Stem cells have two special properties:

- They can divide indefinitely
- They can turn into any other cell type by a process called differentiation.

This makes stem cells very exciting to use in research! It gives researchers the ability to understand how our cells develop, and what happens when this goes wrong. Stem cells also provide a model to test drug safety and due to their properties, they may be frozen for storage or distributed to other researchers.

Stem cells are usually derived from embryos, but scientists can also develop stem cells themselves in the laboratory. These are induced pluripotent stem cells, often abbreviated to iPSCs. iPSCs can be made from almost any adult cell in the body, though often they are made from skin cells as they are easier to obtain than other cell types. The process of converting a cell into an iPSC is called 'reprogramming'. Researchers study reprogramming because it tells us about how cells can change from one cell type to another. iPSCs are also useful models as they can be studied to understand

The process of cell reprogramming incorporates three steps; initiation, maturation and stabilisation.

STAGE 1: INITIATION

The adult cells lose specialised cell features

There are many ways to start the process of reprogramming, such as

only about 1 in 1000 starting cells will successfully become an iPSC.

Which of the following cells can an iPSC turn into?

O Any cell in the body
S Just heart cells
K Just brain cells
M Just liver cells

What percentage of cells become iPSCs during reprogramming?

O
S 0.1%
K
M 100%

Q3

How can you start reprogramming?

O adding OSKM to the cell
S adding specific chemicals to the cells
K altering the epigenetics of the cell
M all of the above

Q4

How many times can an iPSC divide?

O