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MALNUTRITION

NEW MOUSE MODEL OF EE

A novel mouse model of environmental enteropathy (EE) has been developed that recapitulates many of the aspects observed in humans. Published in *Nature Communications*, the new research provides insights into the effects of malnutrition on the microbiota, metabolism and immune system in the mouse small intestine.

Malnutrition is a major health issue worldwide. Environmental enteropathy —a subclinical, chronic inflammatory condition of the small intestine—is widely acknowledged as an important factor in childhood malnutrition. EE typically occurs in regions with poor sanitation and hygiene, and continuous cycles of faecal–oral exposure to enteric pathogens are thought to be a factor. However, EE is poorly understood. "One hallmark is the overgrowth of bacteria … in the small intestine (small intestinal bacterial overgrowth or SIBO)," explains author Brett Finlay. "However, short of biopsies of the small intestine … and with no animal model, we know very little about the disease mechanisms of EE."

Mice were fed either a malnourished diet (7% protein, 5% fat; mimicking that of developing countries) or an isocaloric control diet (20% protein, 15% fat; mimicking that of developed countries). Unlike the control diet, the malnourished diet led to moderate growth stunting of the mice, increased intestinal permeability and altered composition of the microbiota and metabolome of the small intestine.

Crucially, malnutrition alone did not trigger EE. Only when oral gavage of a bacterial cocktail of Bacteriodales and *Escherichia coli* was administered alongside the malnourished diet were the clinical features of EE induced. Compared with controls, malnourished mice exposed to this bacterial cocktail had increased growth stunting, increased intestinal permeability, SIBO, small intestinal inflammation and villous blunting, and susceptibility to enteric infection.

"This research opens up many lines of investigation, the obvious one is probing mechanistically how this disease works," notes Finlay, who hopes the new mouse model will be a valuable resource and a more realistic model to study other diseases of the developing world.

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Original article Brown, E. M. *et al.* Diet and specific microbial exposure trigger features of environmental enteropathy in a novel murine model. *Nat. Commun.* **6**, 7806 (2015)