

Serotonin in stem cell potency and differentiation

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Serotonin is a neuro-transmitter that also has important but elusive functions in early development, pluripotency, and neural crest determination and migration. Therefore, the first goal is to clarify whether serotonin is an important mediator in the establishment and differentiation of pluripotent and neural crest multipotent stem cell (NC-MSc). Genetically altered mouse models with an inhibited serotonin system and substances interfering with this system will be used to study early preimplantation development and the generation of iPS cells and NC-MSc cells. The experiments will clarify whether autocrine or paracrine serotonin production is necessary for the development of blastocysts and the establishment of multi- or pluripotent stem cells in vitro. Serotonin has also been shown to influence in a paracrine or autocrine way cellular differentiation, in particular of neurons producing it, and to inhibit the differentiation of brown adipocytes and thereby fostering obesity. Therefore, the second part of this project will study the role of serotonin in the differentiation of iPS cells and NC-MSc to serotonergic neurons and embryonic fibroblasts and NC-MScs to adipocytes. Fibroblasts, human and mouse iPS cells and NC-MScs will be differentiated. This part of the project will elucidate the capability of serotonin to impact on differentiation processes and may mechanistically explain the newly discovered role of the monoamine in obesity. Overall, the results of this project will improve our understanding of the role of serotonin in the development of serotonergic neurons and adipocytes, also with strong therapeutic potential for diseases with increasing importance in modern societies worldwide, like depression and obesity, respectively.

Projektbeteiligte

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