Researchers find melanoma not caused by early UVA light exposure

May 4 2010

Early life exposure to ultraviolet A light does not cause melanoma in a fish model that previously made that connection, scientists from The University of Texas MD Anderson Cancer Center reported today in the online Early Edition of the *Proceedings of the National Academy of Sciences*.

UVA exposure is unlikely to have contributed to the rise in the incidence of melanoma over the past 30 years, the researchers conclude, because the fish model had been the only animal model to indicate a connection between exposure to UVA at a young age and later development of melanoma.

"Our data refute the only direct evidence that UVA causes melanoma, which is not to say that UVA is harmless," said the study's lead author David Mitchell, Ph.D., professor in M. D. Anderson's Department of Carcinogenesis located at its Science Park - Research Division in Smithville, Texas. "UVA is just not as dangerous as we thought because it doesn't cause melanoma."

UVA is a carcinogen responsible for squamous cell carcinomas that also causes premature aging of the skin and suppresses the immune system. It's also possible, the authors note, that long-term chronic exposure to UVA can hasten the progression to malignancy of melanocytes in the skin that are already on the path to becoming melanoma.

Mitchell and colleagues tested the effects of UVA and ultraviolet B

(UVB) light exposure in melanoma-prone fish hybrids that develop the disease spontaneously 15-20 percent of the time without exposure to UV light.

The scientists exposed a hybrid form of the genus Xiphophorus, more commonly known as platyfishes and swordtails, to either UVA or UVB daily between their fifth and 10th day of life. The fish were then scored for melanoma 14 months after exposure.

"We found that UVB exposure induced melanoma in 43 percent of the 194 treated fish, a much higher rate than the 18.5 percent incidence in the control group that received no UV exposure," Mitchell said. This was expected because UVB exposure at an early age is a well-established cause of melanoma.

Only 12.4 percent of 282 fish exposed to UVA developed the disease, which is not statistically different from the control group.

An influential 1993 study using the same hybrid fish connected UVA exposure to melanoma. Until that study, Mitchell said, sunscreens protected only against UVB exposure, which was of immediate public health concern because UVA makes up 90 percent of the ultraviolet light spectrum of sunlight.

"The thought was that people who used sunscreen stayed out in the sun longer, absorbing a higher dose of UVA, causing a higher risk for melanoma" Mitchell said. Most sunscreens now protect against UVA. However, the increase in the incidence of melanoma has been thought to be partly attributable to childhood exposure to UVA back when sunscreens blocked only UVB. That's unlikely, given the new results, Mitchell said.

The 1993 experiment could not be replicated in mammalian models of

melanoma, Mitchell said, and a statistical retrospective of the 1993 paper indicated problems with sample sizes that were too small to yield a definitive answer on UVA exposure.

So, Mitchell and colleagues conducted the experiment again, with much larger sample sizes that provided the statistical power to reach stronger conclusions.

They also stratified the melanomas found in each group by severity, with the control and UVB-exposed fish having a higher incidence of severe, stage IV disease, while those exposed to UVA had significantly more early stage melanomas.

UVB exposure damages DNA directly, while UVA is thought to inflict its damage indirectly by inducing melanin free radicals that react with DNA to form oxidative damage that leads to melanoma. Previous studies had shown a correlation between melanin radical formation and melanoma in the UVA range of the solar spectrum. Since Mitchell and colleagues found no connection between UVA and melanoma, they note that the role of melanin free radicals in this disease is brought into question.

Provided by University of Texas M. D. Anderson Cancer Center