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Intact-cell mass spectrometry for mammalian cell identification and authentication

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Current biomedical research is highly dependent on correct use of cell lines *in vitro*. There is a constant risk of cell misidentification, cross-contamination orunwanted phenotypic or genetic and epigenetics shifts in *in vitro* cultures. In human cells, the current golden standard is identification of short tandem repeats (STR) profile in the genome and their comparison with a database of known profiles. This approach can easily distinguish cell lines derived from different individuals, however, in is limited in case of non-human species without a defined database, in case of clones or different cells from the same individual or in case of phenotypic alterations that do not change the STR profile. To obtain DNA-independent authentication tool, we developed, optimized and performed the MALDI-TOF MS of intact cells selected for various levels of intrinsic heterogeneity - human embryonic kidney (HEK293), mouse embryonic fibroblasts, human and mouse embryonic stem cells and primary cells from ovarian follicles of BALB/c and C57BL/6 mouse strains. Then, by rigorous statistical evaluation of the method robustness with respect to both technical and biological variability, we demonstrated that specific fingerprints of mammalian cells can be easily obtained with defined intra and inter-instrumental overall reproducibility. Moreover, MS followed by advanced cluster analysis, revealed tiny phenotypic shifts in morphologically indistinguishable human embryonic stem cells induced to differentiation or undergoing silent phenotypic shifts in culture. In summary, intact cell MS represent a powerful tool for identification, authentication and phenotypization of cells in various applications, ranging from biomedical research, cell therapy tobioindustry.

Biography

Petr Vaňhara finished his PhD in Molecular and Cell Biology in 2009 at Masaryk University, Czech Republic. He has an international experience from laboratories in Germany, France and Austria. Since 2005, he is working in the field of biomedical research. In 2011 he joined the Faculty of Medicine, Masaryk University as the Assistant Professor, Researcher and Project Leader. He is focused on biomedical applications of pluripotent stem cells, e.g. tissue regeneration and engineering, cancer modeling or biosafety issues related to the genetic and phenotypic stability, including development of novel bioanalytical phenotyping techniques. He published more than 20 internationally recognized papers in reputed journals.

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