Girl frozen in time may hold key to ageing

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Scientists are hoping to gain new insights into the mysteries of ageing by sequencing the genome of a 17-year-old girl who has the body and behaviour of a tiny toddler.

Brooke Greenberg is old enough to drive a car and next year will be old enough to vote — but at 16lb in weight and just 30in tall, she is still the size of a one-year-old.

Until recently she had been regarded as a medical oddity but a preliminary study of her DNA has suggested her failure to grow could be linked to defects in the genes that make the rest of humanity grow old.

If confirmed, the research could give scientists a fresh understanding of ageing and even suggest new therapies for diseases linked to old age.

“We think that Brooke’s condition presents us with a unique opportunity to understand the process of ageing,” said Richard Walker, a professor at the University of South Florida School of Medicine, who is leading the research team.

“We think that she has a mutation in the genes that control her ageing and development so that she appears to have been frozen in time.

“If we can compare her genome to the normal version then we might be able to find those genes and see exactly what they do and how to control them.”

Such research will be the focus of a conference at the Royal Society in London this week to be attended by some of the world's leading age researchers.

It follows a series of scientific breakthroughs showing that the life span of many animals can be dramatically extended by making minute changes in single genes.

The work began with tiny worms known as C elegans, which normally live for only about a fortnight. Researchers have been able to extend their life span by up to 10 weeks by making small changes in certain genes.

Scientists have gone on to discover that mutating the same genes in mice had the same effect.

"Mice are genetically very close to humans," said Cynthia Kenyon, professor of biochemistry at the University of California, San Francisco, who is a key speaker at the Royal Society.

"The implication is that ageing is controlled by a relatively small number of genes and that we might be able to target these with new therapies that would improve the quality and length of human life."

The laboratory findings have been supported by research into humans, focusing on families whose members are long-lived. In one recent study Eline Slagboom, professor of molecular epidemiology at Leiden University, Holland, collected data on 30,500 people in 500 long-lived families to find the metabolic and genetic factors that make them special.

"Such people simply age slower than the rest of us," she said. "Their skin is better, they have less risk of diseases of old age like

diabetes, heart disease and hypertension and their ability to metabolise lipids and other nutrients is better. The question is: what is controlling all these different manifestations of slow ageing?

“So far, the evidence suggests that there could be just a few key genes in charge of it all. If we can find out where they are and how they work, it opens the way to new therapies against the diseases of ageing that could work in all of us.”

Walker and other researchers, including Kenyon, believe that finding the cause of Brooke Greenberg’s condition could be one way to pinpoint some of those genes.

Superficially, Brooke, who lives with her parents Howard and Melanie Greenberg and her three sisters in Reisterstown, a Baltimore suburb, is frozen in time. She looks and acts as if she were a small toddler — for 17 years her family has changed her nappies, rocked her to sleep and given her cuddles.

Brooke has shown some development, including crawling, smiling and giggling when tickled but she has never learnt to speak and still has her infant teeth.

But she has also suffered a succession of life-threatening health problems, including strokes, seizures, ulcers and breathing difficulties — almost as if she were growing old despite not growing up.

Howard Greenberg, Brooke's father, said he wanted the genome research carried out in the hope it might help others.

He said: "Brooke is just a wonderful child. She is very pure. She still babbles just like a 6 month old baby but she still communicates and we always know just what she means."

Walker and his colleagues, who are working with Brooke's parents to ensure she benefits from any research findings, have just published a research paper which suggests that in reality some parts of her body have indeed aged — but slowly and all at different rates.

"Our hypothesis is that she is suffering from damage in the gene or genes that co-ordinate the way the body develops and ages," he said.

"If we can use her DNA to find that mutant gene then we can test it in laboratory animals to see if we can switch if off and slow down the ageing process at will.

"Just possibly it could give us an opportunity to answer the question of why we are mortal."