Therapeutically useful stem cell derivatives in need of stability

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Human stem cells capable of giving rise to any fetal or adult cell type are known as pluripotent stem cells. It is hoped that such cells, the most well known being human embryonic stem cells (hESCs), can be used to generate cell populations with therapeutic utility. In this context, neural derivatives of hESCs are being tested in clinical trials. However, Natalie Lefort and colleagues, at the Institute for Stem cell Therapy and Exploration of Monogenic diseases, France, have now generated cautionary data that suggest that additional quality controls need to be put in place to ensure that neural derivatives of human pluripotent stem cells are not genomically unstable, a common characteristic of cancer cells.

The key observation of Lefort and colleagues was that neural derivatives of human pluripotent stem cells frequently acquire extra material from chromosome 1q. Worryingly, this chromosomal defect has been associated with some blood cell cancers and pediatric brain tumors with poor clinical outcome, although Lefort and colleagues found that the abnormal neural cells they detected were unable to form tumors in mice.

As noted by Neil Harrison, at the University of Sheffield, United Kingdom, in an accompanying commentary, while the data raise safety issues relevant for the therapeutic use of these cells, the fact that the same chromosome was affected in all cases suggests that it should be possible to design screening strategies to detect and remove these cells.

More information: Recurrent genomic instability of chromosome 1q

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