Stem cells: how do their properties lead to life changing uses and how do their properties limit their use?

Topics Markscheme

Content

- Definition: unspecialised, uni-, multi, pluri, totipotency, Induced iPS.
- Examples: adult stem cells eg bone marrow: detail + potency
- Examples: embryo: totipotent nature + 'immortality'
- Regulation / growth factors (many and complex) that induce differentiation

Application – Uses, limitations

- Replacement of damaged cells/diseased cells (Not yet organs because of complexity of inducing the stem cells to differentiate / and form into the correct 3D structure, despite use of scaffolds).
- Examples of specific diseases / conditions already successfully treated eg Leukaemia. Problem with tissue matching / rejection related back to properties (ie cell surface antigens) unique / variation
  - corneal implants
- Embryonic stem cells potentially best but ethical position affects use / development
- Difficulty of determining regulation / growth factors
- Possibility of starting a cancer because we don't know which genes to switch off and how.