



Differential histopathological and immunohistochemical signatures in two different rat models of interstitial cystitis/ bladder pain syndrome

Naşide Mangir¹, Seda Sezer², Güneş Güner³, Karim Shirinli¹, Cengiz Bayçu², Güldal İnal Gültekin^{3*}

1. Hacettepe University Faculty of Medicine Department of Urology, 2. Istanbul Okan University Faculty of Medicine Department of Histology, 3. Hacettepe University Faculty of Medicine Department of Pathology, 4. Istanbul Okan University Faculty of Medicine Department of Physiology



Background & aim

- Bladder pain, pressure or discomfort; effective treatments are lacking
- Widely used LPS and CYC rat models: relevance to specific inflammatory and remodelling pathways remain unclear
- Aim:** Compare previously identified biomarkers with histopathology and IHC

Study design

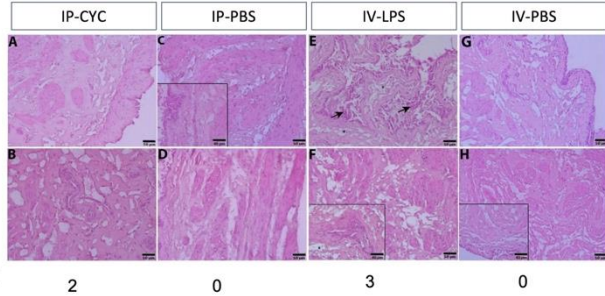
Group	n	Treatment
IV-LPS	8	Intravesical LPS, 1 mg/ml
IV-PBS	6	Intravesical PBS
IP-CYC	8	Cyclophosphamide 75 mg/kg, i.p.
IP-PBS	3	Intraperitoneal PBS

- Female rats; sacrificed and bladders harvested on day 7
- H&E scored 0–3: inflammation, architectural disruption, stromal disorganisation
- IHC (ITGB1, MCP-1, CHI3L1) in urothelium, lamina propria, smooth muscle

Results • Histopathology (H&E)

Figure 1. H&E sections. A–B IP-CYC; C–D IP-PBS; E–F IV-LPS; G–H IV-PBS. Arrows: white blood cell infiltration. Boxes: higher-magnification areas. Scale bars 40–50 µm.

Controls, score 0: intact urothelium, preserved stroma, no inflammatory infiltration.



IV-LPS • score 3

severe, inflammation-driven

- Widespread infiltration, marked urothelial disruption, pronounced stromal disorganisation
- Diffuse, strong staining at damaged urothelium and dense infiltrates; MCP-1 and CHI3L1 high in cell-rich areas (monocyte/macrophage recruitment)

IP-CYC • score 2

moderate, remodelling-type injury

- Partial preservation of architecture, persistent stromal irregularity, increased cellularity
- Localised staining in lamina propria and perivascular regions; ITGB1 in fibroblasts, endothelium, smooth muscle; CHI3L1 tied to stromal remodelling and early fibrosis

Conclusion LPS and CYC models are not interchangeable. Choose by the process of interest: LPS for acute inflammation, CYC for tissue remodelling and fibrotic pathways.

References 1. İnal-Gültekin G, Gormez Z, Mangir N. Defining molecular treatment targets for BPS/IC: uncovering adhesion molecules. *Front Pharmacol* 2022;13:780855. 2. Buford K, Peters KM, Riedl C, et al. Global consensus on IC/BPS: an update on therapeutic treatments. *Neurourol Urodyn* 2026;45(1):46–53. 3. Tay C, Grundy L. Animal models of interstitial cystitis/bladder pain syndrome. *Front Physiol* 2023;14.

Results • Immunohistochemistry

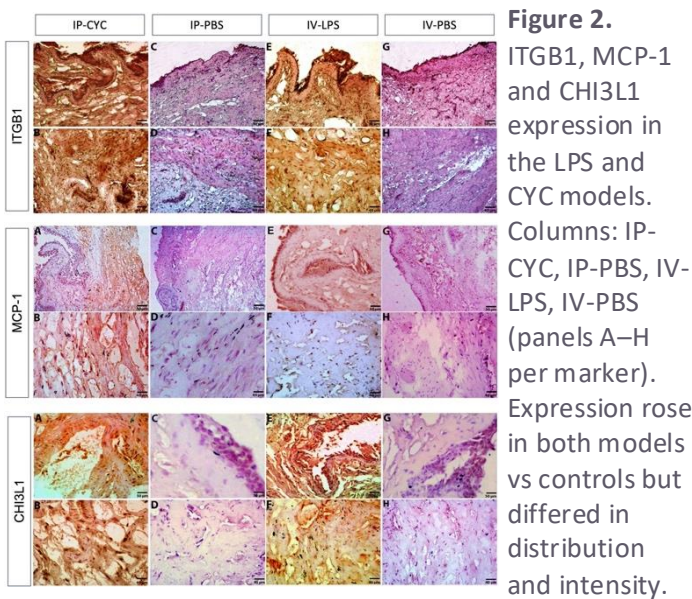


Figure 2.

ITGB1, MCP-1 and CHI3L1 expression in the LPS and CYC models. Columns: IP-CYC, IP-PBS, IV-LPS, IV-PBS (panels A–H per marker). Expression rose in both models vs controls but differed in distribution and intensity.

Interpretation: Both models injure the bladder but reflect distinct processes: LPS acute, inflammation-driven damage; CYC urothelial toxicity with remodelling and early fibrosis. ITGB1, MCP-1 and CHI3L1 differ in localisation, supporting divergence along the inflammation–repair–fibrosis axis.