stem cell therapy

introduction

- stem cell Rx is the use of pluripotent stem cells to repair or replace damaged tissues
- in 1998, the 1st human stem cells to be used were harvested from human embryos and called ***embryonic stem cells (ESCs)*** however this raised ethical issues
- in 2006, a new complex, time consuming technique (at least 4 weeks) was developed to avoid the embryo ethical issues and manually transform cells by introducing 4 genes using a virus to create ***human induced pluripotent stem cells (iPS)***
- in 2013, it was discovered that white blood cells could be rapidly transformed into not only pluripotent stem cells but **totipotent stem cells** potentially capable of creating a new cloned embryo!
    - it appears that cells have a built-in mechanism whereby near-lethal injury can switch off genes and transform the cell to an earlier cell type in proportion to the extent of the insult
    - it was discovered that immersion of mouse white blood cells in acid environment with pH 5.7 for 30 minutes, whilst killing many of the cells, will over the next few days result in some surviving cells transforming into pluripotent stem cells - ***stimulus-triggered acquisition of pluripotency cell***, or **STAP cell**[1)]
    - on their own, STAP cells do not readily multiply.
    - if they are placed alongside various growth factors, they undergo minor changes that allow them to multiply exponentially with no chromosomal abnormalities - ***STAP stem cells***
    - assuming this works in human cells, this technology is likely to be game changing and revolutionary for medical therapies and potentially for reproductive medicine too - although further ethical issues will now be raised regarding cloning.

1)
http://www.newscientist.com/article/mg22129542.500-stem-cell-power-unleashed-after-30-minute-dip-in-acid.html?full=true#.Uumi5bR0byA