Noomycol and lactulose are thought to exert their influence on hepatic coma exclusively by interfering with the bacterial flora, but our results suggest a potential additional effect, namely interference with glutation-dependent non-bacterial ammonia production. This glutation-dependent ammonia production may exceed by far the bacterial ammonia production. We suggest that the mechanism of action of lactulose and noomycol will be better understood when the potential influence of these compounds on non-bacterial ammonia generation is taken into account.

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ANTIBODIES TO PLASMID-ENCODED PROTEINS OF ENTEROPATHOGENIC YERSINIA IN PATIENTS WITH AUTOIMMUNE THYROID DISEASE

Sir,—Bech et al.2 have suggested an association between thyroid autoimmune disorders and humoral-3 and cellular immunity to Yersinia enterocolitica. Binding sites for thyrotropin have also been described. The role of Yersinia in the pathogenesis of thyroid autoimmune disorders is not, however, understood, partly because most studies were done with laboratory strains of Y enterocolitica of different serotypes that had lost their virulence. A pre-requisite to virulence of the most common enteropathogenic Y enterocolitica and Y pseudotuberculosis strains is the presence of a 42-46 MD protein which is rapidly lost after subcultivation. Virulence in terms of serum resistance, phagocytosis resistance, and cell adhesion is mediated by these plasmids. These plasmids also encode for at least six proteins against which man and animals produce antibodies after Yersinia infection.6,7 In calcium-deficient nutrient broth virulent Yersinia release strongly immunogenic proteins in large quantities.6,7 By sodium dodecyl sulphate/polyacrylamide gel electrophoresis bands of released proteins (RPs) can be seen at 25 kD, 34 kD (Y pseudotuberculosis)/36 kD (Y enterocolitica), 35 kD, 46 kD, and 56 kD (Y enterocolitica)/67 kD (Y pseudotuberculosis).

We have investigated sera from patients with thyroid autoimmune disorders for antibodies to RPs and studied the prevalence of specific immunoglobulin classes by western blotting. The occurrence of RP antibodies in 336 healthy blood-donors and 28 patients with non-toxic goitre was compared with that in 100 patients with Graves' disease and 28 patients with Hashimoto's thyroiditis. All Graves' disease patients were hyperthyroid and had TSH-receptor antibodies. The onset of Graves' disease was recurrent in some cases. A crossreactivity of antibodies to RPs with plasmid-encoded released proteins of enteropathogenic Yersinia. Crossreactivity of antibodies against plasmid-encoded released proteins of enteropathogenic Yersinia. FEMS Microbiol Lett 1986; 36: 15-19.

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TSH receptor. Moreover, antibodies to 25 kD RP are transient, emerging in the first three months after infection and fading away after about one year. We observed a similar pattern when patients with Graves' disease were grouped according to the onset of hyperthyroidism. Within one year both 25 kD and IgA antibodies had reached a peak and decreased in recurrent Graves' disease. In most cases the 25 kD antibodies were detected as IgG-class immunoglobulins. IgG antibodies to RPs persist for several years. Consequently IgG antibodies develop and stay increased in 81% of patients with Graves' disease. An ongoing prospective study in newly diagnosed cases of Graves' disease confirms these antibody profiles—ie, no RP antibodies at the time of diagnosis and then IgG, and 25 kD RP antibodies developing within eight months. Thus we have found a strong association between thyroid autoimmune disease and antibodies against plasmid-encoded proteins of enteropathogenic Yersinia. Crossreactivity of antibodies in thyroid autoimmune disease with Y enterocolitica or Y pseudotuberculosis can now be understood independently of Yersinia serotypes. In Graves' disease the binding of thyrotropin in Y enterocolitica, the sharing of epitopes of the Yersinia plasmid with the thyrotropin receptor, and the plasmid antibody profile that we have demonstrated indicate antigenic mimicry, which could well have an initiating role in the disease.

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PREVALENCE OF ANTIBODIES TO PLASMID-ENCODED PROTEINS OF ENTEROPATHOGENIC YERSINIA IN PATIENTS WITH AUTOIMMUNE THYROID DISEASES AND IN CONTROLS

<table>
<thead>
<tr>
<th>Group</th>
<th>IgG</th>
<th>IgA</th>
<th>Anti-25 kD RP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy blood donors (n=336)</td>
<td>116 (34.5%)</td>
<td>40 (19.9%)</td>
<td>10 (3.0%)</td>
</tr>
<tr>
<td>Non-toxic goitre (n=25)</td>
<td>10 (40%)</td>
<td>12 (48%)</td>
<td>10 (40%)</td>
</tr>
<tr>
<td>Graves' disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (n=100)</td>
<td>72 (72.0%)</td>
<td>21 (60%)</td>
<td>35 (33.6%)</td>
</tr>
<tr>
<td>6 months (n=35)</td>
<td>21 (60%)</td>
<td>11 (31.4%)</td>
<td>3 (9.1%)</td>
</tr>
<tr>
<td>12 months (n=38)</td>
<td>28 (74%)</td>
<td>15 (39%)</td>
<td>3 (7.9%)</td>
</tr>
<tr>
<td>Recurrent (n=21)</td>
<td>17 (81%)</td>
<td>6 (28%)</td>
<td>3 (14.5%)</td>
</tr>
<tr>
<td>Hashimoto's thyroiditis (n=38)</td>
<td>25 (66%)</td>
<td>14 (37%)</td>
<td>3 (11%)</td>
</tr>
</tbody>
</table>

Month after occurrence of symptoms of hyperthyroidism, x² test, p<0.05, 1<0.01, and 5<0.001 compared with blood donors; p<0.05 compared with patients with non-toxic goitre.