The food contaminant fumonisin B\textsubscript{1} reduces the maturation of porcine CD11R\textsuperscript{1} intestinal dendritic cells, resulting in a reduced efficiency of oral immunisation and a prolonged intestinal ETEC infection

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Consumption of food or feed contaminated with fumonisin B\textsubscript{1} (FB\textsubscript{1}), a mycotoxin produced by \textit{Fusarium verticillioides}, leads to disease in humans and animals. This mycotoxin reduces the efficiency of parenteral vaccinations, indicating that ingestion of FB\textsubscript{1}-contaminated food suppresses the systemic immune system. This study was conducted to elucidate the mechanisms by which FB\textsubscript{1} exerts its immunosuppressive effects on the intestinal immune system. Piglets were used as a model species for humans since their gastrointestinal tracts are very similar both on an anatomical and physiological level. The animals were orally exposed to a low dose of FB\textsubscript{1} (1 mg/kg body weight) for 10 days which did not result in any clinical signs. However, when compared to control animals, FB\textsubscript{1}-exposed animals demonstrated a prolonged excretion of the porcine-specific enteropathogen F4\textsuperscript{+} enterotoxigenic \textit{E. coli} (F4\textsuperscript{+} ETEC) following infection. Upon oral immunisation with purified F4 fimbriae, FB\textsubscript{1} exposure reduced the intestinal antigen-specific immune response as compared to control animals. Further analyses to elucidate the mechanisms behind these observations revealed a reduced expression of IL-12p40 mRNA by intestinal immune cells. Since this cytokine is mainly secreted by antigen presenting cells, we analysed the effects of FB\textsubscript{1} on small intestinal CD11R\textsuperscript{1} lamina propria dendritic cells (LPDC). These CD11R\textsuperscript{1} LPDC matured in response to stimulation with the ETEC-derived virulence factors, F4 fimbriae and flagellin, indicating that this intestinal DC subset is involved in the induction of protective immunity. However, \textit{in vivo} exposure of piglets to FB\textsubscript{1} impaired the functional maturation of F4 fimbriae- and flagellin-stimulated CD11R\textsuperscript{1} LPDC as evidenced by a decreased upregulation of MHCII and CD80/86 and a reduced T cell stimulatory capacity. These results indicate an FB\textsubscript{1}-mediated reduction of \textit{in vivo} DC maturation and stress the need to reduce exposure of animals and humans to FB\textsubscript{1} in order to enhance the efficacy of vaccination programs.