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ABSTRACTS OF COMMUNICATIONS

A Scientific Meeting was held at the Devonshire Park Centre, Eastbourne on Tuesday–Thursday, 5–7 December 1995, when the following paper was presented. This abstract arrived too late for inclusion in Volume 55 no. 2.

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Growth in rural Gambian infants is closely related to small-intestinal permeability: Why? By P.G. LUNN[1], C.A. NORTHROP-CLEWES[2] and R.M. DOWNES[1], *[1]MRC Dunn Nutrition Centre, Cambridge CB4 1XJ and Keneba, The Gambia and [2]Department of Medical Sciences, University of Ulster, Coleraine BT52 1SA*

Poor growth during infancy is a frequent observation in most developing countries. Although there is no doubt that food quality and availability can affect growth performance, our previous work has shown that much of the poor growth of Gambian infants can be predicted from measurements of intestinal permeability. The purpose of this investigation was to examine the mechanisms by which mucosal enteropathy of the small intestine might cause poor long-term (i.e. over 9 months) growth in Gambian infants.

In a longitudinal study of 112 Gambian infants aged 3-15 months, weight and length measurements were made, a lactulose:mannitol intestinal permeability test performed and a finger-prick blood sample taken at monthly intervals for an average of 9 months. Diarrhoea prevalence was assessed weekly as the number of days in which the subject passed three or more stools per day.

A strong relationship between mean intestinal permeability (expressed as $\log_e$ of the 5 h urinary lactulose:mannitol ratio) and mean (age-corrected) long-term growth in weight and length was found (r -0.60 and -0.61 respectively, $P<0.001$). Although part of the permeability relationship could be explained by a reduced uptake of mannitol, (r 0.23 and 0.20 for weight and length respectively) a result indicative of nutrient malabsorption, most of this relationship was due to increased lactulose uptake and recovery (r -0.31 and -0.36 for weight and length respectively). This suggests that a major part of growth faltering was associated with increased leakiness of the mucosal barrier of the small intestine. Neither long-term growth rate nor mean permeability measurements were related to diarrhoea prevalence in the infants.

Plasma concentrations of α-1-antichymotrypsin and immunoglobulins (Ig) A, G and M were all found to become elevated in Gambian infants beyond 3-4 months of age, coincident with the onset of growth faltering. At 9 months of age, mean concentrations of IgA (0.96 (SD 0.42) g/l) IgG (12.6 (SD 2.6) g/l) and IgM (1.65 (SD 0.70) g/l) were more than double age-matched UK values, whilst the α-1-antichymotrypsin level, at 0.82 (SD 0.30) g/l, was 71% above the UK mean. The high mean levels of both IgA and IgG were strongly related to poor long-term growth in weight (r -0.38 and -0.46, $P<0.001$ for both) and length (r -0.44 and -0.46, $P<0.001$ for both). Moreover, the increased concentrations of these two immunoglobulins also correlated with intestinal permeability and especially with lactulose uptake (r 0.40, $P<0.001$ for IgA and r 0.24, $P<0.01$ for IgG).

The plasma protein results suggest that long-term growth of these infants is reduced in the presence of a chronic inflammatory condition with increased exposure to antigenic stimuli. Although malabsorption of nutrients appears to explain part of the relationship between the small-intestinal enteropathy and growth, it may be that the compromised mucosal barrier allows increased entry of antigenic macromolecules which contribute to the systemic inflammatory response.