CHANGES IN ACTIN CYTOSKELETON IN PROSTATIC CELLS ASSOCIATED WITH RATS PUBERTY

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INTRODUCTION

The cell cytoskeleton is a three-dimensional protein network found throughout the cell, where it performs various functions. This system is made up by microtubules, intermediate filaments and microfilaments. The last ones are actin polymers that, through their polymerization or depolymerization, regulate many essential processes within cells. The deregulation of the proteins that control the polymerization/depolymerization of these microfilaments can affect cell activity, specifically neoplastic cells, promoting tumor progression.

Benign prostatic hyperplasia is a progressive, complex and multifactorial disease whose main lesion consists of epithelial proliferations that do not obliterate the alveolar lumen. In rats, BPH usually occurs in middle-aged or older males and is commonly a preneoplastic syndrome.

OBJETIVE

To observe conformational changes in the actin cytoskeleton by phalloidin staining of rats prostate cells from different ages that may, or may not have benign prostatic hyperplasia.

MATERIAL AND METHODS

Male Sprague Dawley rats aged 1 (n=7), 3 (n=7), 6 (n=5) and 12 (n=7) months were measured for serum testosterone, euthanised and prostate removed. Samples were stained with Haematoxylin/Eosin for histological study and stained with phalloidin and DAPI for immunofluorescence.

RESULTS

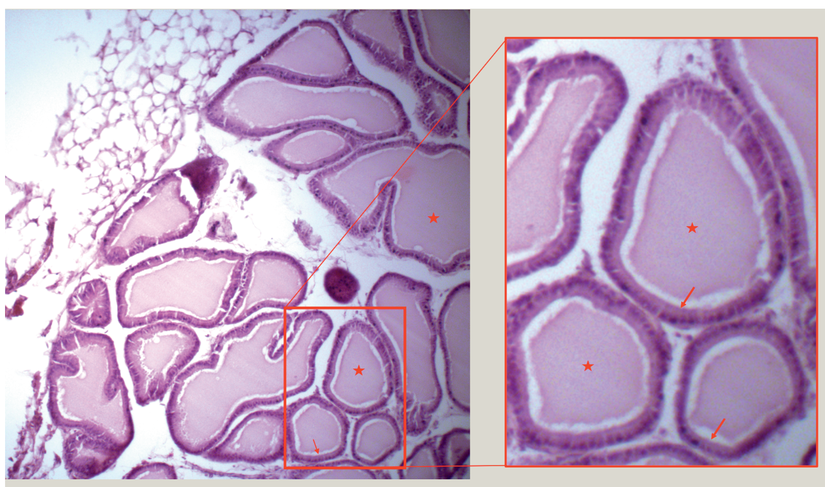

Figure A. Prostate tissue from 1-month-old rats. Marked with stars ★ : the lumen of these prostatic ducts. Arrows → : indicate the cuboid monolayer ductal epithelium with its basal nuclei.

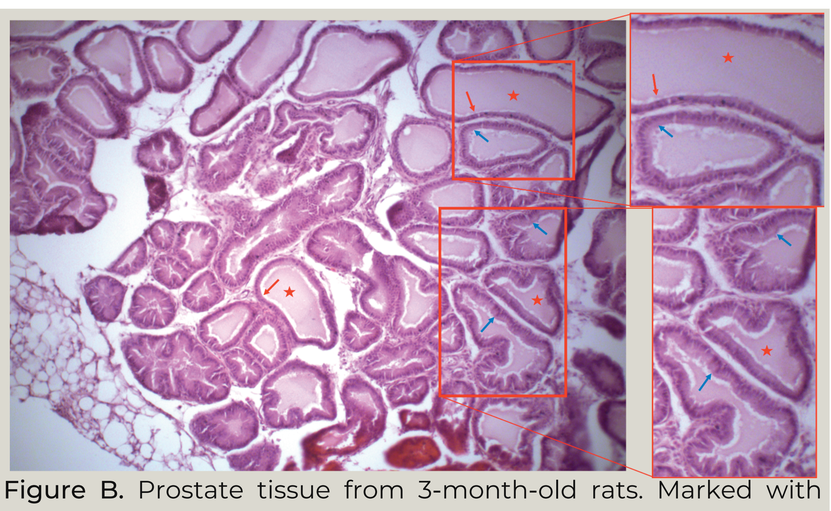

Figure B. Prostate tissue from 3-month-old rats. Marked with stars ★ : the lumen of the prostatic ducts. Red arrows → : indicate the cuboid monolayer ductal epithelium. Marked with blue arrows → : cylindrical ductal epithelium.

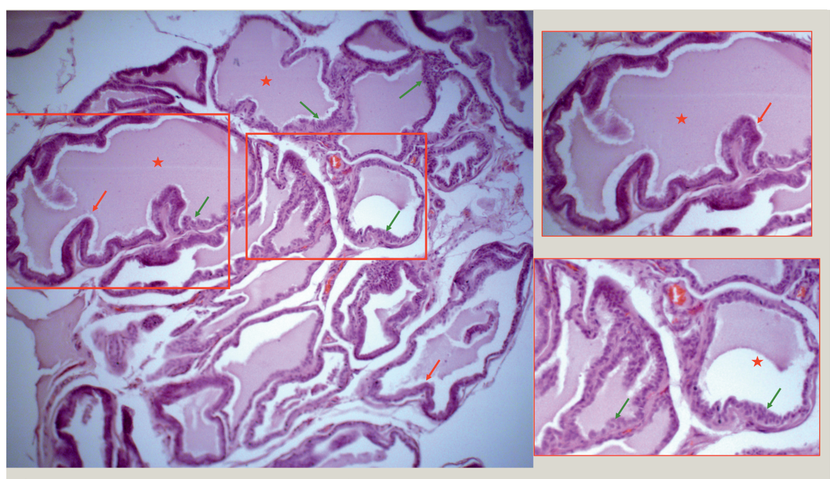

Figure C. Prostate tissue from 12-month-old rats. Marked with stars ★ : the lumen of the enlarged prostatic ducts. Red arrows → point to ductal folds. Green arrows → : show ductal areas with hyperplasia.

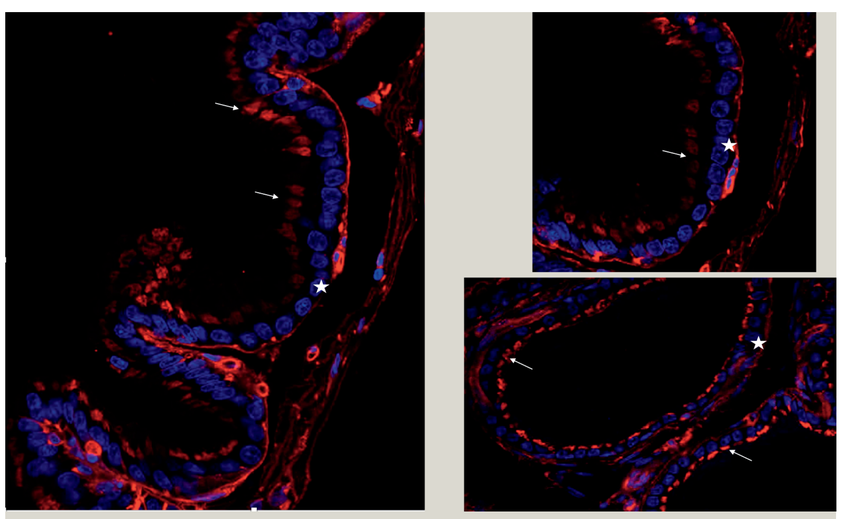

Figure D. Prostate tissue from 1-month-old rats. Marked with stars ★ : cell nuclei. Arrows → : marking the apical clusters of aggregated actin in the epithelial cells of the prostatic ducts.

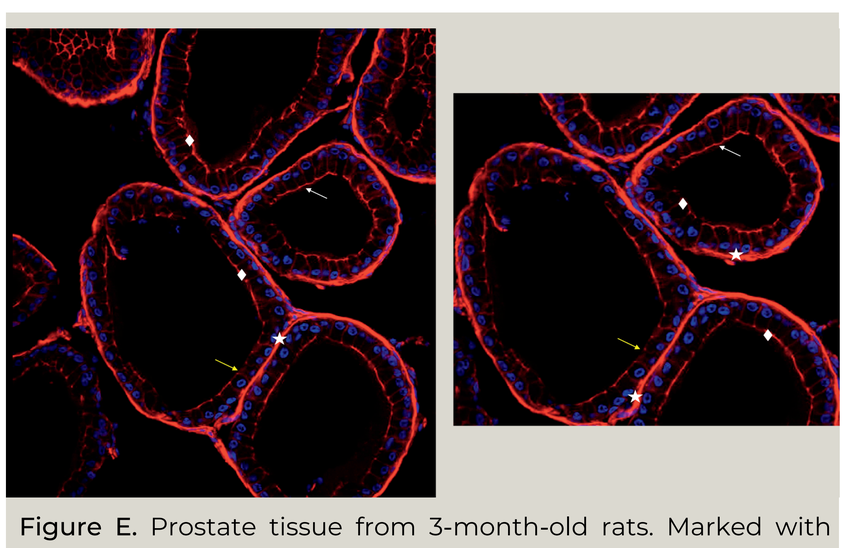

Figure E. Prostate tissue from 3-month-old rats. Marked with stars ★ : cell nuclei. Arrows → : monolayer cylindrical ductal epithelium. Yellow arrows → : cuboidal monolayer ductal epithelium. Diamonds ♦ : absence of actin apical aggregates.

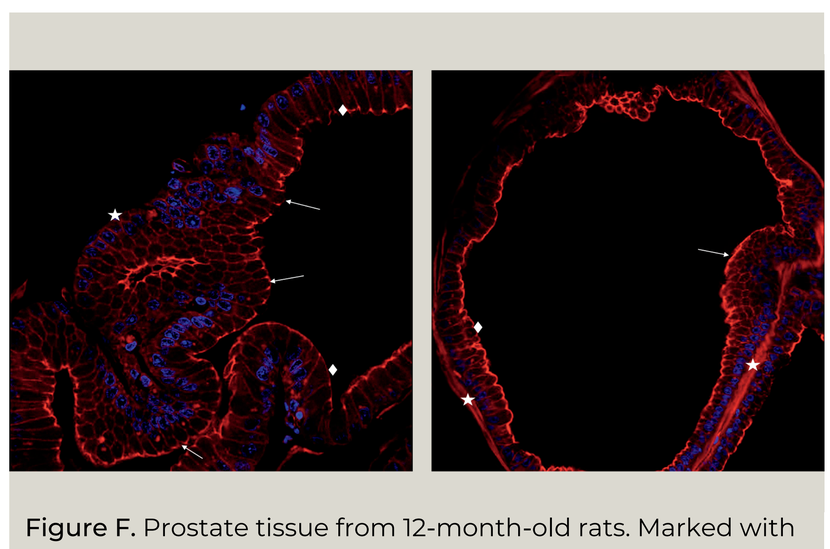

Figure F. Prostate tissue from 12-month-old rats. Marked with stars ★ : cell nuclei. Arrows → : generalized ductal hyperplasia. Diamonds ♦ : absence of actin apical aggregates.

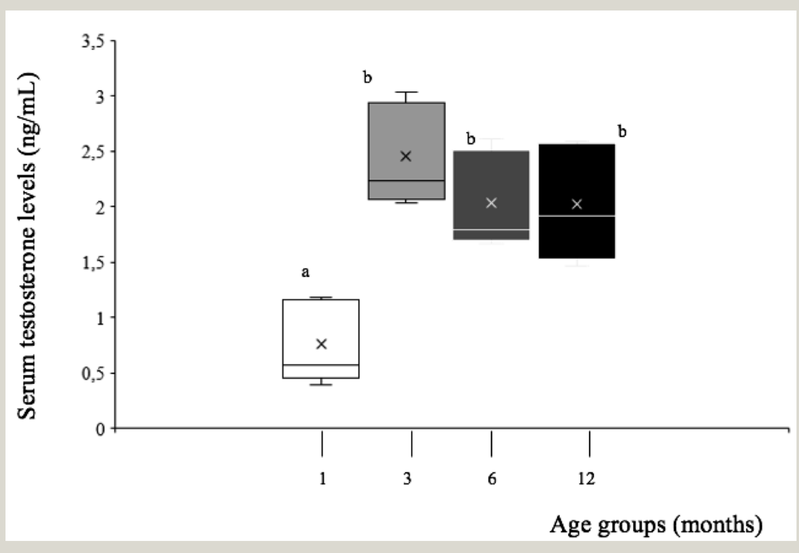

Figure G. Serum testosterone levels in rats aged 1, 3, 6 and 12 months. Letters "a" and "b" indicate that there are significant differences (P<0.05) between rats aged 1 month and the rest.

DISCUSSION

- Significant change in actin cytoskeleton conformation in rat prostatic duct cells linked to puberty.
- No significant changes related to the development of BPH.
- In 3-month-old rats, the cuboid monolayer epeithelium is being replaced by a cylindrical one, which is generalised and maintained in 6- and 12-month-old animals.
- This histological change corresponds to an increase in the level of testosterone, so we assume that the height of the epithelium increases because these cells increase their activity and secretion.
- From the age of 6 months onwards, there are individuals who show occasional foci of BPH.
- BPH becomes generalised in all 12-month-old animals.
- The structure of the actin cytoskeleton does not appear to change with the onset of BPH.
- The appearance of apparently disorganised actin clusters in the apical part of prepubertal rats, their disappearance in animals from the age of 3 months, and the coincidence of this phenomenon with the onset of sexual maturity, suggest that these changes in actin structure occur at the same time as puberty.