In vitro differentiation of stem cells to specialised tissue cells

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There is an enormous research e ff ort aimed at better under - standing the factors responsible for cell fate decisions and establishing e ff ective and reproducible protocols that can be used to di ff erentiate stem cells in vitro into the desired type of specialised cell. Typically , such protocols use culture in chemically defined media containing cocktails of small mole - cules that stimulate or inhibit key signalling pathways, along with cytokines, growth factors and chemicals. It is becoming increasingly clear that exposure to certain biomaterials and the physical attributes of a sca ff old, including its surface character - istics, also promote stem cell di ff erentiation along a particular lineage. Mechanical stress also influences cell fate decisions. After stem cells have been subjected to in vitro di ff erentiation, it is essential that the purity of the di ff erentiated cells and the absence of undi ff erentiated stem cells are confirmed to reduce the risk of tumour transmission. The cells must also be fully - characterised and their function confirmed before they are used for therapeutic purposes.

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