VolkswagenStiftung

OntoTime - Measuring and Modulating Timescales of Life

Initiative: "Leben?" - Ein neuer Blick der Naturwissenschaften auf die grundlegenden Prinzipien des Lebens

(beendet)

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All multicellular organisms exhibit a characteristic life cycle that unfolds by development from immature forms into adults that procreate and age. The timescale of the life cycle and its stages is usually fixed for any given species, but can vary considerably within a class. How these timescale differences arise at the cellular and organism level is a major open question. This work focuses on mechanisms that control developmental timescales, specifically those of early cell differentiation. Pluripotent stem cells (PSCs) from mammals with diverse developmental timescales will be used as a tractable system to study the origin of developmental time at the cellular level. By precisely measuring cell differentiation speed with cutting-edge time-series transcriptomics, time-lapse microscopy and computational modelling, the regulation of developmental timescales through metabolic and gene regulatory mechanisms will be explored. Finally, chimeric cultures of PSCs will be produced and rodent-primate hybrid PSCs as unique tools to map and manipulate the origins of developmental timescales created. Given the links between the timescales of development, maturation, and ageing, this work might have a fundamental impact on understanding the origin of time in the life cycle as a whole.

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Open Access-Publikationen

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