

Vitronectin in clinical patho-physiology

Latest scientific evidence



Clinical study

Increased expression levels of vitronectin in the maternal-fetal interface of placenta in early-onset severe preeclampsia.

Shen et al., Mol Med Report. 2012 Oct 22. [Epub ahead of print]

Summary:

Shen and colleagues analysed vitronectin in normal and pre-eclampsia placentas. They applied immunological methods (immunohistochemical staining and western-blotting) as well as expression analysis by rt-PCR on placental tissue. Also they correlated their findings with plasma coagulation parameters. They found a correlation between early onset severe preeclampsia (EOSP), short Prothrombin Time values and high expression levels of vitronectin in the placental tissue. They conclude that vitronectin "may be involved in the pathogenesis of EOSP (early onset severe preeclampsia) by inducing an imbalance between coagulation and fibrinolysis".

Clinical study

Serum biomarker panels for the diagnosis of gastric Adenocarcinoma.

Ahn HS et al., Br J Cancer. 2012 Feb 14;106(4):733-739.

Summary:

Ahn and colleagues aimed at identifying biomarkers in patient sera for the diagnosis of gastric adenocarcinoma. They followed a multiplex approach by combining 29 markers, either discovered through a proteomics study or previously known to be cancer-associated. Biomarkers were discovered and validated using immunological methods, for validation enzyme-linked immunosorbent assays were used. Finally, they defined two combinatorial serum biomarker panels which include Vitronectin. The authors suggest that measuring these biomarker panels "... could supplement clinical gastroscopic evaluation of symptomatic patients to enhance diagnostic accuracy."

Clinical study

Identification of vitronectin as a novel serum marker for early breast cancer detection using a new proteomic approach.

Kadowaki M et al., J Cancer Res Clin Oncol. 2011 Jul;137(7):1105-1115.

Summary:

Kadowaki and colleagues aimed at identifying serum biomarkers for early breast cancer. They started with proteomics analysis of sera from patients with early stage breast cancer, i.e. ductal carcinoma in situ (DCIS) and controls. Proteins showing different levels between the two groups in the primary analysis were further characterized by immunological methods, i.e. western blotting, immuno-histochemical staining and enzyme-linked immunosorbent assay (ELISA). In these experiments it was found that the level of vitronectin was significantly increased in sera of DCIS patients as compared to sera of normal controls. Moreover: "Immunohistochemical staining of vitronectin in breast cancer tissue revealed high expression in small vessel walls surrounding cancer cells and the extracellular matrix of stroma. Moreover, vitronectin serum concentrations, as measured by ELISA, were significantly increased in patients with DCIS or advanced breast cancer compared with those of controls." They concluded that "Vitronectin could serve as a promising serum marker for the detection of primary breast cancer."

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Clinical study

Low levels of serum vitronectin associated with clinical phases in patients with hemorrhagic fever with renal syndrome.

Liu Z et al., Clin Exp Med. 2009 Dec;9(4):297-301.

Summary:

Given the fact that $\beta 3$ -integrin is both, a binding molecule for vitronectin and Hantaan Virus, Liu and colleagues studied vitronectin levels in patients in Hantaan Virus infections. The acute disease caused by Hantaan Virus presents as "hemorrhagic fever with renal syndrome (HFRS)". The course of the disease comprises five consecutive phases: febrile phase, hypotensive phase, oliguric phase, polyuric phase and convalescent phase. The authors found that "the serum levels of Vitronectin decreased at febrile phase, maintained at the lowest status during hypotensive and oliguric phases, started to increase from polyuric phase and reached almost normal condition till coalescent phase." The authors suggest that the vitronectin level may "correlate with the evolution of the disease."

Basic study

Vitronectin inhibits neutrophil apoptosis through activation of integrin-associated signaling pathways.

Bae HB et al., Am J Respir Cell Mol Biol. 2012 Jun;46(6):790-796.

Summary:

The study by Bae and colleagues is based on previous observations that vitronectin was found to modulate neutrophil adhesion and chemotaxis, and to contribute to neutrophil-associated proinflammatory processes. According to the authors a role for vitronectin in neutrophil apoptosis has so far not been elucidated. The authors found that vitronectin had an anti-apoptotic effect on neutrophils. Further they provide evidence that $\beta 1$, $\beta 3$ and $\beta 5$ integrins and the RGD motif of vitronectin were involved in this effect. Also they provide evidence that activation of phosphatidylinositol 3-kinase and extracellular signal-regulated kinase 1/2 kinases are involved but not the p38 kinase. Along these lines, increased numbers of apoptotic neutrophils were observed in the lungs of LPS-treated vitronectin-deficient mice. The study was taken to suggest "a novel anti-apoptotic function for vitronectin."

Basic study

Vitronectin Induces Phosphorylation of Ezrin/Radixin/Moesin Actin-binding Proteins through Binding to Its Novel Neuronal Receptor Telencephalin.

Furutani Y et al., J Biol Chem. 2012 Nov 9;287(46):39041-39049.

Summary:

A role for vitronectin in neuronal physiology was suggested by a study of Furutani and colleagues. The identified telencephalin (TLCN/ICAM-5) as a novel vitronectin receptor on neuronal dendrites. Vitronectin was found to induce phagocytic cup-like plasma membrane protrusions on dendrites of cultured neurons. Moreover, phosphorylation of the ezrin/radixin/moesin (ERM) family of actin binding proteins was involved. Based on their data Furutani and colleagues conclude that "the extracellular matrix protein VN (vitronectin) and its neuronal receptor TLCN play a pivotal role in the phosphorylation of ERM proteins and the formation of phagocytic cup-like structures in neuronal dendrites."