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The suburothelial interstitial cells of urinary bladder - an IHC and TEM study

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A number of studies describe the presence of suburothelial myofibroblasts (SUMFs) in the urinary bladder [1-7]. It has been discussed that the normal bladder does not contain myofibroblasts as identified by light and electron microscopy standards [8]. There are also studies available identifying either suburothelial interstitial cells (ICs) [9; 10], or suburothelial interstitial Cajal cells (ICCs) [11-13]. Recently there have been also described telocytes in the upper lamina propria of the urinary tract [14] and uretheral suburothelial telocytes and smooth muscle cells [15].

The telocytes (TCs) were recently defined; these cells project long, slender and moniliform processes termed telopodes [16; 17]; prior to their identification based on TEM criteria, telocytes were regarded as interstitial Cajal-like cells (ICLCs) [18-20]. However, the TEM diagnosis of TCs should be approached with caution, as stromal hybrid morphologies such as telopode-like prolongations, can be encountered [21]. It was claimed that networks of TCs are able to ensure stromal signaling [22; 23].

The possible presence of different cell types in the suburothelial band seems overlooked. It was raised this hypothesis and it was decided to use immunohistochemistry (IHC) and transmission electron microscopy (TEM) in order to elucidate the structure of the suburothelial band in the urinary bladder.

Postautopsic human bladder samples from ten donor cadavers were labeled with antibodies against CD34, CD117/c-kit, vimentin and alpha smooth muscle actin (α-SMA). Stromal cells in the immediate suburothelial band were CD34/vimentin/α-SMA positive, but CD117/c-kit negative (fig.1). However, it is not mandatory for ICCs or ICLCs to label with c-kit antibodies, and electron microscopy (EM) is best suited for identifying this cell type [24].

Bladder samples from six Wistar rats were used for immunohistochemistry (IHC) and transmission electron microscopy (TEM). In IHC, desmin antibodies labeled only the detrusor muscle, while α-SMA positive labeling was found in the suburothelial band, the submucosa, and the inner layer of the detrusor muscle. Also perivascular cells and myoepithelial cells were α-SMA positive. In TEM, the suburothelial band had a layered structure, consisting of inner, middle and outer suburothelial layers (ISUL, MSUL and, respectively, OSUL). THE ISUL contained electrono dense fibroblast-like cells (FLCs), the MSUL consisted of two subtypes of myoid cells (MyCs I and II) which were finally diagnosed as smooth muscle cells (MyCs I = SMCs) and myoid ICCs (MyCs II), while the OSUL contained collagen-embedded interstitial cells (ICs). At this time the diagnosis of suburothelial TCs should be regarded with caution.

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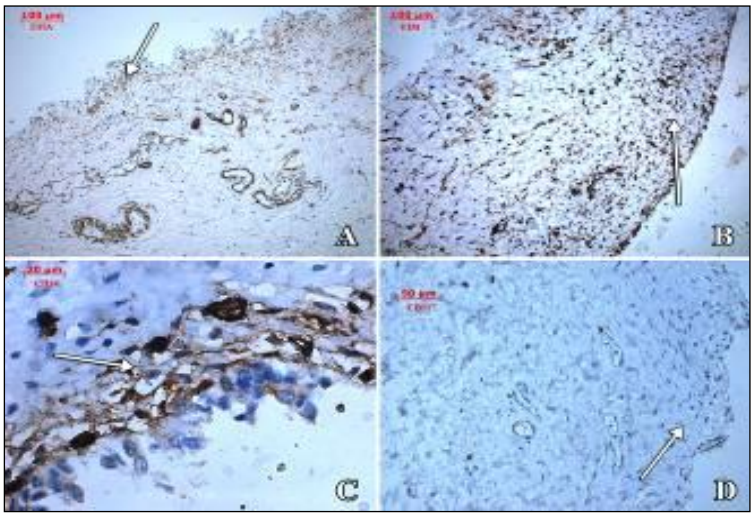

Figure 1. The suburothelial layer (arrow) in human bladder is α-SMA/vimentin/CD34 positive (A, B and, respectively C) and CD117 negative (D).