OTC Supplement Quercetin Kills Senescent Cells

SENS

Aubrey de Grey, the theorist of anti-aging science, came up with so-called Strategies for Engineered Negligible Senescence (SENS), which would have the ability to repair physiological damage and therefore allow for a “negligible” rate of aging. Most of the seven items on the list of aging problems we are nowhere near to solving. Right now, the enhancement of autophagy through fasting, exercise, and various chemical means looks like the best anti-aging method going, in my opinion, but that still doesn’t really halt cellular and tissue damage.

One of the items on the SENS list is dealing with senescent cells, which are cells that have passed their “sell by” date. They have ceased to grow and divide, but they still produce inflammatory cytokines, and are considered to be a major cause of age-related disease and dysfunction.

Senolytics

Now, a group of scientists has discovered a successful way to deal with senescent cells: The Achilles' Heel of Senescent Cells: From Transcriptome to Senolytic Drugs. From the abstract:

> The healthspan of mice is enhanced by killing senescent cells using a transgenic suicide gene. Achieving the same using small molecules would have a tremendous impact on quality of life and burden of age-related chronic diseases. Here, we describe the rationale for identification and validation of a new class of drugs termed senolytics, which selectively kill senescent cells. By transcript analysis, we discovered increased expression of pro-survival networks in senescent cells… Drugs targeting these factors selectively killed senescent cells. Dasatinib eliminated senescent human fat cell progenitors, while quercetin was more effective against senescent human endothelial cells and mouse BM-MSCs. The combination of dasatinib and quercetin was effective in eliminating senescent MEFs… **In old mice, cardiac function and carotid vascular reactivity were improved 5 days after a single dose. Following irradiation of one limb in mice, a single dose led to improved exercise capacity for at least 7 months following drug treatment.** … These results demonstrate the feasibility of selectively ablating senescent cells and the efficacy of senolytics for alleviating symptoms of frailty and extending healthspan.

The two compounds used were dasatinib, an anti-cancer drug, and quercetin, a phytochemical that is available as an over-the-counter supplement. While the combination of both dasatinib and quercetin was the most effective, quercetin alone was more effective than dasatinib alone against senescent epithelial cells. The dose of quercetin used was 50mg/kg body weight. (From the full paper in PDF.) Dose needs to be divided by 12 for mouse/human interconversion, so more like 300 mg for a 70 kg man.

One dose of the combined treatment improved cardiac function in old mice after 5 days.

Dasatinib is a prescription drug, but quercetin is readily available and inexpensive. A recent review paper on quercetin states that "a regular diet provides amounts of quercetin (10 µM) by supplementation with quercetin-enriched foods or supplements."

The first paper states that in the *in vitro* part of the experiment, the concentration of quercetin used was in fact 10 µM. So we're in luck: supplementation will get us into that range.

The authors also state that getting rid of as few as 30% of senescent cells will result in a huge improvement in health. The authors of the study are quite enthusiastic about it, referring to their compounds as "senolytics":

> “We view this study as a big, first step toward developing treatments that can be given safely to patients to extend healthspan or to treat age-related diseases and disorders,” said TSRI Professor Paul Robbins, PhD, who with Associate Professor Laura Niedernhofer, MD, PhD, led the research efforts for the paper at Scripps Florida. “When senolytic agents, like the combination we identified, are used clinically, the results could be transformative.”

> “The prototypes of these senolytic agents have more than proven their ability to alleviate multiple characteristics associated with aging,” said Mayo Clinic Professor James Kirkland, MD, PhD, senior author of the new study. “It may eventually become feasible to delay, prevent, alleviate or even reverse multiple chronic diseases and disabilities as a group, instead of just one at a time.”

I’m tempted to try some quercetin, a supplement I’ve never taken.