



Investigating Intestinal Inflammation: The Dextran Sulfate Sodium (DSS)-Induced Colitis Model

Context and Purpose

Inflammatory bowel diseases (IBDs), including ulcerative colitis, remain complex disorders characterised by recurrent inflammation and mucosal injury of the gastrointestinal tract. Preclinical models that capture these pathological events are critical for understanding disease biology and for assessing new therapeutic strategies.

The Dextran Sulfate Sodium (DSS)-induced colitis model is widely regarded as one of the most reliable and translational systems for studying epithelial barrier disruption and inflammatory activation in the colon.

Model Rationale

Administration of DSS in drinking water causes damage to the colonic epithelium in rodents, producing intestinal inflammation, mucosal ulceration, bloody diarrhoea and weight loss that resemble clinical colitis.

The model triggers innate immune responses and allows investigation of epithelial barrier dysfunction and immune modulation in a controlled preclinical setting.

Experimental Outline

Model Description

Parameter	Description
Animal Species	Female BALB/c mice
Induction	3% DSS solution in drinking water for 14 days
Endpoints	Body weight, faecal consistency, rectal bleeding, disease activity index (DAI), colon length, histopathology

Statistical Analysis

- Two-way ANOVA followed by Bonferroni post-tests.
- Significance reported as $p < 0.05$, $p < 0.01$, $p < 0.001$ versus vehicle.

Validation Summary

- The model produced clinically observable signs consistent with colitis (changes in body weight, faecal consistency and rectal bleeding), which were used to calculate the DAI.
- Colon length and histopathological assessment were employed to confirm macroscopic and microscopic manifestations of colonic injury and inflammation.
- Data were analysed using two-way ANOVA with Bonferroni post-tests to determine statistical significance versus vehicle.

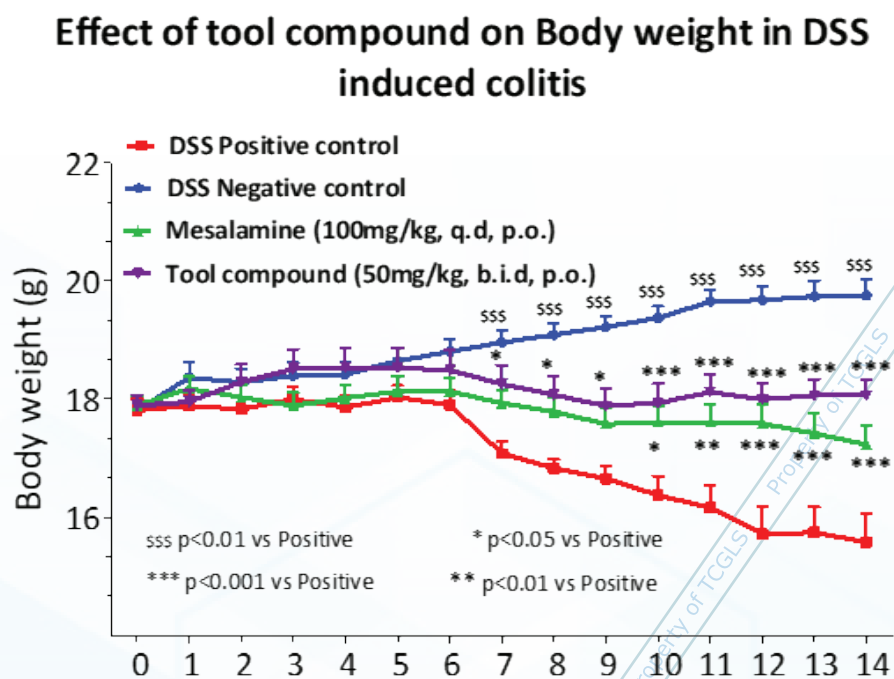


Figure 1. Body weight (%) of DSS-induced colitis model

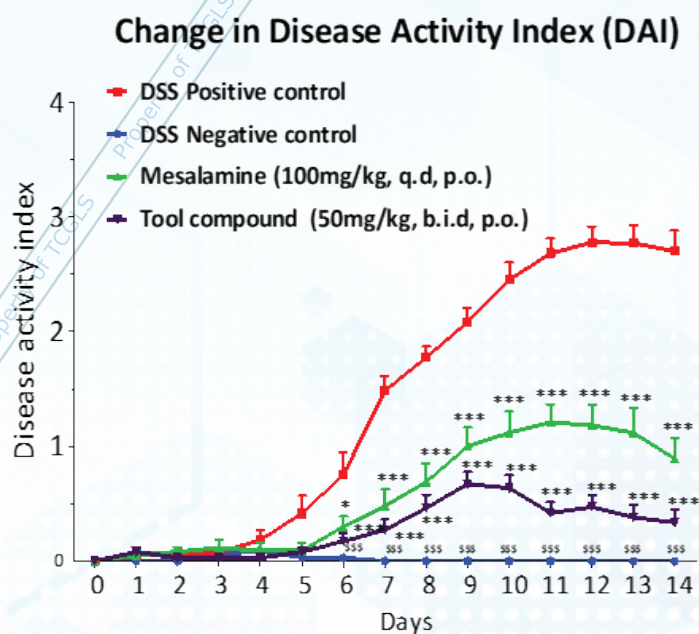


Figure 2. Disease Activity Index (DAI) of DSS-induced colitis model

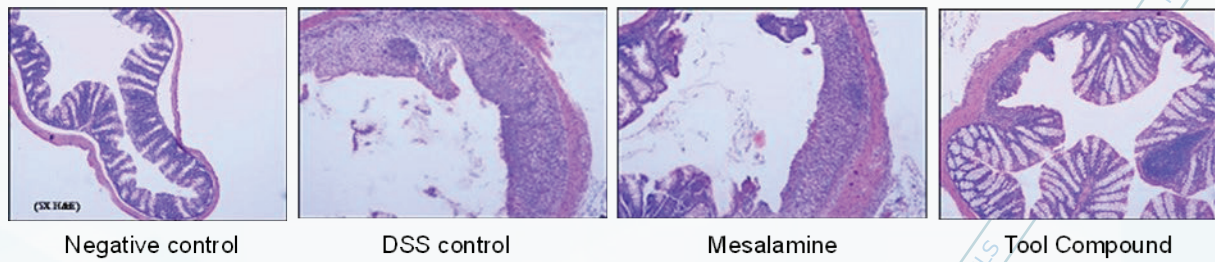


Figure 3. Histopathology of colon tissue (H&E staining) in vehicle- and DSS-treated groups

Relevance to Preclinical IBD Research

The measured endpoints (clinical scores, colon length and histology) permit quantification of disease severity and are commonly used to evaluate candidate anti-inflammatory or mucosal-protective interventions.