Abstract

In addition to the dominant keratinocytes and fibroblasts, melanocytes are also indispensable representatives of skin cell populations. Melanocytes are pigment cells whose primary function is to produce the pigment melanin, which is important for protecting keratinocytes from harmful ultraviolet radiation. Excessive exposure to this radiation is a risk factor for the development of skin tumours, including malignant melanoma of the skin, in which pathological transformation of melanocytes into melanoma cells occurs. The presented thesis focuses on 4 thematic areas associated mainly with malignant melanoma. In the first thematic area, the increasing incidence of malignant skin melanoma is associated with the ageing of the population. One of the reasons seems to be the more frequent occurrence of proinflammatory setting in the ageing organism. It prepares a suitable environment for tumour development. The second thematic area focuses on new approaches that could expand the range of diagnostic methods for the early detection of malignant melanoma. The first approach methodically uses the detection of proinflammatory molecules in the patient´s serum. Higher serum levels of IL-6 and IL-8 correlate with an unfavourable patient prognosis. The second approach is based on the possibility of detecting a tumour cell and the possibility of distinguishing it from a healthy cell using methods such as surface-enhanced Raman spectroscopy extended by artificial intelligence methods using convolutional neural networks. *In silico* it seems to be highly sensitive. In the third thematic area there are described various methods to model the melanoma microenvironment in 3D, *in vitro* or *in ovo* using the chorioallantoic membrane of the chicken. The fourth thematic area focuses on intercellular communication between malignant melanoma cells and cells of the tumour microenvironment, predominantly cancer-associated fibroblasts. In this area, emphasis is placed on communication through extracellular vesicles – the exosomes. The data showed that exosomes produced by melanoma change the biological properties of cancer-associated fibroblasts to promote tumour progression.

Key words

Melanocytes, malignant melanoma, ageing, inflammation, microenvironment, cancer-associated fibroblasts, spheroids, IL-6, exosomes