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INTERSTITIAL MATRIX REMODELLING OF THE TESTIS IN EXPERIMENTAL COLITIS: COLLAGEN AND GLYCOSAMINOGLYCAN DYNAMICS AND THEIR PHYTOCORRECTION

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Relevance. Chronic intestinal inflammation increasingly affects men during their fertile years, yet the fibrotic component of its impact on the gonad has received little attention. Excessive deposition of extracellular matrix in the peritubular and interstitial compartments of the testis thickens the lamina propria, activates peritubular contractile cells and compromises the microenvironment required for spermatogenesis. Because interstitial remodelling may precede irreversible functional loss, its early, quantitative detection is clinically meaningful.

Aim. To quantify, across two ages, the collagen and glycosaminoglycan (GAG) response of the rat testis to experimental ulcerative colitis and to test whether a moderate dose of dandelion (Taraxacum officinale) root extract can attenuate this remodelling.

Materials and methods. One hundred fifty outbred male rats aged 6 and 9 months were divided into three groups (n=25 per age): untreated controls; colitis induced by intrarectal 4% acetic acid; and colitis treated with T. officinale root extract (200 mg/kg daily for 14 days). Paraffin sections were stained with van Gieson for collagen and with Alcian blue (pH 2.5) for acidic GAGs, and the stained interstitial area fraction was measured digitally in QuPath under blinded conditions. Group and age effects were compared by two-way analysis of variance with the Tukey test ($p<0.05$).

Results. In control testes collagen formed only a delicate peritubular rim and GAGs were barely detectable. Colitis produced a pronounced expansion of the interstitial matrix. At nine months the collagen area fraction approximately doubled (from 13.1±0.5% to 29.4±1.2%; a 2.24-fold rise), whereas the GAG fraction rose more than four-fold (from 2.9±0.2% to 13.4±0.7%; a 4.62-fold rise) — the sharpest relative change recorded — and both increases were greater in the older animals ($p<0.001$). Treatment with the root extract lowered collagen by about one third (37.1%) and reduced GAGs 2.39-fold relative to untreated colitis ($p<0.01$), partially restoring the delicate interstitial pattern without returning it to baseline.

Discussion. The findings place colitis-associated testicular injury within the broader framework of organ fibrosis, in which oxidative stress and pro-inflammatory

signalling activate peritubular myofibroblasts and expand the extracellular matrix. The disproportionately large rise in glycosaminoglycans suggests that proteoglycan-rich matrix expansion is an early event, potentially preceding mature collagen cross-linking; this makes Alcian blue a sensitive early indicator of interstitial change. The partial normalization achieved with a standardized, moderate-dose root preparation is consistent with the antioxidant and anti-inflammatory profile of dandelion and supports the concept that curbing the systemic inflammatory drive limits gonadal fibrogenesis. Because a single dose and an acute-to-subacute model were used, dose-response and chronic-colitis studies with molecular markers of matrix turnover are warranted.

Conclusion. Experimental colitis drives an age-dependent fibrotic remodelling of the testicular interstitium, marked by parallel accumulation of collagen and glycosaminoglycans; dandelion root extract exerts a partial, histochemically verified antifibrotic effect. Van Gieson and Alcian blue quantification offers a simple, reproducible tool for monitoring gonadal fibrosis and its pharmacological correction.

Keywords: ulcerative colitis, testis, interstitial fibrosis, collagen, glycosaminoglycans, Taraxacum officinale.

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