

# Vitamin A supplementation supports urothelial regeneration in a mouse model of acute nonbacterial cystitis

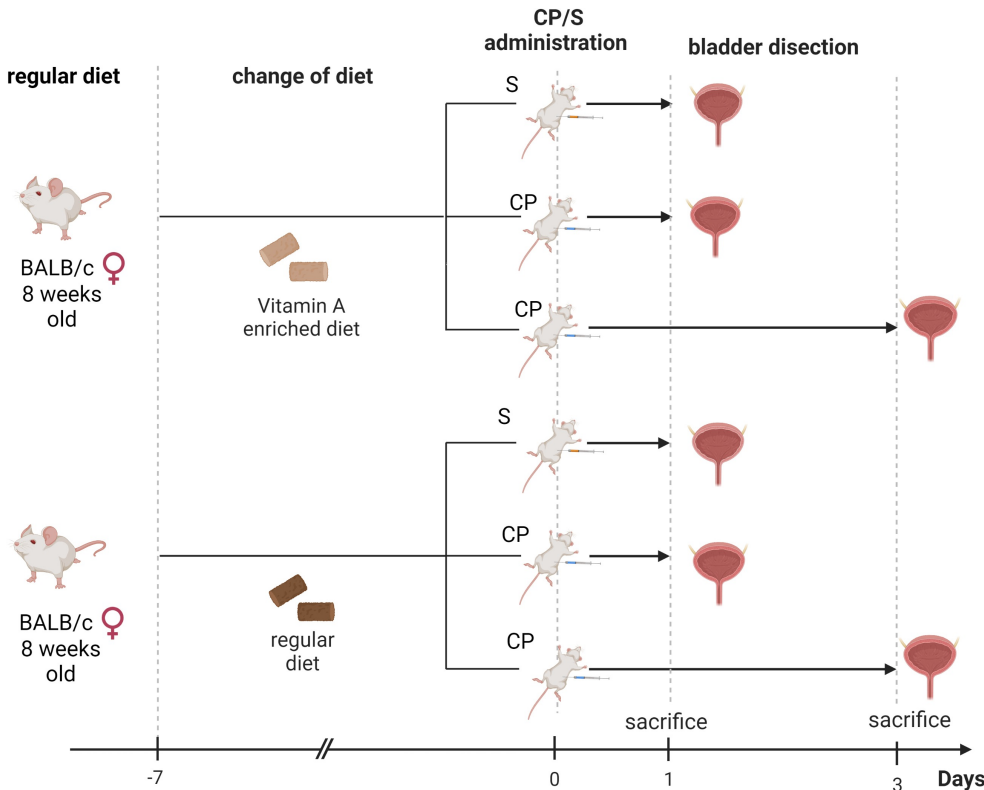
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## INTRODUCTION

**Vitamin A** or retinoids are a group of hydrophobic substances that mainly affect cell proliferation, differentiation and apoptosis. They also **possess anti-inflammatory properties**. Therefore, retinoids are used in the **treatment of various cancers and non-cancerous diseases**.

However, their **potential use** in the treatment of cystitis **has not been adequately explored**. In acute nonbacterial cystitis, the urothelium is damaged and the bladder wall is inflamed. In this case, the disruption of the urothelium is caused by chemical or physical injury. The undamaged urothelium forms a tight blood-urine barrier, which must be rapidly restored after disruption. **The aim of our study was to investigate the effects of a vitamin A enriched diet on the regeneration of the urinary bladder urothelium** in a mouse model of acute nonbacterial cystitis.

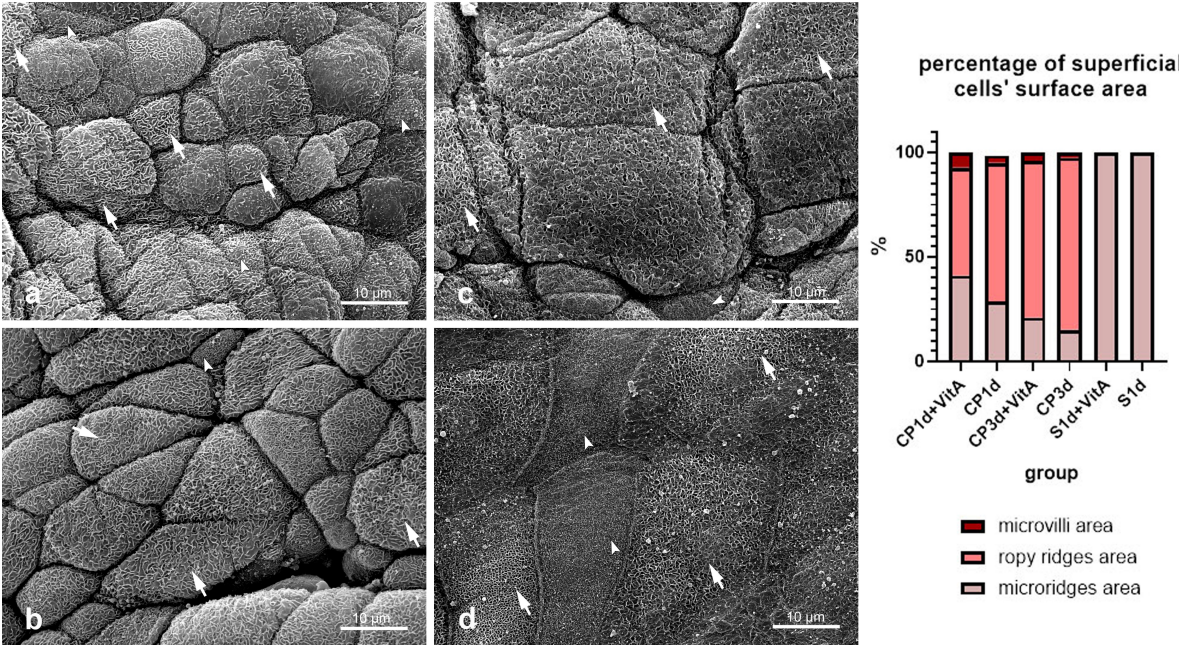
## METHODS



**Eighteen** female BALB/c mice (8 weeks old) were used for the experiment. There were 3 mice in each group. The vitamin A-enriched diet contained 586081 UI retinyl-acetate per kilogram of diet. Cyclophosphamide was administered by intraperitoneal (i.p.) injection at a concentration of **150 mg/kg** of body weight. Urinary bladders were collected and prepared for paraffin embedding, **hematoxylin-eosin staining (HE)**, and **scanning electron microscopy**. CP - cyclophosphamide; S - saline; VitA - Vitamin A

The experiments were approved by the Ministry of Agriculture, Forestry and Food of the Republic of Slovenia (permission no. U34401-4/2022/10).

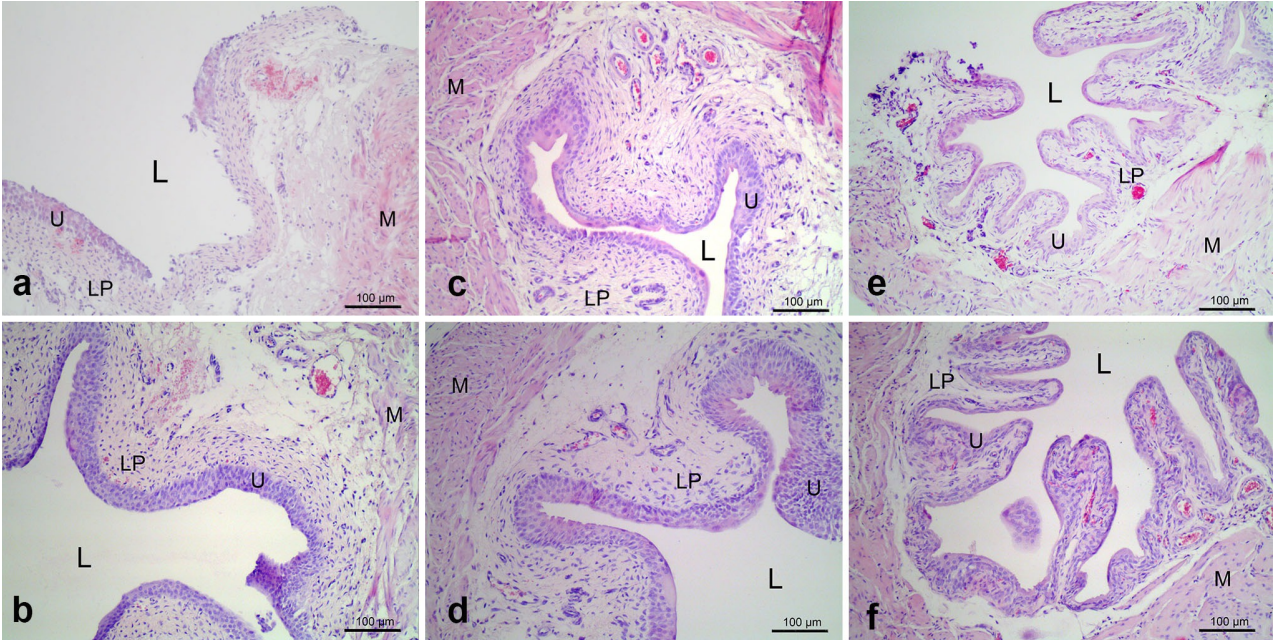
## RESULTS



A higher degree of differentiation of the urothelial surface in mice fed a vitamin A-enriched diet compared with control animals fed a regular diet was determined after analysis of scanning electron micrographs (a: CP1d; b: CP1d +VitA; c: CP3d; d: CP3d +VitA).

CP1d - 1 day after CP administration,  
VitA-Vitamin A-enriched diet,  
CP3d- 3 days after CP administration;  
S1d-1 day after S administration.

Arrows- ropy ridges,  
arrowheads - microvilli.



HE stained mouse bladder tissue for all groups in our experiment (a: CP1d, b: CP1d +VitA, c: CP3d, d: CP3d+VitA, e: S1d, f: S1d+VitA).

On these tissue sections we observed destruction of the urothelium and inflammation of the lamina propria in mice treated with CP, regardless of diet.

L = lumen,  
LP = lamina propria,  
U = urothelium,  
M = detrusor muscle.

## CONCLUSIONS

**Conclusion 1:** Vitamin A-enriched diet does not reduce the extent of urothelial surface damage.

**Conclusion 2:** Higher intake of Vitamin A could lead to slower desquamation and faster differentiation of the superficial urothelial cells.

## ACKNOWLEDGEMENTS

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