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Analysis of soluble platelet endothelial cell adhesion molecule-1 (sPECAM-1) levels in children with solid tumours

Adhesion molecules are transmembranal cell surface glicoproteins that play an important role in the interaction between cells or extracellular matrix. These are involved in physiologic processes such as inflammation, immune response, cell growth and repair, hemostasis and hematopoiesis. Adhesion molecules are also responsible for some pathologic process, including neoplasms and thrombosis (4, 5, 9, 11).

Platelet endothelial cell adhesion molecule-1 (PECAM-1, CD31, EndoCAM) is a 130 kDa member of the immunoglobulin superfamily. This is expressed on human platelets, monocytes, neutrophils and all vascular cells. PECAM-1 is an early and sensitive marker for tumour-induced angiogenesis. Besides the membrane-bound form of PECAM-1, a soluble form of one exists (sPECAM-1), which is 5–10 kDa smaller than PECAM-1 (2, 3, 6).

The aim of the study was to determine sPECAM-1 level in serum of children with solid tumours in various phases of therapy.

MATERIAL AND METHODS

The study comprised 51 children with solid tumours, who were treated at the Department of Pediatric Hematology and Oncology in Lublin, Poland between 1999 and 2004. There were 26 girls (51%) and 25 boys (49%), age ranged from one month to 20 years (mean 7.7 years). The study group included children with Ewing sarcoma (n=10), neuroblastoma (NBL; n=17), rhabdomyosarcoma (RMS; n=15), Wilms' tumour (n=9). Evaluation of sPECAM-1 levels was performed in 41 children at the time of diagnosis, 30 after induction chemotherapy and 35 after the treatment was completed. The control group consisted of 40 healthy children. There were 18 girls and 22 boys, age ranged from 4.5 to 16 years (mean 11.8 years).

sPECAM-1 levels were determined with an immunoenzymatic assay (ELISA test) using Bender MedSystems reagent kit. The level of sPECAM-1 was expressed in ng/ml according to the manufacturer's instruction. Statistical analyses were carried out using t-Student, F-Fisher and Cochran-Cox tests.

RESULTS

The levels of sPECAM-1 in blood serum in patients divided according to histopathologic type of tumour are presented in Figs 1, 2, 3 and 4. Mean sPECAM-1 levels in patients with Ewing's sarcoma, rhabdomyosarcoma and Wilms' tumour were similar to mean of this molecule in control group in each phase of therapy. In patients with neuroblastoma, mean sPECAM-1 levels were significantly higher than in control after inductive chemotherapy ($p < 0.05$), but mean level had a similar value to mean sPECAM-1 in control group at the time of diagnosis and after completed treatment.

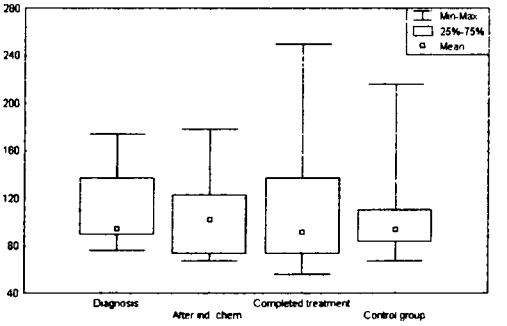

Fig. 1. Mean sPECAM-1 levels in children with Ewing's sarcoma

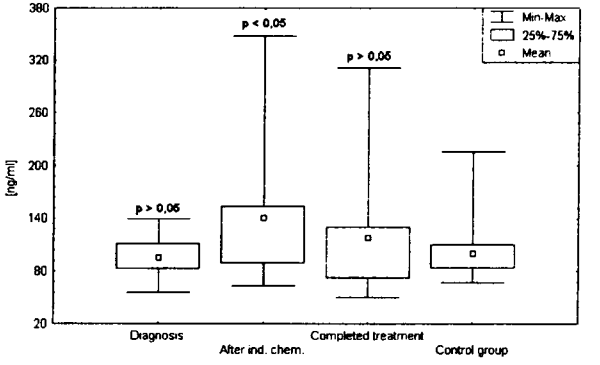

Fig. 2. Mean sPECAM-1 levels in children with neuroblastoma

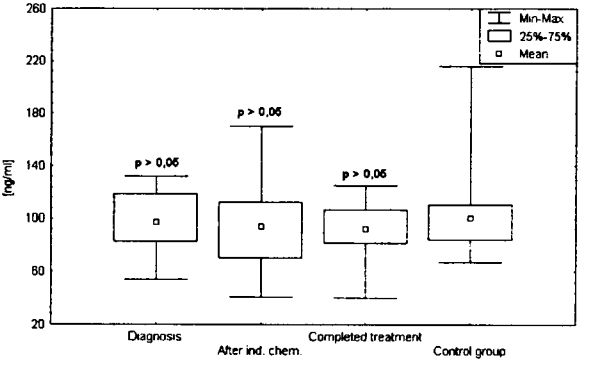

Fig. 3. Mean sPECAM-1 levels in children with rhabdomyosarcoma

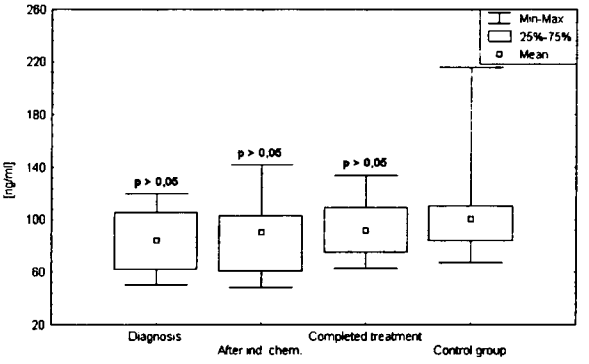

Fig. 4. Mean sPECAM-1 levels in children with Wilms' tumour

DISCUSSION

PECAM-1 is a immunohistochemical marker of blood vessels, especially in the setting of angiogenesis. Activation of angiogenesis process is connected (associated) with pathologic condition, e.g. new blood vessels penetrating retina can cause blindness. However, the most adverse condition is neoplastic angiogensis, which play a very important role in both tumour and metastases development. There is confirmed the role of angiogenesis in pathogenesis of solid tumour such as sarcomas, melanomas and carcinomas (2, 6, 7, 8).

Berger et al. found that PECAM-1 is specificity and sensitivity marker for melanoma. Thus, this molecule can be useful for early detection of neoplastic metastasis (3). In our study, the level of soluble PECAM-1 form was determined in serum of children with various phases of solid tumour. Mean sPECAM-1 levels in children with RMS, Wilms' tumour and Ewing sarcoma were comparable to controls. Only in children with NBL, the sPECAM-1 was significantly higher after inductive chemotherapy than in controls.

The presented study proves that sPECAM-1 in blood serum is not a suitable marker for children with solid tumours. It seems that further investigations should concern PECAM-1 expression of neoplastic tissue, particularly in tumour generating massive blood vessels network.

CONCLUSION

The presented study indicates that sPECAM-1 is not a useful marker for solid tumors of children. However, the study was limited by too small number of children.

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SUMMARY

The paper aimed to determine the serum sPECAM-1 levels in children with solid tumours in various phases of the disease: at diagnosis, after induction chemotherapy and after the treatment is completed. The study was carried out in 51 children with solid tumours, who were treated between 1999–2004. The control group consisted of 40 healthy children. sVCAM-1 levels were determined with an immunoenzymatic assay. Mean sPECAM-1 levels in patients with Ewing's sarcoma, rhabdomyosarcoma and Wilms' tumour were similar to mean of this molecule in control group in each phase of therapy. In patients with neuroblastoma, mean sPECAM-1 levels were significantly higher than in control after inductive chemotherapy ($p < 0.05$), but mean level had a similar value to mean sPECAM-1 in control group at the time of diagnosis and after completed treatment. The presented study indicates that sPECAM-1 is not a useful marker for solid tumors of children.

Analiza stężeń rozpuszczalnej cząstki adhezyjnej płytkowo-śródbłonkowej (sPECAM-1) u dzieci z nowotworami litymi

Celem pracy było oznaczenie stężeń sPECAM-1 u dzieci z nowotworami litymi na różnych etapach leczenia: w momencie diagnozy, po chemioterapii indukcyjnej i po zakończonym leczeniu. Badana grupa obejmowała 51 dzieci z nowotworami litymi, które były leczone w latach 1999–2004. Grupę kontrolną stanowiło 40 zdrowych dzieci. Stężenie sPECAM-1 oznaczano przy pomocy testów immunoenzymatycznych. Średnie stężenie sPECAM-1 u dzieci z mięsakiem Ewinga, mięsakiem prążkowanokomórkowym i guzem Wilmsa były porównywalne ze średnim stężeniem tej cząstki w grupie kontrolnej na wszystkich analizowanych etapach leczenia. U pacjentów z nerwiakiem zarodkowym współczulnym średnie stężenie sPECAM-1 było znacząco wyższe niż w grupie kontrolnej po chemioterapii indukcyjnej ($p < 0,05$), ale wartość średnia tej cząstki była zbliżona do średniej grupy kontrolnej w chwili diagnozy i po zakończonym leczeniu. Przedstawione badanie wskazuje na niską przydatność sPECAM-1 jako markera dla dzieci z nowotworami litymi.