# The body rids itself of damage when it really matters

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Although the body is constantly replacing cells and cell constituents, damage and imperfections accumulate over time. Cleanup efforts are saved for when it really matters. Researchers from the University of Gothenburg, Sweden, are able to show how the body rids itself of damage when it is time to reproduce and create new life.

'I have a daughter. She is made of my cells yet has much less cellular damage than my cells. Why didn't she inherit my cells including the damaged proteins? That's the process I'm interested in,' says Malin Hernebring from the Department of Cell- and Molecular Biology at the University of Gothenburg.

A few days after conception, the cells in the embryo all look the same – they are unspecified stem cells that can develop into any bodily cell type. As the process of cell specification (differentiation) begins, they go from being able to keep dividing infinitely to being able to do so only a limited number of times. This is when they start cleansing themselves.

'Quite unexpectedly we found that the level of protein damage was relatively high in the embryo's unspecified cells, but then it decreased dramatically. A few days after the onset of cell differentiation, the protein damage level had gone down by 80-90 percent. We think this is a result of the damaged material being broken down.'

In the past, researchers have believed that the body keeps cells involved in reproduction isolated and protected from damage. Now it has been

shown that these types of cells go through a rejuvenation process that rids them of the inherited damage.

Some types of protein damage in the body increase with age. Although all the necessary information is stored in the DNA, something keeps the body from using it to keep repairing the body.

'These types of protein damages are what make us appear old, like wrinkles around the eyes. While wrinkles are relatively harmless, serious problems may arise elsewhere in the body. I'm thinking of age-related diseases like Parkinson's, Alzheimer's, type 2 diabetes and cancer.'

Malin Hernebring can show that the damaged proteins in the cells are probably broken down by molecular machines called proteasomes. The proteasome activity increases considerably during the initial steps of embryonic stem cell differentiation in mice. Deciphering this rejuvenation process helps us better understand what ageing really is, which in turn may help us slow it down and also prevent the occurrence and ill effects of age-related diseases.

Provided by University of Gothenburg