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Uterine Leiomyoma and Telocytes: Impact on Pathogenesis?

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COLUMN ARTICLE

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No doubt, uterine leiomyoma (UL) still the most common benign tumor of female reproductive system, affected about 80% of women during all reproductive age. The history of discovering referred to the times of Hippocrates, which firstly mentioned UL as "womb stones". Later Galen depicted that condition as "scleromas". The first "exhibition" of real samples with a high probability is situated in the Egyptology Section of the British Museum in London, where some mummies has calcified pelvic masses located though radiographic techniques which are suggestive of uterine leiomyoma.

Most often among risk factors are isolated an early onset of menarche, obesity, hormonal misbalance. In addition, smoking could play a protective role because impact on the 2-hydroxylation pathway of estradiol metabolism, which can lead to decline bioavailability of estrogen target tissues. Despite about 60% of UL are chromosomally normal, not rare it might be a part of hereditary syndromes (hereditary leiomyomatosis and renal cell cancer syndrome, Alport syndrome, Recklinghausen's disease (Neurofibromatosis type 1 (NF1)).

There are not exist one theory that may explain why UL are so common nowadays. However, two components are always dominates in pathogenesis of leiomyoma: exceeded production of extracellular matrix and angiogenesis. Different in size types of myoma are characterized by controversial vascularization. For instance, large tumor has a "vascular capsule", which characterized by an extremely dense vascular network at the border between the tumor and the surrounding myometrium, while the smallest are usually avascular. In addition, huge impact on both processes play growth factors (insulin-like growth factors (IGFs), platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF) and basic fibroblast growth factor (bFGF), heparin binding epidermal growth factor (HB-EGF), tumor necrosis factor-α (TGF-α), transforming growth factor beta (TGF-β), acidic fibroblast growth factor (aFGF)), ovarian steroids (estrogen and progesterone), cytokines and chemokines (IL-1, IL-6, IL-11, IL-12, IL-15, IFNγ, TNF- α) [1].

Up to now, the presence with possible integration into physiological and pathological processes of telocytes (TCs) is still hotly observed and described by numerous scientists. These unique cells were described in more than 50 different places inside human body. Since 2005, when L.M. Popescu's group from Bucharest, Romania, depicted a new type of cell that resides in the stroma of several organs, which became known as interstitial Cajal-like cells (ICLC), telocytes exists in scientific world as unique multifunctional cells. They have the longest cellular prolongations in the

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human body – telopodes (Tps). Tps are made by an alternation of dilated portions, named podoms (250 - 300 nm), containing mitochondria and endoplasmic reticulum and podomers (~80 nm) with thin segments [2,3].

Telocytes demonstrate specific direct (homocellular and heterocellular junctions) and/or indirect (chemical, paracrine/juxtacrine signalling, microvesicles and exosomes, sex hormone and microRNAs) contacts with various surrounding cells, have immunohistochemical profile, receptors to growth factors and steroid hormones, involved in the electrical modulation of excitable tissue, such as the smooth muscle of the uterus. Important to note, that its dynamics were observed in such diseases as systematic sclerosis, Crohn's disease, myocardial infraction, gallstone disease, psoriasis, acute salpingitis, liver fibrosis and primary Sjögren's syndrome [3,4]. Moreover, changing in quality and quantity of myometrial TCs have been observed during pregnancy (in human and animal tissue) (Table 1) [5,6].

	Pregnant myometrium	Non-pregnant myometrium
Length of telopodes	Normal	Longer
Podomers of telocytes	Thinner (75.53 ± 1.81 nm)	Thicker (81.94 ± 1.77 nm)
Podoms of telocytes	Thicker (316.38 ± 17.56 nm)	Thinner (268.6 ± 8.27 nm)
Evidence of exosomes/ shedding microvesicles (SMVs)	Normal	Lower
The diameter of extracellular vesicles measured in the myometrial interstitium	58 - 405 nm	65 - 362 nm
*The median value	151 nm	170 nm
Exosomes: SMVs	20 vs 168	26 vs 89
The mean diameter of exosomes/SMVs	No difference	No difference

Table 1: *Comparing of telocytes in pregnant and non-pregnant myometrium.*

In conclusion, dynamics of changing in pregnant myometrium, involvement in fibrosis and angiogenesis, reflection of hormonal action, high sensitivity to growth factors allow us to separate telocytes as a new target in pathogenesis of uterine leiomyoma. Surely, required further observations to correlate mechanisms of response myometrial tissue to changes of amount telocytes, but undoubtedly – they have own crucial role in pathophysiology of uterine leiomyoma.

BIBLIOGRAPHY

1. Aleksandrovych V., *et al*. "Uterine fibroid: common features of widespread tumor (Review article)". *Folia Medica Cracoviensia* 55.1 (2015): 61-75.

2. Popescu L and Faussone-Pellegrini MS. "TELOCYTES - a case of serendipity: the winding way from interstitial cells of Cajal (ICC), via interstitial Cajal-like cells (ICLC) to TELOCYTES". *Journal of Cellular and Molecular Medicine* 14.4 (2010): 729-740.

3. Aleksandrovych V., *et al*. "Telocytes in female reproductive system (human and animal)". *Journal of Cellular and Molecular Medicine* 20.6 (2016): 994-1000.

4. Pasternak A., *et al*. "Telocytes: New Players in Gallstone Disease". *Advances in Experimental Medicine and Biology* 913 (2016): 77-103.

5. Cretoiu SM., *et al*. "Human myometrium – the ultrastructural 3D network of telocytes". *Journal of Cellular and Molecular Medicine* 16.11 (2012): 2844-2849.

6. Cretoiu SM., *et al*. "Telocytes: ultrastructural, immunohistochemical and electrophysiological characteristics in human myometrium". *Reproduction* 145.4 (2013): 357-370.