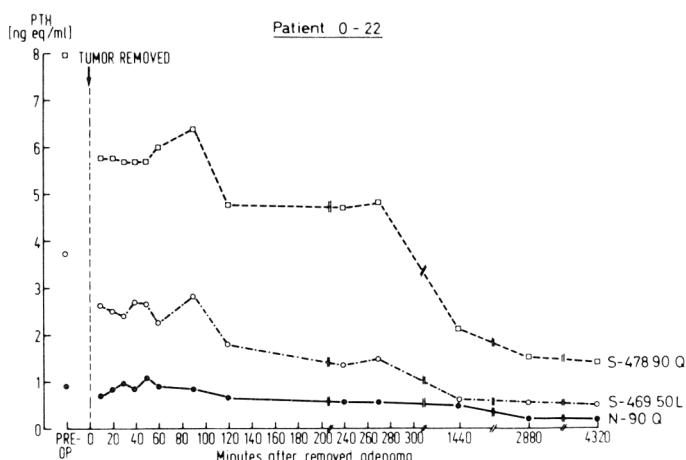


Fig. 3 Patient 0-22 showing immunoreactive PTH serum levels before and up to 3 days after removal of an adenoma, as measured in 3 assay systems

10 times the normal values. One patient was found to have an adenoma which secreted N-regional immunoreactive PTH and Figure 3 shows the levels of PTH measured in three assays before and up to 3 days after removal of the adenoma.

To assess the usefulness of the assays in their ability to differentiate between a normal population and patients with HPT, parallel studies were made between the S-469 50L and S-469 50Q assays in 76 patients (Fig. 4a) and between S-469 50L and S-478 90Q assays in a further 90 patients (Fig. 4b). The results showed that the assays have the ability to differentiate between normals and HPT and also between patients with calcium metabolism disorders due to other causes and HPT.

3) Standard Curve Characteristics and Reproducibility

Table 3 shows the standard curve binding characteristics of the S-469 50L, S-469 50CL, S-469 50Q and S-478 90Q assays, together with sensitivity and 50% intercept values for each assay. Table 4 shows the same for the N-90Q assay. The reproducibility of binding is seen, and no correction has been made for the age of tracer. The change from charcoal to PEG for separation of bound and free hormone has minimal effect on the binding but has a lower standard deviation.

The S-469 50Q assay was less sensitive and had a higher 50% intercept but when seen in context with the 3 times higher results, the assay was comparable to the S-469 50 L assay. The binding characteristics

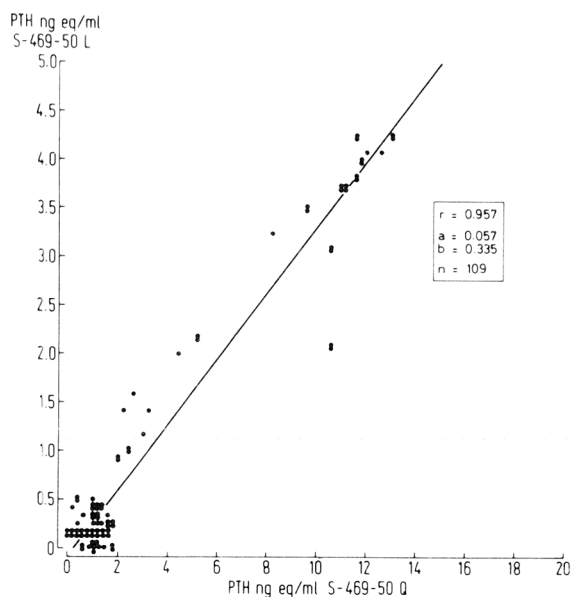


Fig. 4a Comparison of results between S-469 50L and S-469 50Q assays in 47 normal persons and 76 patients with calcium metabolism disturbances

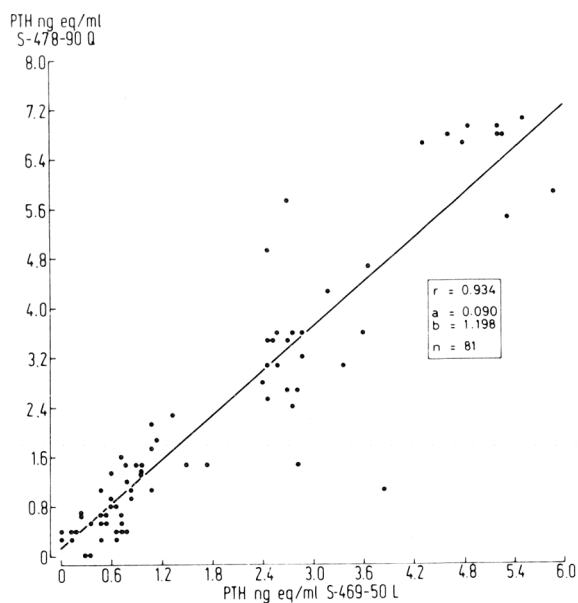


Fig. 4b Comparison of results between S-478 90Q and S-469 50L assays in 48 normal persons and 90 patients with calcium metabolism disorders

Table 3 Mean and standard deviation (s.d.) of the percent binding of the standard curve points, together with the sensitivity, 50% intercept and number of assays from which the data was obtained

Standard ng bPTH/ml	S-469 50CL			S-469 50L			S-469 50Q			S-478 90Q		
	%Bo x	s.d.	CV%	%Bo x	s.d.	CV%	%Bo x	s.d.	CV%	%Bo x	s.d.	CV%
0.19	96.3 ± 1.74	1.82		97.2 ± 1.84	1.89		98.0 ± 0.62	0.64		93.7 ± 2.89	3.09	
0.39	90.9 ± 1.78	1.95		92.4 ± 2.06	2.23		96.1 ± 1.23	1.28		88.5 ± 3.29	3.72	
0.78	82.9 ± 3.94	4.70		84.6 ± 3.67	3.67		92.8 ± 2.00	2.16		78.2 ± 4.33	5.55	
1.56	67.5 ± 6.19	9.16		68.1 ± 2.76	4.06		83.2 ± 2.28	2.75		63.0 ± 5.48	8.69	
3.12	39.1 ± 6.67	17.1		40.8 ± 4.28	10.5		65.0 ± 4.62	7.11		44.6 ± 4.68	10.4	
6.25	15.6 ± 2.87	18.4		18.2 ± 2.41	18.2		36.9 ± 1.08	2.93		26.9 ± 4.97	18.4	
12.5	9.0 ± 1.17	13.0		11.4 ± 1.66	14.6		16.1 ± 2.28	14.2		16.5 ± 4.10	24.8	
Sensitivity ng bPTH/ml	0.28±0.13			0.28±0.08			0.66±0.16			0.24±0.10		
50% intercept ng bPTH/ml	2.39±0.40			2.49±0.21			0.40±0.50			2.60±0.45		
No. of Assays	10			10			5			12		

Table 4 This shows the same data as Table 3, but for the N-90Q assay

Standard ng 1-34hPTH/ml	Bo%		CV%
	x	s.d.	
0.15	81.1 ± 2.13		2.56
0.31	65.8 ± 3.10		4.71
0.62	47.6 ± 3.29		6.92
1.25	30.3 ± 3.20		10.6
2.50	18.0 ± 4.30		23.8
5.00	12.2 ± 3.82		31.2
10.0	8.3 ± 3.50		42.0

Values from 8 assays

of the S-478 90Q assay were slightly different although sensitivity and 50% intercept were similar to S-469 50CL and S-469 50L assays. The curve was not so steep in the S-478 90Q assay but fell away from zero quicker. The N-90Q assay was more sensitive and was able to measure within the normal

range, the sensitivity and 50% intercept being about 20% of those for the S-478 90Q assay. As the normal range of this assay was also about 20% of that of S-478 90Q, the two were comparable in this respect.

In all cases, sensitivity was defined as the point of the standard curve lying 3 standard deviations away from the zero standard. All values are the mean and standard deviation of several assays as shown.

4) Kinetic Studies

The kinetic study results are shown in Figures 5a and 5b and highlight the different binding characteristics of S-469 VI for bPTH and C-hPTH. Figure 5a shows the rate of binding of tracer after a 18 hr preincubation expressed as cpm bound.

Table 5b shows the rates of binding when the preincubation is omitted. The results show quite clearly why the S-469 50Q assay delivers higher results than

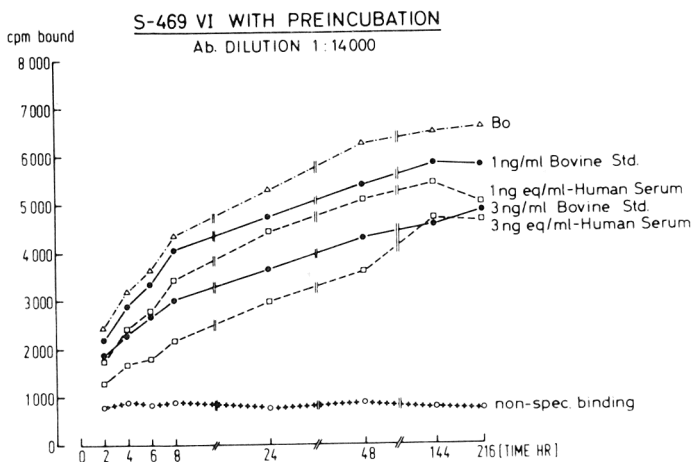


Fig. 5a Ab S-469 kinetic studies showing the difference in the reaction rates of bPTH and hPTH with time, accounting for the difference in results obtained in the long and short assays. Assay with 18 hr pre-incubation

S-469 VI NO PREINCUBATION  
Ab DILUTION 1 : 14000

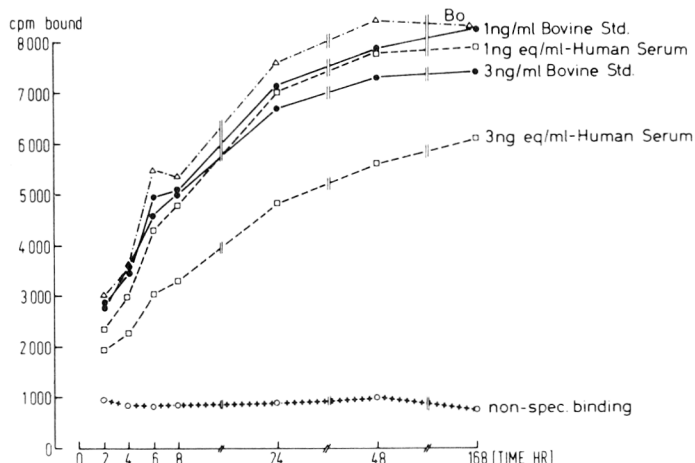


Fig. 5b As Fig. 5a but without the 18 hr preincubation. This shows why the same day assay only functions with an hPTH standard curve

the S-469 50L assay, and also why the same-day assay only function with a C-hPTH standard curve. The kinetics for S-478 VI were similar and have been reported elsewhere (Wood, Marschner and Scriba 1978).

### Discussion

This study has demonstrated that a modification of the labelling technique combined with drastic shortening of the assay time has led to assays with the same sensitivity and reproducibility as the original long assays. In the tracer preparation, no trace of „damage“ peaks was seen in the elution profiles as reported elsewhere (Hehrmann, Wilke, Nordmeyer and Hesch 1976) which lead to the question as to whether these are artefacts introduced by the technique used, rather than oxidation products produced by the chloramine-T. The Ultrogel AcA 54 column only functioned at 4 °C.

This labelling technique in producing „long-life“ tracer is not only restricted to bPTH but is used regularly in this laboratory in the production and storage of human calcitonin (shelf-life longer than six months) transferrin and  $\beta$ -endorphine.

The introduction of an analogue of the *Wide* technique (Wide, Nillius, Gemzell and Roos 1973) led to the shortening of the assay without any loss of sensitivity or clinical value of the results. Ab S-469 VI was „serum sensitive“ and any attempt to increase the serum amount in the assay led to reduction of  $B_0$  and to a less sensitive assay. This together with the difference in reaction rates between bPTH and C-hPTH with the antibodies raised in sheep have no doubt helped in the development of such short assays, especially the same-day assays. The circulating forms of hPTH are themselves

undefined, and are composed of peptides of varying compositions and biological activity (Berson and Yalow 1968; Habener, Powell, Murray, Mayer and Potts jr. 1971; Segre, Habener, Powell, Tregear and Potts jr. 1972; Canterbury and Reiss 1972; Canterbury, Levey and Reiss 1973; Arnaud, Goldsmith, Sizemore, Oldham, Bischott, Larsen and Gilkinson 1973; Arnaud 1974; Silverman and Yalow 1973). In certain pathological conditions the intact 1-84 hPTH is present in serum in relatively small amounts when compared with the degradation products (Segre, Niall, Habener and Potts jr. 1974; Purnell, Scholz, Smith, Sizemore, Black, Goldsmith and Arnaud 1974; Segre, D'Amour and Potts jr. 1976). Bearing these facts in mind, the value of a 1-84 hPTH assay can only be supplementary to the fragment assays at present in use. More important is the introduction of internationally defined preparations extracted from human serum or parathyroid adenomas containing C- and N-regional peptides to act as reference standards in addition to those already existing for 1-84 hPTH such as the MRC 75/549.

Ab S-469 VI does not react with 1-34 hPTH and Ab S-478 VI only to give a  $B_0$  of 5-10% in the S-478 90Q assay using  $^{125}$ I-labelled 1-34 hPTH as tracer. The  $^{125}$ I-bPTH from Inolex does not react with the „Pinkey“ Ab even at an i.d. of 1:10,000 showing that this material is unlikely to be 1-84 bPTH, but more likely a large C-regional peptide or group of peptides. Results from other laboratories (Hehrmann, Wilke, Nordmeyer and Hesch 1976) have shown that S-469 VI does not react with the 13-34, 18-34 and 23-34 peptides of hPTH, or with the 1-34 hPTH from Beckman. Another observation was that the same-day assay coded S-478 90SQ did not give useable results if the incubation was carried out at room temperature instead of at 4 °C.



The reason for the higher values obtained in the shorter assays for the C- and C+N-regional assays may be due to the fact that the antibodies with the highest avidity for C-hPTH bind first, and the less avid ones bind the bPTH somewhat more slowly eventually giving rise to more counts bound, hence to lower results. In contrast, the values in a 4 hr version of the N-90Q assay were identical with the 24 hr assay, possibly due to the fact the antibody was raised against a human peptide of unique structure, rather than a undefined mixture of bPTH and pPTH of unknown structure and purity. The kinetic studies have shown the reason for the different numerical values for PTH with different incubation times. In patients at risk the short assay were combined with an angiographic study in order to locate the areas of high PTH production. It has been clearly demonstrated in this laboratory that the C- and C+N-regional assays may be just as good as an N-regional one in most cases for these purposes, as shown in Table 2 and the other angiographic studies carried out. The C-assays may be better because of the much larger concentration differences between "background" and "hot" areas.

The use of parathyrin-free serum (PTHFS) for standard curves is imperative in all non-extractive procedures in order to standardise conditions in the standards and serum samples under test. The use of synthetic protein solutions such as albumin or a "synthetic serum" made up of 4% HSA, 1%  $\beta$ -globulins and 2% human  $\gamma$ -globulins was not acceptable as the  $B_0$  and shape of the standard curve were different from that obtained using PTHFS. Equine serum and serum from HPX dogs were also unsuitable for the same reason. The disadvantage of PEG is in its serum globulin concentration dependance but the small number of patients with dysproteinemia severe enough to cause false results was so low as not to cause undue hinderance with excessive numbers of unspecific binding tubes – about 10% of all samples received. Unspecific binding tubes should be run with all sera from dialysis patients, as this group has shown the greatest deviation in unspecific binding, which could significantly affect results if not taken into account. All sera with total protein outside the range 60–80 g/liter should be run with an unspecific binding.

The N-regional assay showed values within and above the normal range in several patients with clinically confirmed HPT, as has been reported elsewhere (Mine, Raptis and Ziegler 1976), and was therefore only used in cases where the other assays had given unclear results.

Tables 3 and 4 have shown that the assays are sensitive and reproducible enough for routine use. The S-478 90Q assay was adapted for routine use because of its wider specificity and also as a result of a meeting of PTH-laboratories in Hannover, Germany, in May

1976 (Chairman Prof. R.D. Hesch). This assay has detected all 2. HPT and between 85–90%. 1.HPT patients in the 12 months that this assay has been in routine use and in which time over 1800 patients have been examined.

To conclude, although the assays here described are heterologous, the results which they give allow a rapid and reproducible assay for hPTH to be performed with the accuracy required in the confirmation or rejection of hyperparathyrianaemia.

#### Acknowledgements

The authors would like to thank Fräulein *Gabriela Kuflicki* for excellent technical assistance, Frau *Marianne Preisendanz* for secretarial duties and Herr *Manfred Bauer* (SFB 51-F3) for statistical advice.

This study was supported in part by the Bundesministerium für Forschung und Technologie, D-5300 Bonn, Germany.

#### References

- Almquist, S., B. Hjern, B. Wästhed*: The diagnostic value of a radioimmunoassay for parathyroid hormone in human serum. *Acta Endocrinol.* 78: 493–509 (1975)
- Arnaud, C.D., H.S. Tsao, T. Littledike*: Radioimmunoassay of human parathyroid hormone in serum. *J. Clin. Invest.* 50: 21–34 (1971)
- Arnaud, C.D., R.S. Goldsmith, G.W. Sizemore, S.B. Oldham, J. Bischott, J.A. Larsen, P. Bordier*: Studies on characterization of human parathyroid hormone in hyperparathyroid serum: practical considerations. In: *Excerpta Medica International Congress Series, No. 270, Amsterdam 1972, p. 281*
- Arnaud, C.D., R.S. Goldsmith, P.J. Bordier, G.W. Sizemore, J. A. Larsen, J. Gilkinson*: Influence of immunoheterogeneity of circulating parathyroid hormone on results of radioimmunoassays of serum in man. *Amer. J. Med.* 56: 785–793 (1974)
- Arnaud, C.D.*: Parathyroid hormone, calcitonin and vitamin D. Clinical considerations (Part 1). *Amer. J. Med.* 56: 743–750 (1974)
- Berson, S.A., R.S. Yalow*: Immunoassay of bovine and human parathyroid hormone. *Proc. Nat. Acad. Sci.* 49: 613–617 (1963)
- Berson, S.A., R.S. Yalow*: Immunochemical heterogeneity of parathyroid hormone in plasma. *J. Clin. Endocrinol. Metab.* 28: 1037–1047 (1968)
- Bouillon, R., J. Reynaert, J.H. Claes, W. Lissens, P. de Moor*: The effect of anticonvulsant therapy on serum levels of anticonvulsant therapy on serum levels of 25-hydroxyvitamin D, calcium and parathyroid hormone. *J. Clin. Endocrinol. Metab.* 41: 1130–1135 (1975)
- Canterbury, J.M., E. Reiss*: Multiple immunoreactive molecular forms of parathyroid hormone in human serum. *Proc. Soc. Exp. Biol. Med.* 140: 1393–1398 (1972)
- Canterbury, J.M., G.S. Levey, E. Reiss*: Activation of renal cortical adenylate cyclase by circulating immunoreactive parathyroid hormone fragments. *J. Clin. Invest.* 52: 524–527 (1973)
- Greenwood, F.C., W.M. Hunter, J.S. Glover*: The preparation of  $^{131}\text{I}$ -labelled growth hormone of high specific activity. *Biochem. J.* 89: 114 (1963)
- Habener, J.F., D. Powell, T.M. Murray, G.P. Mayer, J.T. Potts jr.*: Parathyroid hormone: secretion and metabolism in vivo. *Proc. Nat. Acad. Sci. USA* 68: 2986–2991 (1971)

- Hehrmann, R., R. Wilke, J.P. Nordmeyer, R.D. Hesch:* Hochsensitiver C-terminalspezifischer Radioimmunoassay für menschliches Parathormon als Routinemethode. *Dtsch. med. Wschr.* 101: 1726–1729 (1976)
- Hehrmann, R., J.P. Nordmeyer, R. Wilke, R.D. Hesch:* Radioimmunoassay of human PTH: Characterisation of two new antisera from sheep and clinical results. *Acta Endocrinol. Suppl.* 208: 117 (1977)
- Joel, E.W., D.K. Schönberg, W. Ilg, E. Keller:* Problems of optimization of double antibody radioimmunoassay of hLH, hFSH and hGH: "hook" phenomenon, false negative patient values and linearity of values from patient plasma dilutions. In: *Radioimmunoassay and Related Procedures in Medicine*, Vol. 1, International Atomic Energy Agency, Vienna 1974, p. 45–56
- Mallet, E., Ph. Brunelle:* Technique de dosage radioimmunologique de la parathormone humaine. Utilisation d'un antiserum disponible et d'un étalon international. *Clin. Chim. Acta* 64: 11–18 (1975)
- Marschner, I., I.H. Dobry, F. Erhardt, T. Landersdorfer, B. Popp, C. Ringel, P.C. Scriba:* Berechnung radioimmunologischer Meßwerte mittels Spline Funktionen. *Ärztl. Lab.* 20: 184–191 (1974)
- Minne, H., S. Raptis, R. Ziegler:* Radioimmunologische Bestimmung von Gastrin, Calcitonin und Parathormon: Methode und klinische Anwendung. *Med. Welt* 37: 1726–1730 (1976)
- Purnell, D.C., D.A. Scholz, L.H. Smith, G.W. Sizemore, B. M. Black, R.S. Goldsmith, C.D. Arnaud:* Treatment of primary hyperparathyroidism. *Amer. J. Med.* 56: 800–809 (1974)
- Segre, G.V., J.F. Habener, D. Powell, G.W. Tregear, J.T. Potts jr.:* Parathyroid hormone in human plasma: immunochemical characterization and biological implications. *J. Clin. Invest.* 51: 3163–3172 (1972)
- Segre, G.V., H.D. Niall, J.F. Habener, J.T. Potts, jr.:* Metabolism of parathyroid hormone: physiologic and clinical significance. *Amer. J. Med.* 56: 774–784 (1974)
- Segre, G.V., P. D'Amour, J.T. Potts, jr.:* Metabolism of radioiodinated bovine parathyroid hormone in the rat. *Endocrinology* 99: 1645–1652 (1976)
- Silvermann, R., R.S. Yalow:* Heterogeneity of parathyroid hormone: clinical and physiological implications. *J. Clin. Invest.* 52: 1958–1971 (1973)
- Sinha, T.K., S.F. Queener, N.H. Bell:* Acquired resistance to parathyroid hormone. *Acta Endocrinol.* 83: 321–328 (1976)
- Wide, L., S.J. Nillius, C. Gemzell, P. Roos:* Radioimmunosorbent assay of follicle stimulating hormone and luteinizing hormone in serum and urine from men and women. *Acta Endocrinol. Suppl.*, 184: 73 (1973)
- Wood, W.G., I. Marschner:* Comparison of different labelling and separation techniques in the production of a stable <sup>125</sup>I-bovine parathyrin tracer. *Acta Endocrinol. Suppl.* 215: 113–116 (1978)
- Wood, W.G., I. Marschner, P.C. Scriba:* Rapid and sensitive radioimmunoassays for human parathyrin. In: *Radioaktive Isotope in Klinik und Forschung*. 13. Band, pp. 479–488. Editor R. Höfer, Verlag H. Egermann, Wien (1978)

Requests for reprints should be addressed to: Dr. W.G. Wood, Laboratorien für Klinische Chemie und Endokrinologie, Medizinische Klinik Innenstadt der Universität München, Ziemssenstraße 1, D-8000 München 2 (Germany)