Role of Actin and Sonic Hedgehog Signaling Pathway Expression in Primary and Recurrent Basal Cell Carcinoma

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Introduction. Basal cell carcinoma (BCC) is one of the most frequent skin tumours. Despite the diversity of treatment methods, the BCC reoccurs in 20–40 % of cases. BCC is a slowly growing tumour, but with great mitotic potential. Differently from primary BCC, recurrent tumours can increase their size in the shorter period of time. Actin microfilaments enable cells to move thus giving invasive properties. Differentiation of stromal fibroblasts in myofibroblasts is an essential moment in studying the features of oncogenesis, since the stromal microenvironment plays a huge role in the progression of the tumour. Sonic hedgehog (Shh) pathway is an essential regulator of cell proliferation and differentiation during embryogenesis. Activation of Shh pathway often leads to tumourigenesis in general, and BCC, in particular.

Aim, Materials and Methods. This study aimed to evaluate peculiarities of actin expression and Shh signaling implicated in development of primary and recurrent BCC assessed using immunohistochemistry.

During the study, 31 preparations were analysed, each with 20 fields of vision. Formalin-fixed and paraffin-embedded tissues were sectioned and stained immunohistochemically with anti-actin and anti-Shh antibodies. Semiquantitative estimation of samples in 20 randomly selected microscopic fields was applied. Expression of actin was evaluated by express expression as zero, one and two, where zero – 0 %, one – < 50 %, and two – > 90 %, respectively. Expression of *Shh* was scored as follows: zero, one, two and three (one – 0 %, one – 0–10 %, two – 10–75 % and three – > 75 %), and tumour and stromal expressions were estimated separately. Statistical analysis was preformed using SPSS 22.0 programme and tissue samples were analysed using Leica microscope (× 400).

Results. Differences in actin expression of both the stroma and in the tumour, itself were found, depending on the type: primary or recurrent tumour. The most significant difference was observed in the stroma, where relapses showed more pronounced expression compared with primary tumours – 47.9 % (relapses) and 19 % (primary), respectively. In the tumour itself, the expression of the two groups was very similar, the difference was expressed only in the intensity of expression – 47.9 % (relapses) and 45 % (primary), respectively. Statistically higher stromal expression was evident in recurrent BCC, where Shh immunopositivity was up to 58.3 %, conversely, Shh expression in primary BCC was only 19.3 %. Moreover, both types of BCC, namely primary and recurrent tumours demonstrated mostly a low percentage of Shh-positive cells graded as "1" – 15 % and 29.2 %, respectively. Higher expression grade estimated as "3" was more frequent in recurrent BCC (up to 16.8 %) whereas in primary BCC up to 0.7 % only. A moderately expressed marker presented in recurrent and primary BCC is 18.3 and 3.6 %, accordingly.

Conclusions. Identification and understanding of the features of the stroma and tumour actin expression in relapses and primary tumours will allow to more accurately anticipate and reduce the risk of relapse in the future. The presence of a high-level stromal expression suggests on possible paracrine communication and involvement of it in the development of relapse via the Shh pathway. Inhibition of this paracrine signaling can be effective in treatment of primary and recurrent BCC.

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