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Development of high-affinity protein binders for selective detection and separation of circulating tumor cells (CTCs) by microfluidic chip technology

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Most cancer-related deaths are caused by blood-borne metastasis initiated by circulating tumor cells (CTCs) identified in blood stream. CTCs are heterogeneous population of cancer cells of yet not well defined composition which are thought to be metastatic precursors. A population of CTCs which undergo the epithelial-mesenchymal transition (EMT) process may have enhanced ability to intravasate and to participate on distal metastases formation. Generally, occurrence of mesenchymal CTCs phenotype is supposed to represent a higher risk in diagnosis of further metastatic cancer progression. The monitoring of CTCs in peripheral blood of cancer patients represents an enormous potential for early non-invasive diagnostics of cancer progression, identification of recurrence risks and real-time monitoring of treatment responses. The development of novel types of high-affinity protein binders for epithelial and mesenchymal membrane markers of CTCs is a crucial step for the development of tools for selective CTCs detection and monitoring such as microfluidic chip technology. Small artificial protein binders represent a non-immunoglobulin alternative to antibodies and can be easily modified for the purpose of a chip design. Moreover, they do not contain disulfide bridges, have sufficient thermal stability and are resistant to many organic solvents. In addition, they can be easily produced en mass in *E. coli* strains. Protein binders targeting CTCs epithelial membrane marker EpCAM or mesenchymal membrane marker N-Cadherin were developed and characterized. The most promising variants will serve as captured proteins on the surface of a microfluidic chip for fast and more precise screening of patients with lung adenocarcinoma.

Biography

Lucie Mareckova is currently a PhD student of Biochemistry at the Faculty of Science, Charles University of Prague, Czech Republic. She is a Member of the Laboratory of Ligand Engineering at the Institute of Biotechnology CAS, v.v.i., Czech Republic. Her research topic is focused on the development of novel protein binders, derived from small protein domains, targeting diagnostically important molecules.

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