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RCSN Cell System for Identifying Dopaminergic Neurotoxicity

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Abstract

Dopaminergic toxicity represents a potential mechanism underlying Parkinson's disease (PD) neuropathology. Nevertheless, the study of such a mechanism is hampered by the lack of permanent and stable in vitro models that bear relevant cellular traits, namely, neuronal dopaminergic function. Although various permanent cell lines exhibiting variable dopaminergic properties do exist, such properties are not necessarily stable and may require the application of complex and costly differentiation protocols for induction. The latter is particularly true when inducing in vitro differentiation from more undifferentiated tissue, such as stem cells. Also, cell lines may lose viability or eventually undergo permanent differentiation. This chapter discusses a permanently growing cell line, named RCSN-3, which was established from the substantia nigra of an adult Fisher 344 rat. The cell line retains dopaminergic traits, including dopamine production and secretion, and the presence of catecholamine reuptake transporters. Notably, these properties have remained expressed in RCSN-3 cells for decades. This chapter also addresses the contribution of RCSN-3 to dopaminergic-mediated toxic phenomena, in particular, and to the identification of potential therapeutic targets in dopaminergic neurons. Finally, RCSN-3 cells are also presented as a model for cell transplant therapy, in animal models of PD, and their contribution in this field is discussed in relation to more recently available cell sources, such as stem cells and induced pluripotent stem cells (iPSCs).

Keywords

[RCSN](#)

[Cell line](#)

[Dopaminergic](#)

[Parkinson's disease](#)

[Toxicity](#)

[Cell transplant](#)

[In vitro](#)