

what is Ageing?

Ageing results from the accumulation of senescent cells. Senescent cells are older deteriorated cells that don't function properly and compromise surrounding cells function. It has been shown that removal of these senescent cells has improved the effects of aging e.g. delaying cataracts.

A factor for developing senescence may be due to the loss of our ability to turn genes on and off.

As we age it becomes more difficult to control how our genes are regulated. Each cell in our body contains the same DNA and genome to produce most specialised cells needed to sustain life. In the tissue not all genes are switched on, hence different cells are produced. i.e. white blood cell is different from a red blood cell.

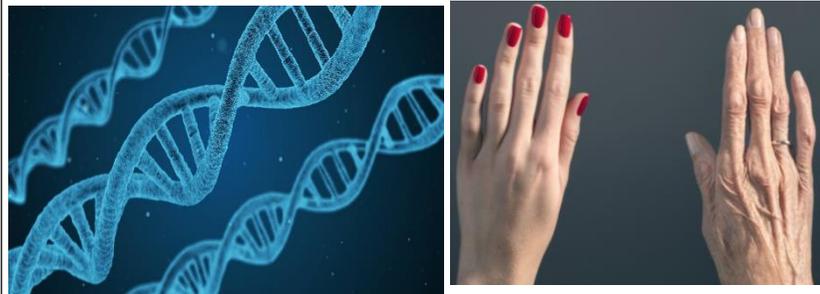
When a gene is activated by a chemical signal, RNA is produced. This molecule contains information needed to produce the desired protein by the gene. The decision to what type of molecule is produced and needed is decided by a group of 300 proteins known as splicing factors.

The amount of splicing factor we are decreases over time which makes it harder for our cells to switch genes on and of to respond to changes in the environment

The effects of ageing

As we age our skin losses its elasticity and ability to heal faster, becoming thinner and making us more prone to wrinkles developing. The regeneration capacity of our cells also slows down which can cause tissues to become stiffer and perform less efficiently.

In addition, there are high risk of blood pressure and cardiovascular diseases due to the stiffening of the arteries which cause your heart to work harder.



What has been done

New technology is developing to produce innovate methods to help reverse aging. There are skin products are the already in the market for the public to combat the signs of aging. Although it doesn't reverse aging, they do help in decreasing the visual effects on the skins. Through moderate exercise, there will be a reduction on diseases (that is increased in risk due to ageing) such as cardiovascular disease.

First step to new anti-degenerative drugs

Researchers have found a way to turn splicing factors on by treating an old cell with chemicals releasing hydrogen sulphide. This molecule can be found in our bodies and has shown to improve age-related diseases in animals. As hydrogen sulphide is toxic in large amounts, researchers have been able to deliver small amounts of this molecule directly to the mitochondria via "molecular postcode" with aim to remove senescent cells.

Keshav Singh and his colleagues had used a mouse model to experiment if age-associated wrinkles and hair loss could be reversed. The experiment involved mice being given the antibiotic doxycycline in their food which caused the enzyme responsible for DNA replication to become inactive. This had induced a mutation in the mice, resulting in mitochondrial DNA depletion. Mitochondria is known as the powerhouse of the cells and produces ATP for all human cells. A decline in mitochondrial function, which comes with aging results in cell deterioration due not enough energy being provided to carry out simple yet vital chemical reaction's effect of this doxycycline can be seen by the mice displaying grey hair, hair loss and slowed movements in the first 4-8 weeks. Furthermore, when they turned off the mutations by stopping the doxycycline, it allowed for mitochondrial DNA to be restored. This had caused the same mouse to grow back its hair and become more active. This experiment showed that we are able to reverse aging.