Milk diets influence doxorubicin-induced intestinal toxicity in piglets

Chemotherapy-induced gastrointestinal (GI) toxicity is a common adverse effect of cancer treatment. We used preweaned piglets as models to test our hypothesis that the immunomodulatory and GI trophic effects of bovine colostrum would reduce the severity of GI complications associated with doxorubicin (DOX) treatment. Five-day-old pigs were administered DOX (1 × 100 mg/m^2) or an equivalent volume of saline (SAL) and either fed formula (DOX-Form, n = 9, or SAL-Form, n = 7) or bovine colostrum (DOX-Colos, n = 9, or SAL-Colos, n = 7). Pigs were euthanized 5 days after initiation of chemotherapy to assess markers of small intestinal function and inflammation. All DOX-treated animals developed diarrhea, growth deficits, and leukopenia. However, the intestines of DOX-Colos pigs had lower intestinal permeability, longer intestinal villi with higher activities of brush border enzymes, and lower tissue IL-8 levels compared with DOX-Form (all P <0.05). DOX-Form pigs, but not DOX-Colos pigs, had significantly higher plasma C-reactive protein, compared with SAL-Form. Plasma citrulline was not affected by DOX treatment or diet. Thus a single dose of DOX induces intestinal toxicity in preweaned pigs and may lead to a systemic inflammatory response. The toxicity is affected by type of enteral nutrition with more pronounced GI toxicity when formula is fed compared with bovine colostrum. The results indicate that bovine colostrum may be a beneficial supplementary diet for children subjected to chemotherapy and subsequent intestinal toxicity.