

Saffron offers protection from liver cancer

As a recipe ingredient, saffron's golden color and bright flavor and aroma make it one of the world's most popular seasoning agents. It's also one of the costliest, collected from the stigmas and style of the flowering plant *Crocus sativus*, which is native to southwest Asia. In addition to its culinary qualifications, saffron has long been attributed medicinal properties as well. These include antioxidant, anticancer, anti-inflammatory, antidepressant, antihistamine and memory-boosting effects. Modern research has provided scientific evidence to support several of these curative assets, and particular attention has been given recently to saffron's anticancer abilities. Studies have confirmed that saffron can interfere with cancer during initiation and progression and that it has antitumorigenic and proapoptotic activity. Now, a group led by Amr Amin (United Arab Emirates University, Al Ain), including colleagues at Tawam Hospital (Al Ain, United Arab Emirates) and Cairo University (Egypt), reports that saffron can prevent hepatocellular carcinoma (HCC) in a rat model of the disease.

HCC ranks fifth in incidence and third in mortality among cancers worldwide. It can be caused by infection with hepatitis B or C or by exposure to environmental carcinogens, among other triggers. It can be modeled for research purposes in rats by exposing them to diethylnitrosamine (DEN), a relatively common environmental carcinogen. Because treatment options for HCC are very limited, research has focused on strategies to prevent its development.

In Amin's study, rats were exposed to DEN and to various concentrations of saffron extract, and development of HCC was monitored (*Hepatology* 54, 857–867; 2011). Rats that received saffron had significantly fewer liver nodules than untreated rats, with those receiving the highest saffron doses showing complete inhibition of nodule development. Saffron-treated rats also had lower concentrations of proteins that indicate liver damage, lower levels of cellular markers of cancer development and progression, and greater numbers of apoptotic cells in the liver. Saffron seemed to inhibit proliferation, upregulate apoptosis



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and have antioxidant and anti-inflammatory effects in DEN-exposed rats, all leading to protection against HCC carcinogenesis.

“With limited treatment options, approaches that prevent cancer development are among the best strategies to protect against the disease,” said Amin in a press release. He continued, “Our findings suggest that saffron provides an anticancer protective effect by promoting cell death (apoptosis), inhibiting proliferation of cancerous cells, and blocking inflammation. Further investigation of saffron extract and its mechanism of action in HCC is currently underway.”

Monica Harrington

STRESSED PARTNERS SHORTEN LIVES OF THEIR MATES

It has long been known that prolonged exposure to high levels of stress can be damaging to one's health and may even lead to a shortened lifespan. Furthermore, exposure to high levels of stress early in life can predispose the brain to be more sensitive to stress in the future, setting up a lifelong pattern of heightened stress responses.

Now, researchers show that early life stress harms not only the longevity of the individual who experiences it, but that of the individual's mate as well. Karen A. Spencer and colleagues at the University of Glasgow (UK) mimicked a high-stress childhood in zebra finches by giving them corticosterone (CORT), the stress response hormone, when they were nestlings (*Proc. R. Soc. B* doi:10.1098/rspb.2011.1291; published online 17 August 2011). They then paired both 'stressed' and 'non-stressed' birds with breeding partners of either the same or opposite treatment.

As predicted, birds who had received CORT as nestlings were more likely to have a shortened lifespan. Surprisingly, non-stressed birds paired with partners that had received CORT early in life were also far more likely to die within three years. Conversely, CORT-exposed birds' longevity was not enhanced by being paired with a non-stressed mate. Birds that both had experienced early life stress themselves and were paired with stress-exposed partners had an even higher likelihood of reduced lifespan than birds in all other conditions.

This study suggests that the shortened lifespan that results from stress in early life can be transmitted between partners. Pat Monaghan, first author of the study, tells *Science News*, “It's like giving them a disease.” The observed differences in longevity continued long after the birds were no longer housed with their breeding partners but rather in single-sex groups.

The authors suggest that this effect was caused by an inability of the CORT-exposed birds to participate in 'social buffering', a phenomenon in which the presence of a familiar partner reduces stress responsiveness by increasing levels of the bonding hormone. Social buffering is particularly important in zebra finches, which form strong pair bonds.

Interestingly, it has previously been shown that zebra finches exposed to stress early in life are discriminated against during the mating process. Breeding capacity and reproductive success were unaffected by early treatment with CORT. It therefore seems likely that this discrimination may have evolved as a means of preventing exposure to the increased risk of shortened lifespan that comes with a stress-exposed breeding partner.

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