

Old blood, new science: 115-year-old woman's blood suggests lifespan depends on stem cells

Our time on this earth is limited, and some of society's most dedicated futurists are [trying to extend or even transcend this limitation](#) — but we don't really even have a firm grasp on what the natural limits of the human lifespan are.

Now, the blood from one of the oldest, healthiest women on record is being used to probe the question of just what it is that leads even the most resilient of us to succumb to old age. [Andy Coghlan at New Scientist](#) introduces our subject:

Born in 1890, Hendrikje van Andel-Schipper was at one point the oldest woman in the world. She was also remarkable for her health, with crystal-clear cognition until she was close to death, and a blood circulatory system free of disease. When she died in 2005, she bequeathed her body to science.

It's rare enough for someone to reach 115 years of age, let alone to do so in good health, and to then donate their body to science. As you can imagine, the available pool of blood and tissue samples from healthy "supercentenarians" is extremely limited — but it is invaluable.

As [io9's George Dvorsky](#) notes:

Studies have consistently shown that lifestyle factors have little to do with their remarkable longevity; something's clearly going on at the genetic level.

At the same time, biogerontologists also know that there's a link between blood and the aging process. A fascinating 2012 study showed that it's possible to reverse cognitive decline in elderly mice by injecting them with blood from the young (do not try this at home, folks). The researchers concluded that cognitive decline happens as we get older as a function of our decreased production of neural stem cells.

The last sentence becomes especially important in light of the new study. The team by Henne Holstege at VU University Medical Center in Amsterdam, the Netherlands, analyzed the mutations in her blood and found something intriguing: at the time of her death, two-thirds of her white blood cells could be traced back to just two blood stem cells.

"It's estimated that we're born with around 20,000 blood stem cells, and at any one time, around 1000 are simultaneously active to replenish blood," Holstege told New Scientist.

Over the course of her 115-year life, van Andel-Schipper's stem cells had slowly died off, until she reached a point of "stem cell exhaustion." Stem cells are the cells in our bodies that act like seeds for new cells, allowing us to replenish our tissues. But eventually even stem cells wear out, and once they do the

body can no longer regenerate lost or damaged cells.

“Evidence for the stem cell fatigue,” writes Coghlan, “came from observations that van Andel-Schipper’s white blood cells had drastically worn-down telomeres – the protective tips on chromosomes that burn down like wicks each time a cell divides.”

A limit to the lifespan of stem cells translates to a limit to our lifespans. It might also translate into a way to push those limits, however. Dvorsky explains:

This is all quite exciting because it hints at a very plausible rejuvenation therapy. Conceivably, we could re-inject ourselves with stem cells saved from birth or early life — stem cells free from mutations and with full-length telomeres. Now, this wouldn’t halt the aging process, but it could have a dramatic impact on our health and the rate at which we age.

This brings us full circle back to radical longevity and adds yet another line to stem cells’s already impressive resume as the keystones of regenerative medicine. In trying to better understand the natural limits of our lifespans we may have just stumbled on another way to extend them.

For now, though, Holstege is interested in the brain/blood difference. Despite her age, van Andel-Schipper’s brain was in excellent shape. According to Coghlan: “Next, Holstege hopes to hunt for clues to genes that protect against Alzheimer’s disease by comparing van Andel-Schipper’s genome to that of people who succumb abnormally early to the disease.”

The blood of the young might help the bodies of the old, but what of their minds?

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Sources:

- [“Blood of world’s oldest woman hints at limits of life,”](#) Andy Coghlan | New Scientist
- [“Supercentenarian’s Blood Provides Clues To Extending Human Life,”](#) George Dvorsky | io9
- [“Somatic mutations found in the healthy blood compartment of a 115-yr-old woman demonstrate oligoclonal hematopoiesis,”](#) Genome Research

Additional Resources:

- [“Live to be 100+? Extreme longevity research is futuristic privatized enterprise,”](#) Meredith Knight | Genetic Literacy Project
- [“Transhumanism in the crosshairs: The dark side of radical longevity,”](#) Kenrick Vezina | Genetic Literacy Project