Can aging be treated with drugs?

Alfred Russel Wallace, the British naturalist edged out by Charles Darwin as the first to introduce the world to modern evolutionary theory, also had an idea about aging. He theorized that elderly senescence was caused by the need to "weed out" the old and make more resources available for younger, reproductive-age individuals.

The idea was definitely fodder for science fiction movies, from *Soylent Green* and its use of the elderly to provide, well, resources for the young, to *Cocoon*, in which the senescent elderly became useful to another planet (once their diseases were cured). Wallace was criticized for assuming, as in Soylent Green, that the diseases of aging were an inseparable part of aging. Today, more scientists are looking at aging like the writers and directors of *Cocoon*: as a disease state that can be cured.

Outside the worlds of science fiction and evolutionary theory, medical scientists have led the way to proper treatment of the diseases that come along with aging: cardiovascular problems, type 2 diabetes, Alzheimer's disease (and other dementias), and cancer. Some have also searched in vain for a drug or other magic substance that could extend lifespan.

Testing the first anti-aging pill

On June 24, however, one group of researchers took another step toward producing the first anti-aging treatment. They met with the US Food and Drug Administration for permission to start a clinical trial. This trial, called TAME (Targeting Aging with Metformin), was set up to test a drug for aging. As in, they wanted to treat aging as a chronic disease.

Nir Barzilai, a physician and researcher at Albert Einstein College of Medicine in New York City, and his colleagues sought to test metformin, a drug already approved to treat so-called "adult" diabetes (otherwise known as type 2), on a group of elderly participants. If approved, 3,000 elderly participants with cancer, heart disease or cognitive impairment will take metformin and the researchers will monitor them to see what ultimately becomes their causes of death. This experiment, Barzilai claims, will then be able to determine if the causes of aging can indeed be removed. at least in part, from the aging process.

As for metformin, it has been used to increase sensitivity to insulin and reduce glucose production in the liver for 60 years. It also has been shown to prolong life in mice and roundworms (specifically, *C. elegans*, a worm that's been used in longevity and aging research). But the meeting with the FDA is significant, because the agency does not consider aging itself to be a disease.

Is being old an illness?

Supporters of the study of aging treatments say that they're not looking for an El Dorado, but instead want to improve "health span," as in the length of time before a person succumbs to chronic illness and death. They are seeking to remove risk of diseases that commonly afflict and impair quality of life among the elderly. But this kind of work also has its detractors, who are concerned about what they call the

“biomedicalization of aging.”

Sharon Kaufman, Janet Shim and Ann Russ of the University of California, San Francisco, divided the “biomedicalization” problem into three categories:

- More medical interventions in late life. The age of patients undergoing life-extending surgeries like angioplasty, coronary artery bypass graft, stent, and defibrillator insertion, kidney dialysis; and kidney transplant has risen dramatically. Minimally invasive techniques and other improvements have made these surgeries safer, so that now 80, even 90-year-olds are receiving and recovering from these treatments.
- It’s harder to say “no.” Things like standards or care, and routine treatments are undergoing a redefinition to include the elderly in procedures like the above (bypass surgery on a 90-year-old was unheard of 40 years ago). Researchers concerned about medicalization point to an authority relationship between doctors and patients that makes it much harder to negotiate about what care the family and elderly relative thinks appropriate.
- Who loves you, mom and dad? Because these therapies and available and encouraged, pressure is put on family members to accede. Sometimes the elderly patients themselves, initially reluctant, decide to undergo kidney dialysis or another procedure because they felt their families wanted it. Other family members have to make new decisions, such as whether to donate a kidney to a parent.

The questions that arise, then, is not whether we should find treatments for heart disease, kidney failure or Alzheimer’s, but where to draw the line between disease and aging. Could a drug like metformin, rapamycin, or another chemical investigated for its “anti-aging” abilities, remove the need for a bypass operation in anybody? And, if so, what will we die of?

What we know about getting old

Meanwhile, the science of aging continues to evolve. Geneticists have found several genes that seem to affect longevity (in roundworms, rodents and even humans), including target of rapamycin (TOR), Insulin growth factor (IGF), protein kinase A (PKA) and silent information regulator 2 (SIR2). Mutations in these genetic pathways have been identified in 100-year-olds, and appear to fend of diseases of aging in other animals.

Still other studies look at cultural attitudes toward life, death, and growing old. A Canadian study recently traced how older people were reaching out more to complementary and alternative medicine (CAM), as a way around traditional treatments associated with advancing age. And a group of Swiss researchers showed how a certain “senior coolness,” or change in attitude toward the dignities and indignities of old age, could make a difference in how that age was experienced.

Nikolas Rose, a professor at the London School of Economics, wrote in Lancet that medicalization, the extension of medical practice and science beyond simple treatment of illness, is here to stay:

> Nowadays, there are many examples of such extension of medical expertise to the management of life itself, from new reproductive technologies, through hormone replacement

therapy and treatment for age-related sexual dysfunction, to psychopharmaceutical attempts to modify mood, emotion, and volition. The division of the natural and the cultural has ceased to do useful analytical work. Medicine has helped make us thoroughly artificial.

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