

Wonder drug could reverse ageing process

US scientists are trialling senolytics, which target the zombie cells that cause age-related diseases

By Sarah Knapton SCIENCE EDITOR
at the Mayo Clinic, Minnesota

WITH its podgy body, tired eyes and fur loss, the mouse on the right could easily be the father of the sprightly and alert animal alongside. But they are the same age, the result of extraordinary trials of drugs that are slowing or even reversing the ageing process.

Scientists believe that ageing itself is responsible for many major conditions such as Alzheimer's, Parkinson's, arthritis, cancer, heart disease and diabetes. And they think they have found a way to turn it off.

Anti-ageing drugs - known as "senolytics" - are being trialled in humans, and unlike previous tests, which have focused on a single disease, these drugs work like a broad-spectrum antibiotic, preventing or alleviating most age-related illnesses and frailty.

Scientists at the Mayo Clinic in Rochester, Minnesota, have six trials in humans under way and plan to start six more. If successful, they estimate that drugs to slow down ageing could be ready within two years. In mice, the drugs extend lifespan by 36 per cent, the equivalent of around 30 human years, and the animals remained in good health.

Clinical geriatrician Dr James Kirkland, director of the Robert and Arlene Kogod Centre on Ageing at Mayo Clinic, said: "Most people don't want to live to 130 and feel like they're 130 but they wouldn't mind living to 90 and feel like they're 60. And now that can actually be achieved in animals.

"Ageing itself is the highest risk factor for most of the chronic diseases. And if you get one age-related disease, you've got a huge chance of having several. You tend to find older individuals who are completely healthy and are playing 18 rounds of golf a day, or they've got three, five or 10 different conditions. There aren't too many people in between.

"Therefore, if you targeted fundamental ageing processes it might be possible to delay, prevent or alleviate chronic conditions as a group, instead of going after them one at a time.

"It's much more like developing an antibiotic. Antibiotics will treat 25 dif-

ferent conditions. We're trying to do the same thing."

The senolytic drugs target senescent cells, also known as "zombie cells". These form from normal cells which have stopped dividing, but instead of dying and being cleared away, they begin pumping out damaging chemicals which harm healthy cells. Senescent cells accumulate with age, caused by the stresses of life, and scientists now believe that, at a critical threshold, they

Zombie cells

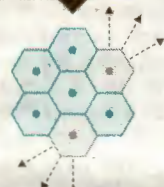
1. The trigger

Damage and disease triggers zombies cells, which neither divide or die



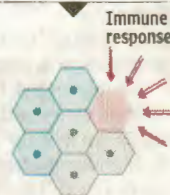
2. Rogue operators

Once senescent, zombie cells pump out signals which invite immune cells to kill nearby healthy cells.



3. Build-up

Over time zombie cells infect those around them and can send out signals throughout the entire body, triggering senescence in far away areas, and causing multiple diseases like Alzheimer's and arthritis.



4. Zombie killers

New drugs target the pathways that zombie cells use to avoid death, clearing out the cells and leaving room for healthy new growth



trigger disease. Zombie cells cluster around the lesions which cause heart attacks and strokes, in bones of people with osteoporosis, in the joints arthritis sufferers, and in the fat tissue of diabetics.

Scientists have shown that if they transplant zombie cells into young animals, they begin to age, and develop age-related disease. But importantly, the ageing can be reversed by senolytic drugs. It was also recently demonstrated that in tissue samples of obese human diabetics, senolytic drugs made fat cells sensitive to insulin again.

The Mayo Clinic has joined seven other research institutions across the US to form the Translational Geroscience Network, which will carry out urgent trials into the drugs.

Dr Kirkland added: "With a single intervention it might be possible now to affect healthspan and lifespan."