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Tomaszewski J[1], Adamiak-Godlewska A[1], Bogusiewicz M[1], Brzana W[2], Juszczak M[2], Rzeski W[2], Rechberger T[1]
1. *2nd Department of Gynecology, Medical University of Lublin,* ***2.*** *Department of Toxicology, Institiute of Agricultural Medicine, Lublin, Poland*

COLLAGEN TYPE III BIOSYNTHESIS BY PUBO-CERVICAL FASCIA FIBROBLASTS CULTURED WITH MONO AND MULTIFILAMENT POLYPROPYLENE MESH AFTER ESTROGENS AND TAMOXIFEN TREATMENT

Hypothesis / aims of study

Surgical procedures using synthetic implants are regarded to be the most efficient therapy for stress urinary incontinence (SUI) and pelvic organ prolapse (POP). Insertion of tape or mesh causes enhanced collagen synthesis that largely affects the biomechanical property of the implant. This process is significantly modulated by estrogens and hypoestrogenism may result in improper wound healing and treatment failure. Aim of the study was to assess the rate of collagen type III synthesis by pubo-cervical fascia fibroblasts cultured with mono and multi polypropylene meshes in the presence of estrogens and tamoxifen.

Study design, materials and methods

Tissue specimens of human pubocervical fascia were obtained during surgical procedure from 56 years-old woman suffering from SUI and POP. Fibroblasts were isolated and cultured by outgrowth technique. After performing several passages cell lines were ready to assessment. The experiments were conducted using 24-multiwell culture plates (density $3x10^4$ cells/ml). Control group performed without mesh and study group were divided into two subgroups surrounding mono (SPMM-149, SURGIPRO™ Polypropylene Monofilament Mesh, Covidien AG) and multifilament (SPM-149, SURGIPRO™ MULTI-filament Polypropylene Mesh, Covidien AG) meshes. Cells were exposed to 17β-estradiol, estriol and phytoestrogen daidzein added in 10 µM/ml concentration into culture medium supplemented only with Serum Replacement 2 (Sigma). The cultures were run for 216hr and the media were replaced every 72hr. Collagen type III biosynthesis was assessed using UniQ PIIINP (Orion Diagnostica Oy, Finland) - quantitative radioimmunoassay of intact aminoterminal propeptide of type III procollagen.

Results

		N-terminal propeptide collagene type III (PIIINP) (µg/l)							
		Control		17β-estradiol		Estriol		Daidzein	
Type of MESH (mono or multifilament)		Mono	Multi	Mono	Multi	Mono	Multi	Mono	Multi
Time (hrs)	**72**	114.9±5.7	128.4±0.8	140.7±6.2	128.5±3.8	95.1±2.0	77.9±2.9	139.2±7.2	101.1±5.8
		p < 0.05		p<0.005		p<0.005		p < 0.005	
	144	135.60±3.1	136.9±3.3	126.2±2.6	132.6±1.2	130.4±1.2	144.4±5.5	153.5±4.5	134.2±7.2
		NS		p<0.05		p<0.005		p < 0.05	
	216	102.45±3.4	66.8±1.9	89.7±3.3	56.3±1.9	131.8±3.2	92.0±0.7	80.7±1.0	76.0±1.4
		p < 0.005		p<0.005		p<0.0005		p<0.005	

		Tamoxifene	
Type of MESH (mono or multifilament		Mono	Multi
Time (hrs)	**72**	143.2±3.7	120.6±3.1
		p<0.005	
	144	136.8±4.1	153.9±4.2
		p<0.005	
	216	115.1±4.6	82.4±3.0
		p<0.005	

Interpretation of results

Pubo-cervical fascia fibroblast cultured with monofilament or multiflament meshes are capable of collagen type III synthesis. Following treatment with estradiol or tamoxifen the highest PIIINP concentrations were observed after 72hr, whereas in case of

estriol, daidzein or no treatment after 144hr of culture, regardless of the type of mesh used. Only in cultures containing monofilament mesh and stimulated with estriol the high rate of collagen type III synthesis persisted until the end of the experiment. The rate of collagen type III synthesis by pubo-cervical fascia fibroblast cultured with polypropylene meshes is subjected to modulation by estrogens and antiestrogens. The highest total production of PIIINP was observed in fibroblast cultures treated with tamoxifen, both for multifilament and monofilament meshes.

Concluding message

This is an indirect rationale for local estrogen treatment in case of female SUI or POP.

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What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**Bioethical Committee of Medical University of Lublin**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**