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Histoenzymatic and Immunocytochemical Characteristics of Extravillous Trophoblast Cells of Placental Basal Plate as Parameter of Their Function in Hypertensive Pregnancy

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A B S T R A C T

An intense activity of enzymes which actively participate in the renin-angiotensin-aldosterone system was shown in extravillous trophoblast cells which are involved in the performing of spiral arteries into uteroplacental vessels. The hydrolase activity in villous trophoblast underwent important variations, but it was constant in cells of the extravillous trophoblast. Activity of lysosomal hydrolases, of leucine aminopeptidase and N-acetyl glucosaminidase type, was markedly positive in X-cells, while negative in the villous trophoblast. Beta glucuronidase activity has shown moderate activity in cells of extravillous trophoblast, while in villous trophoblast it was weakly emphasized or negative. Intense activity of prostaglandin E2 dehydrogenase in the way of strongly emphasized microsomal reaction was noted exclusively in extravillous cells of basal plate, especially in perivascular cell groupings. Within all examined enzymes activities, only the membranous activity of alkaline phosphatase was of the same intensity in cells of extravillous trophoblast. Lacking of penetration of these cells into the spiral arteries wall in EPH-gestosis, which also means loss of their close contact with the blood of a pregnant, implicates the practical meaning of these observations.

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Introduction

A part of extravillous trophoblast cells that originate from cell population of cytotrophoblast columns or from trophoblastic shell has the ability of migration that is tried to be explained by phenotype change of integrin expression in them[1]. Migration of extravillous trophoblast cells goes in two directions: towards deciduas and internal third of myometral section and towards wall or into the spiral arteries lumen.

A part of extravillous trophoblast interstitial cells penetrate through fibrinoid masses of basal plate into decidua and myometrium and has the role to fixate placenta to its bed in uterus, that is enabled with secretion of metaloproteinases with which they dissolve or destroy structural proteins of endometrial and myometral extracellular matrix[2]. The rest of extravillous cells population shows vascular tropism and migrates towards the wall of the spiral arteries. Invasion of the spiral arteries wall goes in two different time periods: first one is at the very beginning of pregnancy and second is in the middle of pregnancy, between 16th and 20th week. Trophoblast cells that invaded wall of decidual part of spiral arteries in first weeks of pregnancy cause series of morphological changes in them. Intramural incorporation of these cells brings to destruction of musculoelastic wall tissue and to gradual accumulation of fibrinoid in the vessel wall. With further progress extravillous trophoblast cells imbue intima and finally replace endothelial layer (Figure 1). Brosens et al.[3] gave this phenomena term »physiological changes« due to that they are primary adjusting and purposeful changes and not pathological. In the middle of pregnancy starts secondary migration wave of endovascular trophoblast retrograde towards myometral part of spiral arteries but also towards terminal segment of radial arteries[4]. De-

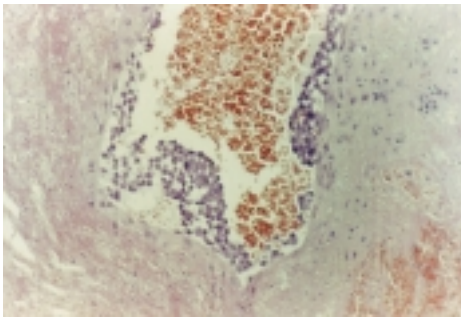

Fig. 1. Decidual segment of spiral artery. Intimal endothelium is completely substituted with extravillous trophoblastic cells that are in clusters also present in vascular lumen (HE × 400).

scribed changes repeat and with them come to penetration of surrounding myometrium with basal plate syntitial gigantocytes[5]. From teleological point of view purpose of described process is transformation of spiral arteries into wide uteroplacental blood vessels that acquires the possibility of uteroplacental blood vessels distension as the pregnancy goes further and that brings to significant reduction of peripheral vascular resistance in placental basal plate. That also makes bigger, sufficient irrigation of intervillosum with arterial blood possible[6].

Pregnancy endangered with high blood pressure is today still one of the most common causes of morbidity and mortality of mother and of fetus. Main part of EPH-gestosis pathogenesis is lack of extravillous trophoblast cells endovascular migration and lack of their invasion into myometral part of spiral arteries that remains narrowed during the pregnancy (Figure 2). The consequence is gradual development of placental and fetal hypoxia due to inadequate spiral arteries adjustment to growing needs for arterial blood.

At appraisal of placental morphological changes from EPH-gestosis endange-

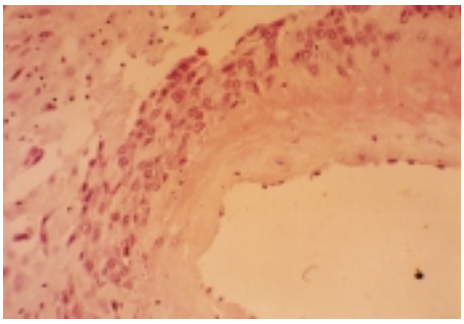

Fig. 2. Gestosis EPH. Maintained endothelium of spiral artery intima whose wall is diffusely imbued with fibrinoid. Perivascular dense cluster of extravillous trophoblastic cells that are not present in the wall (HE × 400).

red pregnancies there occurred need for immunocytochemical and enzymohistochemical identification of extravillous trophoblast cells and also presentation of activities of enzymes that are directly or indirectly included in renin-angiotensin-aldosterone system regulation and others that show specifically functional maturity of these cells.

Materials and Methods

Material is 40 placentas from EPH-gestosis endangered pregnancies that were taken at Department of obstetrics and gynecology of University hospital »Sestre milosrdnice« in period of 6 to 12 hours after delivery. After routine macroscopic and microscopic examination of placentas, tissue samples were additionally immunocytochemically and histoenzymaticaly researched.

Immunocytochemical analysis included presentation of expression of cytosceletal proteins, cytokeratin and vimentin type, in placental tissue samples that were previously fixed in buffered 4% paraformaldehyde through 12 hours and afterwards embedded in paraffin. Paraffin blocks were cut with »Reichert« microtom on 5 micron thick sections and after deparaffinization rehydrated in series of decreasing concentration alcohols.

Immunocytochemical expression of cytokeratin was revealed with anti-mouse monoclonal anti-cytokeratin antibody (DAKO) in 1:100 dilution through 60 minutes. As detecting system swine anti-rabbit peroxidase antiperoxidase (PAP) of the same company was used. Unspecific background coloring was reduced/eliminated with 3% hydrogen peroxide in methanol. As chromogen 3,3 diaminobenzidine tetrahydrochloride (DAB) (SIGMA) was used. Positive reaction manifested as brown-yellowish precipitate.

Immunocytochemical expression of vimentin was revealed with anti-mouse monoclonal anti-vimentin antibody (DAKO) in 1:30 dilution. As detecting system swine anti-rabbit peroxidase antiperoxidase (PAP) of the same company was used. Unspecific background coloring was reduced/eliminated with 3% hydrogen peroxide in methanol. As chromogen 3,3 diaminobenzidine tetrahydrochloride (SIGMA) was used. Positive reaction manifested as brown-yellowish precipitate at the site of immunoreaction. Sections were contrast colored with hematoxylin. For positive control were used skin tissue samples that were treated the same procedure. Result of reaction was visually marked as positive (+) or negative (–) reaction in extravillous trophoblast cells.

Histoenzymatic research was done with showing of activity of enzymes that characterize functional status of trophoblast cell membrane (placental alkaline phosphatase), and enzymes that are included into blood pressure regulating mechanism i.e. in renin-angiotensin-aldosterone system (leucine aminopeptidase, beta glucuronidase, N-acetyl glucosaminidase, prostaglandin E_2 dehydrogenase). Assessment of these enzymes activity was done by testing of specific substrates. Placental alkaline phosphatase (PLAP).

For histoenzymatic analysis placental tissue pieces that were taken during macroscopic examination were fixed in 4% buffered cold paraformaldehyde (pH 7.2) through 24 hours at 4°C temperature. Afterwards the tissue pieces were carried over into hypertonic 0.1M solution of buffered sacharosis and after that were embedded into sorbitol-gelatine mixture heated up to 55°C. Sorbitol-gelatine was gradually cooled down and blocks were formed that were kept in refrigerator up to cutting.

PLAP activity was tested by simultaneous coupling method with the naphtol AS-MX phosphate (SIGMA) as a substrate and with the Fast Blue BB (SIGMA) diazonium salt as a coupler. Incubation medium contained naphtol AS-MX phosphate 0.2 mg/ml, 0.2 M TRIS HCl buffer (pH 8.7) and Fast Blue BB 1 mg. Incubation of free floating slices was 30 minutes at 37°C temperature.

Leucine aminopeptidase (LAP/PLAP). Enzyme activity was examined on placental tissue sections that were previously treated and prepared with method described at PLAP. Enzyme activity was tested with method of simultaneous coupling of substrate L-leucyl-4-methoxy-2-naphtylamide with Fast Blue BB diazonium salt. Incubation medium contained L-leucyl-4-methoxy-2-naphtylamide (SIGMA) and Fast Blue BB (SIGMA) as coupling diasotate at pH 6.5. Incubation took 3 to 10 minutes at room temperature.

Beta glucuronidase (bGL). Placental tissue pieces were fixed during 24 hours in buffered 4% cold paraformaldehyde and slices were dipped into incubation medium that contained AS-BI-beta-D glucuronide (SIGMA) as substrate and hexazonium pararosanyline (SIGMA) as binding agens in simultaneous substrate coupling reaction, pH 5. Incubation lasted 1 hour at 37°C. Afterwards the sections were dipped into Canada balsam.

N-acetyl-glucosaminidase (NAG). Placental tissue pieces were fixed through 24 hours in buffered 4% cold paraformaldehyde and sections were dipped into incubation medium containing AS-BI-N-acetyl-beta-D-glucosamine (SIGMA) as coupler, pH 5. Incubation lasted 1 hour at 37°C temperature. Sections were afterwards included in Canada balsam.

Prostaglandin E_2 dehydrogenase (PGE2-DH). Fresh unfixed placental tissue pieces were sliced on »Reichert« ice microtome. Sections were dipped into incubation medium containing 0.3 M PGE2 (UPJOHN) solution as substrate, 2.5 mg / 5 ml NBT solution (SIGMA) as tetrasolium salt and 0.65 mM NAD as coenzyme. Incubation lasted 50 minutes at 37°C.

Activities of examined hydrolases were visually marked as negative (–), weak (–/+), moderate (+) and strong (++) reaction in the cell. Considering topography and look of deposition of enzymatic reaction final product, reaction was described as membranous or cytoplasmatic (diffuse or grained) one.

Results

Outcome of immunohistochemical reactions

Population of villous and extravillous trophoblast cells has expressed identically intensive deposition of anti-cytokeratin reaction products, without regard for their topography. In villous and extravillous trophoblast cells anti-vimentin reaction was negative.

Outcome of enzymohistochemical reactions

Histoenzymatic findings of examined enzyme activities in the placental trophoblast are summarized in the Table 1.

PLAP reaction was positive in villous and extravillous trophoblast cells. It was mostly membranous, only sporadically

TABLE 1
OUTCOME OF HISTOCHEMICAL ACTIVITIES OF EXAMINED ENZYMES IN THE TROPHOBLAST OF GESTOTIC PLACENTAS

Enzyme	Trophoblast	
	Villous	Extravillous
PLAP	–	++
LAP/P-LAP	–	++
bGL	–/+	+
NAG	–	++
PGE2-DH	–	++

– = negative; –/+ = weak; + = moderate; ++ = intensive

PLAP = placental alkaline phosphatase; LAP = leucine aminopeptidase; P-LAP = placental leucine aminopeptidase; bGL = beta glucuronidase; NAG = N-acetyl glucosaminidase; PGE2-DH = prostaglandin E_2 dehydrogenase

also of cytoplasmatic type, and of strong intensity only present in trophoblast while was negative in connective-vascular core of villi. Continuous membranous reaction type changed with apposition of perivillous fibrinoid into discontinuous one. This observation referred only to the villous, but not to the extravillous trophoblast.

There were zonal differences in intensity of the enzyme reaction in extravillous trophoblast cells: reaction was most intensive in group of perivascular or adluminal placed cells while towards the periphery intensity of reaction decreases (Figure 3).

LAP reaction was enhanced positive in extravillous trophoblast cells while was negative in villous trophoblast at all levels of villi branching. Reaction was also negative in individual basal plate decidual cells. Reaction type was of the cytoplasmic/microsomal type, and of the strong intensity. Strong intensity reaction was also noticed in X-cells that substituted endothelium of spiral arteries intima and that were in direct contact with pregnant woman's blood (Figures 4 and 5).

bGL reaction of lysosomal type enzymes was weakly positive in villous trophoblast and weakly to moderate intense in extravillous trophoblast cells. Reaction was much emphasized in the cells that replaced endothelium or in the cells that were situated in the lumen of the spiral artery (Figure 6).

Strongly emphasized NAG reaction of lysosomal type was present exclusively in extravillous trophoblast cells while was negative in chorionic villi trophoblast. Reaction was especially enhanced in perivascular-situated cells and in the cells that substituted intima endothelium. Intensity of reaction decreased with distance of cells from blood vessels wall (Figure 7).

Very enhanced cytoplasmic/microsomal PGE2-DH reaction was expressed only in extravillous trophoblast cells while was negative in villous trophoblast. Reaction was of uniform intensity in perivillous situated X-cells (Figure 8).

Discussion

Immunocytochemical reactions

With development of placenta trophoblast differentiate in three topographically and functionally different cell types[7]. Villous trophoblast performs nephropneumoid, intestinal and hormonal placental function. Extravillous trophoblast fixes villi for basal plate and with that placenta for uterus. A part of EVT cells (X-cells, intermediary cells) has the ability of migration and invades into the wall of decidual and myometral segment of spiral arteries turning them into uteroplacental blood vessels.

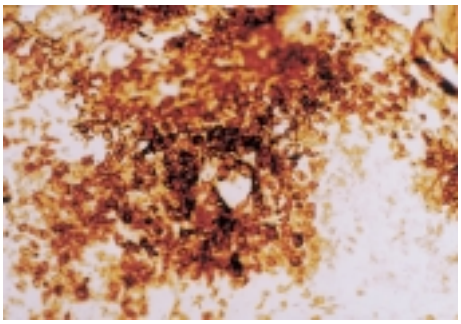

Fig. 3. Intensive enzyme activity in perivascular grouping of extravillous trophoblast cells. PLAP activity decreases with distance of cells from spiral artery lumen (× 100).

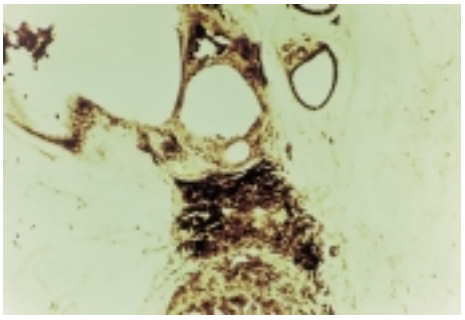

Fig. 4. LAP. Intensive enzyme reaction in extravillous trophoblast cells of basal plates and spiral arteries (× 100).

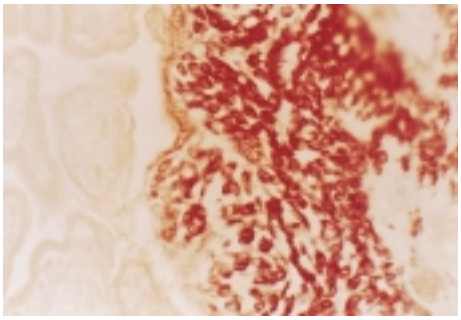

Fig. 5. LAP. Intensive enzyme reaction in extravillous cells of intervillous columns. Negative reaction outcome in villous trophoblast (× 400).

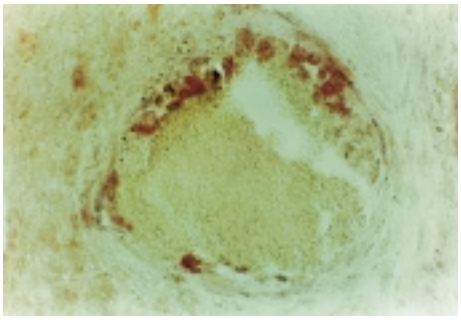

Fig. 6. LAP. Moderate enzyme activity of the lysosomal type in the layer of the extravillous trophoblastic cells that substituted intimal endothelium (× 400).

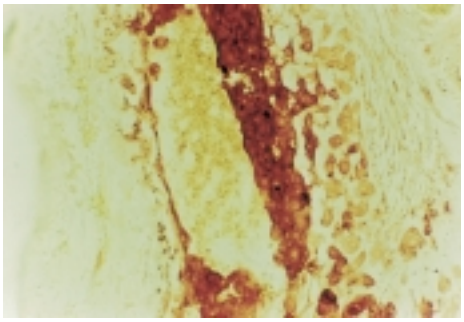

Fig. 7. NAG. Intensive enzyme reaction in luminaly placed cells of the extravillous trophoblast (× 400).

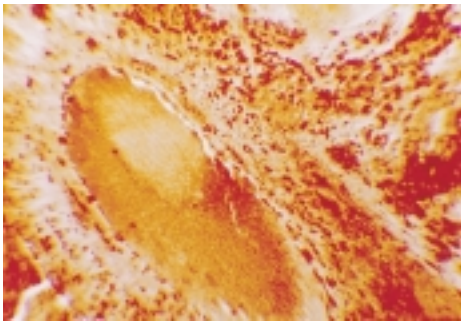

Fig. 8. PGE2-DH. Enzyme activity in perivascular groupings of extravillous trophoblast cells (× 100).

Former researches demonstrated that all three trophoblast types cells, no matter of described diversities, show same immunocytochemical phenotype: positive reaction on anti-cytokeratin antibody[8]. Irving et al.[9] have, based on positive outcome of anti-cytokeratin reaction in EVT cells that invade spiral arteries wall, identified these cells as trophoblast originating cells. Daya and Sabet[10] consider cytokeratin as sensitive and reliable marker of trophoblast cells population.

Results of immunocytochemical research of EVT cells in this work are in conformity with stated postulations because EVT and villous trophoblast cells expressed same positive reaction to cytokeratin while reaction to anti-vimentin was always negative in them.

Alkaline phosphatase

Alkaline phosphatase is a group name for a number of enzymes that break down phosphatic acid esters in alkaline surrounding[11]. In histochemistry that name is most often given to phosphomonoestherases that have catalytically effect on orthophosphate acid esters, with optimal hydrolytic effect at pH between 7.6 and 9.9[12]. Alkaline phosphatase isomers differentiate by their sensitivity towards specific inhibitors. Placental alkaline phosphatase (PLAP) is tissue specific polymorph enzyme whose activity in placenta is mostly localized in plasmatic membranes of synciciotrophoblast microvilli[13,14], and they differentiate from other isoenzymes by thermostability and stereospecifical sensitivity for left isomer of phenylalanine as inhibitor. Pirkić[15] has shown changes of PLAP activity in villous trophoblast dependent on morphological changes of placenton, on maturity of chorionic epithelium of the villi and on its histopathological changes. Author also speaks about PLAP activity in extravillous trophoblast cells.

Johnson and Molloy[16] have, testing the monoclonal antibody H315 that identifies trophoblast-specific surface antigen, demonstrated positive PLAP reaction in extravillous trophoblast cells of placental basal plate with immunofluorescent method. McLaughlin et al.[17] have, with the same method, presented thermostability and specific sensitivity to L-phenylalanine of monoclonal antigen H317 which is expressed on placental trophoblast membranes and that authors have identified as PLAP on the extravillous cells surface. Opposite to quoted authors, Yeh, O'Connor and Kurman[18] describe negative or weakly positive PLAP reaction in intermediary trophoblast cells.

In this work we have demonstrated intensive PLAP reaction in perivascular placed extravillous trophoblast cells with decreasing of intensity with distance of cells from spiral arteries lumen. As possible reason of negative PLAP reaction outcome in extravillous trophoblast cells[18] we consider diversity of applied methodology and tested substrates in estimating of terminal reaction product.

Leucine aminopeptidase

In normal pregnancy renin-angiotensin system activates, but blood pressure remains within normal range what is taken as effect higher activity of angiotensinase during pregnancy[19–21]. Tsujimoto et al.[22] have identified placental leucine aminopeptidase (P-LAP) from retroplacental hematoma as oxytocinase and demonstrated that P-LAP and serum oxytocinase show same hydrolytic activity.

Placental leucine aminopeptidase is exopeptidase, which physiological substrate of activity is not yet well known but it is considered as proved that LAP inactivates angiotensin II, releases bradykinin and is also included in neurosecretory mechanism[19,23]. Placental leucine aminopeptidase degrades vasoactive

peptides as oxytocine, angiotensin and bradykinin that fetus actively produces, so higher vascular resistance in feto-placental circulation is also partially controlled by hydrolytic activity of this enzyme[23].

Mizutani and Tomoda[24] have demonstrated increase of angiotensin II inactivation with angiotensinase during normal pregnancy in pregnant women's serum and in placenta, which they could not confirm in serum of pregnant women with EPH gestosis, where values of this enzyme were lower than in normal pregnancy. Based on this observation authors consider higher sensibility to angiotensin II in pregnant women with EPH gestosis as consequence of its reduced degradation with placental leucine aminopeptidase. Akiyama et al.[25] have examined values of placental leucine aminopeptidase in serum of pregnant women with normal pregnancy and in serum of pregnant women endangered with EPH gestosis and they have noticed significant variations in achieved results. Values of placental leucine aminopeptidase have increased identically until 31st week of pregnancy both in serum of normal pregnancy and in EPH-gestosis serum and at the end of 31st values in serum of pregnant women with higher blood pressure were even higher than at pregnant women with normal pregnancy. After 31st week of pregnancy enzyme values have shown sheer progressive decrease towards the end of pregnancy so that in 39th and 40th week they were significantly lower than those in serum from normal pregnancy. Mizutani and Tomoda[24] stree out that angiotensin and vasopresin act like feto-placental vasoconstrictors and activity of enzymes that hydrolyze them are significantly decreased in serum of pregnant women with EPH gestosis in distinction from serum of pregnant women with normal pregnancy. Mizutani[21] has demonstrated that placental proteases, first of all placental leucine aminopeptidase, break down vasoactive peptides and regulating their concentration they control uteroplacental circulation that changes depending on changes of their serum activity.

In this work we demonstrated an intense activity of leucine aminopeptidase exclusively in extravillous trophoblast cells, while this activity was negative in villous trophoblast and also in other constituents of placental tissue, what implicates role of this cells in regulation of feto-placental circulation. This finding is congruent with observation of Pirkić and Rode[26] who have also described positive LAP reaction exclusively in X-cells. Mentioned lack of endovascular migration and invasion of wall of myometral segment of spiral arteries with extravillous trophoblast cells at the middle of pregnancy can have decreased concentration of P-LAP in the serum of pregnant women with EPH-gestosis in second half of pregnancy as consequence.

N-acetyl glucosaminidase, beta glucuronidase

N-acetyl glucosaminidase (NAG) is glycolytic lysosomal enzyme that is present in cells of many tissues among them very high values were proved in lysosomes of renal proximal tubule cells[27]. Damage of renal parenchyma as result of ischemia during EPH-gestosis cause increased enzyme secretion into urine, what can be used as diagnostic indicator of early renal function disorder in pregnancy[28]. Hypertensive nephropathy is important complication of arterial hypertension, which can cause renal insufficiency, whose early stage is accompanied with increased values of NAG in urine[29]. There are a lot higher values of urine NAG in pregnant women with EPH-gestosis than in serum of normotensive pregnant women[30]. In opposite, Schmieder et al.[31] have demonstrated increased

values of NAG in serum of hypertonics without evident laboratory or clinical manifestations of renal damage.

In hypertensive pregnant women proximal tubule epithelium damage leads to the so called lysosomal enzymuria in which is particularly emphasized excretion of beta glucuronidase whose serum values are, however, in these pregnant women decreased[32]. High concentration of this lysosomal enzyme in uterus, vagina and breast is described, where its activity is remarkably influenced by sex hormones[12]. Fukuda, Tanaka, Isshiki[33] have noticed variations in activity of 14 lysosomal enzymes in chorionic villi, accentuating gradual increase of beta glucuronidase activity as pregnancy progress. Same authors however do not mention cellular source of beta glucuronidase secretion in chorionic villi. Kushari and Mukherjea[34] have researched beta glucuronidase characteristics placental tissue homogenates at different ontogenetic stages of placental development and have described maximal activity between 22nd and 26th week that significantly decreases to low levels in terminal placenta.

In this work we observed enhanced NAG histoenzymatic activity exclusively in extravillous trophoblast cells, highest in perivascular and intraluminal placed cells, while beta glucuronidase activity of moderate intensity was noticed as in extravillous so in villous trophoblast. This finding points to trophoblast cells, especially extravillous, as additional source of lysosomal hydrolases in pregnancy. It still needs to be explained if noticed NAG and bGL activity in X-cells secretion phenomena or these cells are place of accumulation of these enzymes.

Prostaglandin E2 dehydrogenase

Eicosanoids, especially prostaglandins, but also other derivates of arachidonic acid have important role in EPH-gestosis endangered pregnancy. In normal pregnancy there is present enhanced production of eicosanoids with vasodilatatory qualities, especially of prostaglandin E2 and of prostacycline whose activity is shown in decreased peripheral resistance with consequent growth of blood volume and sufficient uteroplacental perfusion. Lack of pregnancy specific reduction of angiotensin vasoconstrictor activity by inhibition of prostaglandin was proved experimentally. Numerous clinical and experimental data showed prostacycline deficiency, increased thromboxane production and enhanced thrombocyte agglutinability in serum of pregnant women with EPH-gestosis[36]. In blood and urine of pregnant women with EPH-gestosis comes to shift in relation between two antagonistic acting prostaglandins, prostacycline and thromboxane, in benefit of thromboxane[37]. Changed prostaglandins metabolism in hypertensive pregnancy can influence on decreasing of PGE2 production in endothelial or trophoblast cells with consequent decreased invasion capability of X-cells[38].

Pedersen et al.[39] made hypothesis about preeclampsia as state of prostaglandin shortage, so changes in renin-angiotensin-aldosterone system would be secondary to changes in serum concentrations of prostaglandins. Interaction between vascular effect of prostacyclins and angiotensin II shows in significant reduction of angiotensin II vasoconstrictor action after prostacycline infusion[40].

Demonstrated intensive PGE2-DH activity in this work conforms to findings of Pirkić and Rode[26], Parisi and Walsh[41], that placenta also produces significant amounts of prostaglandins. Noticed cytoplasmic/microsomal activity of prostaglandin E2 dehydrogenase in numerous cells of basal plate extravillous trophoblast points at possibility of additional supply of pregnant woman placental originating prostaglandins. Lack of invasion of spiral artery wall with extravillous tro-

phoblast cells that show emphasized PGE2-DH activity could be additional cause of decreased prostaglandin concentration in serum of pregnant women with EPH-gestosis with all hemodynamic consequences to intervillosum.

Conclusions

1. Extravillous trophoblast cells of basal plate with positive outcome of anticytokeratin reaction show same immunocytochemical phenotype as other trophoblast cells.
2. Placental alkaline phosphatase (PLAP) activity is positive in villous and extravillous trophoblast cells. In extravillous trophoblast cells reaction is mostly of membranous type but in individual EVT cells in lumen of spiral arteries reaction is of cytoplasmic type.
3. Placental leucine aminopeptidase (P-LAP) activity is expressed only in EVT cells and is negative in villous trophoblast. Reaction is of uniform strong intensity.
4. N-acetyl glucosaminidase (NAG) activity of lysosomal type and of very strong enzyme intensity is enhanced in perivascular and luminal placed EVT cells. Intensity of reaction decreases with distance of these cells from the lumen of spiral arteries.
5. Beta glucuronidase (bGL) activity of lysosomal type and of moderate intensity is noted in villous and extravillous cells.
6. Prostaglandin E2 dehydrogenase (PGE2-DH) activity of cytoplasmic/membranous type with strong intensity was noted exclusively in EVT cells.
7. Activity of researched enzymes in EVT cells that invade spiral artery wall and perform it into uteroplacental blood vessel and that are directly or indirectly included in blood pressure regulation can with lack of its vascular invasion in EPH-gestosis be additional cause of their deficit in pregnant women serum.

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HISTOENZIMSKE I IMUNOCITOKEMIJSKE OSOBITOSTI STANICA EKSTRAVILOZNOG TROFOBLASTA BAZALNE PLOČE POSTELJICE KAO PARAMETAR NJIHOVE FUNKCIJE U HIPERTENZIVNOJ TRUDNOĆI

S A Ž E T A K

Stanice ekstraviloznog trofoblasta koje sudjeluju u preformiranju spiralnih arterija u uteroplacentne krvne žile pokazuju intenzivnu aktivnost enzima koji su aktivno uključeni u renin-angiotenzin-aldosteron sustav. Aktivnost istraženih hidrolaza u viloznom trofoblastu podliježe značajnim varijacijama, međutim je ona konstantna u stanicama ekstraviloznog trofoblasta. Aktivnost lisosomalnih hidrolaza, tipa leucin aminopeptidaze i N-acetil glukozaminidaze, istaknuto je pozitivna u stanicama ekstraviloznog trofoblasta, dok je u viloznom trofoblastu negativna. Aktivnost beta glukuronidaze pokazala je umjerenu aktivnost u stanicama ekstraviloznog trofoblasta, a u viloznom trofoblastu je bila slabo pozitivna ili negativna. Intenzivna aktivnost prostaglandin E2 dehidrogenaze u vidu istaknute mikrosomalne reakcije zapažena je isključivo u u stanicama ekstraviloznog trofoblasta bazalne ploče, osobito u perivaskularnim nakupinama stanica. Od svih istraženih enzimskih aktivnosti, jedino je membranska aktivnost alkalne fosfataze bila jednakog intenziteta u stanicama ekstraviloznog i viloznog trofoblasta, ali diskontinuirana u viloznom trofoblastu na mjestima nakupljanja periviloznog fibrinoida. Izostanak penetracije ovih stanica u stijenku spiralnih arterija u EPH-gestozi, što ujedno znači i gubitak njihovog intimnog kontakta s krvlju trudnice, implicira i praktično značenje ovog zapažanja.