"**Human Umbilical Cord-Derived Neural-like Cells: towards model complexity for neurotoxicity screening**"

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Abstract

Human cell-based models are strongly recommended as relevant alternative methods to reduce theuncertainty in species-specific extrapolation of results and to improve prediction in toxicology. In thisrespect, the use of stem cells (SCs) currently represents one of the emerging trends in technologiesfor developing assays and tools. SCs have the advantage, over primary and immortalized cells:(i) to generate large populations of stably-differentiated cells representative of different target speciesincluding humans, and (ii) to provide a virgin, nontransformed source of cells which can be differentiatedinto any lineage and serve as potent in vitro models. Successful differentiation of SCs into neuronal lineages is widely reported and recent data confirm that the mesenchymal stem cells derived from human umbilical cord are able to transdifferentiate into neuronal-like cells (hNLCs). These properties make hNLCsas potential gold standard tool for establishing *in vitro* models of neurotoxicity.

Examples for the use of these human NLCs (from 2D cell-based model and moving to 3D spheroids) associated with a complementary test panel after exposure to different compounds (e.g., nanoparticles, new psychoactive substances) will be presented in the lecture.The findingsobtained in our lab support the worth of using such novel models for initial risk identification for xenobiotic risk assessment as a screening strategy to define the neurotoxicity of emerging toxic compounds in terms of mechanistic understanding of cellular responses.