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Reversing Aging: Not as Crazy as You Think

Harvard researchers find a new compound that can make old cells young again

By Alice Park @aliceparkny | Dec. 19, 2013 | 54 Comments

What makes cells age? Wear and tear, yes. But biologically, says, Dr. David Sinclair, professor of genetics at Harvard Medical School, it's lack of oxygen that signals cells that it's their time to go. Without oxygen, the energy engines known as the mitochondria become less efficient at turning physiological fuel like glucose into the energy that the cells need to function. Eventually, they shut down.

But in a paper published in the journal *Cell*, Sinclair and his colleagues describe for the first time a compound naturally made by young cells that was able to revive older cells and make them energetic and youthful again. In an experiment in mice, the team found that giving older mice a chemical called NAD for just one week made 2-year-old-mice tissue resemble that of 6-month-old mice (in human years, that would be akin to a 60-year-old's cells becoming more like those belonging to a 20-year-old).

As mammals age, says Sinclair, levels of NAD drop by 50%; with less of the compound, the communication between the cell and its mitochondrial energy source also falters, and the cell becomes vulnerable to common aging assaults — inflammation, muscle wasting and slower metabolism. By tricking the cell into thinking it's young again, with adequate amounts of NAD, aging can theoretically be reversed. “When we give the molecule, the cells think oxygen levels are normal and everything revs back up again,” Sinclair says.

While NAD may be a key to the fountain of youth, Sinclair, who also investigated the anti-aging effects of the red-wine compound resveratrol, isn't ready to say that the chemical could lead to immortal cells. “I wouldn't take it that far,” he says. “What makes reversing aging interesting is that it could buy more time than we are currently looking at.”



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His next step is to put NAD in the drinking water of his mice, and see if they take longer to develop the typical chronic diseases linked to aging, such as inflammation, muscle wasting, cancer and diabetes. The pathway may become an important target for cancer researchers as well, since tumors typically grow in low-oxygen conditions and are more common in older patients.

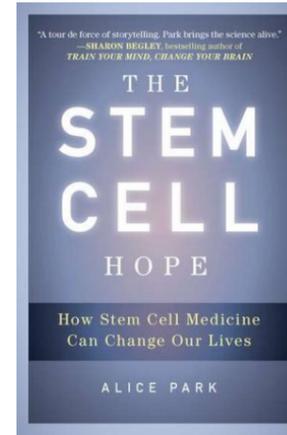
Because NAD is a naturally occurring compound that simply declines with age, Sinclair is optimistic that boosting its levels in people won't have as many significant adverse effects as introducing an entirely new compound might. "If a body is slowly falling apart and losing the ability to regulate itself effectively, we can get it back on track to what it was in its 20s and 30s," he says.

At least that's the hope.



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