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Seeking Elixir of Life, a Scientist Studies Fruit Flies

Testing cinnamon and other common substances to see if they extend life and health

By **ANGELA CHEN**

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A research lab at a University of California campus has a big ambition—to extend the number of years people live disease-free. The animal model it uses for its experiments is decidedly smaller: the tiny fruit fly.

The Jafari Lab, located at UC Irvine, has run tests on substances as diverse as green tea, cinnamon and an Arctic plant called *Rhodiola rosea*, looking for an elixir of life. To pass muster, each experimental compound must help the fruit flies live longer and not have adverse effects.

The researchers are currently investigating the effects of cinnamon on lifespan. The spice passed the first test: A 25-milligram dose resulted in fruit flies living up to 37% longer. But to be declared a success, the lab is putting cinnamon through three additional tests—does it harm reproductive ability and locomotion and what impact does it have on cognitive capacities such as memory.

“When you look at how we think about aging, we don’t really consider it a disease—it’s just considered a ‘natural’ thing. But I think aging and lifespan research really should be the future of medicine,” says Mahtab Jafari, an associate professor of pharmaceutical sciences at UC Irvine for whom the lab is named.

Fruit flies, or *Drosophila melanogaster*, are tiny insects commonly found hovering around fresh fruit. The flies are frequently used in scientific research, especially genetics. They have been studied to assess the effects of drugs for




Dr. Mahtab Jafari, facing the camera, an associate professor of pharmaceutical sciences at UC Irvine, is investigating whether cinnamon and other common substances can extend lifespan. Her creature of choice for her experiments: the tiny fruit fly. Here, Dr. Jafari, and Sally Pham, a senior in pharmaceutical sciences, separate male and female flies. *PHOTO: DR. VOLKAN COSKUN*

several diseases, including Parkinson's, Huntington's, Alzheimer's, diabetes and cancer.

Dr. Jafari says fruit flies are ideal for her research. They are small and cheap and have short lifespans that make it easy to observe the effects of a treatment on successive generations. What's more, 70% of the genes that cause disease in humans are also found in the fruit fly, she says.

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Tests so far show cinnamon has no adverse effect on reproduction, and locomotion was improved—flies given the spice were able to climb the wall of a vial almost 30% faster than a control group. To test cognition, the researchers will record how long it takes groups of flies to walk through mazes to find food.

“We shouldn’t just be focused on extending lifespan, but also the quality of life, so it’s important to make sure that any compounds that might be helpful don’t have other bad side effects,” Dr. Jafari says.

Cinnamon has been found in previous research to have various healthful properties for people—it appears to help regulate insulin levels in people with prediabetes, for example—but there is no evidence it could help people live

longer, Dr. Jafari says. She hopes her research will shed light on how the substance works in the body to create those positive effects.

One substance that has passed all the lab's tests is *Rhodiola rosea*, which has long been used in Russian and Chinese folk medicine to treat fatigue and prevent altitude sickness, Dr. Jafari says. She is now pursuing a grant to further study Rhodiola in mice, which have even more in common genetically with humans than do fruit flies. She also hopes to get a grant to administer the plant to a group of nonagenarians to see how it affects cognition.

Another substance tested—nutrients in green tea called polyphenols—resulted in fruit flies living longer. But when the researchers ran another test, they found the polyphenols, administered in large doses, had harmful effects on the insects' reproduction and early development. That finding, recently reported in the *Journal of Functional Foods*, resulted in Dr. Jafari's lab discarding green tea as a candidate for its research.

Fruit flies also figured in research at King's College London to identify a gene that could be linked to Parkinson's disease. The researchers, led by senior lecturer Joseph Bateman, damaged nerve cells in the flies' mitochondria to mimic the effect of Parkinson's. They then genetically "switched off" a gene called HIF-alpha, which is responsible for regulating some of those nerve cells. When HIF-alpha was blocked, the fly began to move more normally again.

"The fly model enabled us to identify HIF-alpha, which is present in both humans and flies, has been studied in many other contexts and is quite a well understood gene," Dr. Bateman says. He says that HIF-alpha might be a potential target for gene therapies for Parkinson's, and that his team is now hoping to replicate the research on animal models.

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