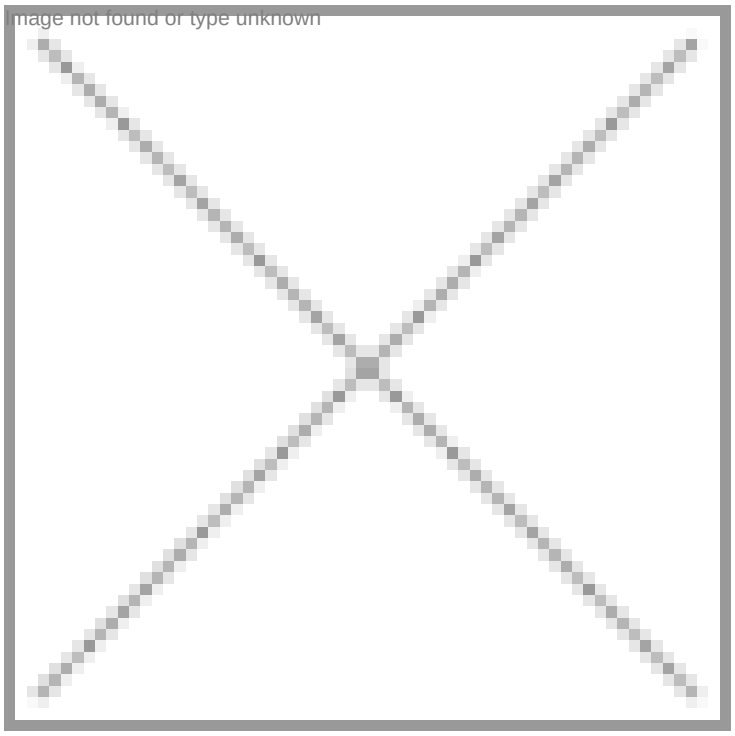
BioSpectrum the business of Bio & Health Sciences

Life-saving drug developed from fish oil

13 July 2004 | News



Life-saving drug developed from fish oil

Recent studies have shown that squalene, found in the liver oil of some species of marine sharks, can prevent the formation of cancer cells and suppress the formation of tumor cells. Besides, it also strengthens the human immune system.

Scientists at the Cochin-based Central Institute of Fisheries Technology (CIFT) have developed a technology for the separation of squalene from shark liver oil, which can be used as a life-saving drug. Dr K Devadasan, Director, CIFT, said that the product developed for the first time in the country has been approved by the drugs department of the Union Government as a medicine. The separation technology facilitates the isolation of squalene from liver oil and its purification to achieve 99.5 percent purity level. The technology is now being passed on to the pharmaceutical industry for commercial exploitation. Squalene, which is a natural combatant for virus, bacteria and fungal infections, is a highly unsaturated hydrocarbon found in the liver oil of some species of deep-sea sharks. One of the species Centrophorus scalpratus is found in abundance in the Indian Ocean, especially off the Andaman and Nicobar islands. When used as a dietary supplement, the drug helps normalize cholesterol level even in individuals who consume excess of fatty foods.

CyberMedia News

Biochip to serve as artificial retina

A new biochip promises to serve as both a prosthetic retina for people who suffer from age-related macular degeneration and

as a drug-delivery system that could treat conditions such as Parkinson's disease.

Researchers at the US-based Stanford University School of Medicine developed a prototype for a new kind of implantable chip, which uses minute amounts of chemicals to stimulate nerves. As nerve cells normally communicate with each other by releasing chemicals known as neurotransmitters, the new device points to a more effective way of treating very delicate tissues, such as those in the eye and in the brain.

Harvey A Fishman, director, Stanford Ophthalmic Tissue Engineering Laboratory, along with an interdisciplinary team of colleagues built a computer chip with four tiny openings and used it to control the environment of neuron-like cells. The chip exuded droplets of chemicals using electro osmosis. They then gauged the cells' responses using fluorescent dye. The chip also withdraws fluid when needed, which could prevent a potentially toxic buildup of the chemicals.

Although the chip has many potential applications, both in medicine and research, the Stanford team is mainly concerned with devising a treatment for age-related macular degeneration, a condition that is the most common cause of blindness. In about 80 percent of those patients, some underlying cells remain alive although the cover layer has degraded, and they could potentially be treated with tissue transplants. For the remaining 20 percent of patients, however, a chip implanted on the retina could prove to be the best option. Rather than just four openings, such a chip would have thousands, each filling in for a lost light-sensitive cell that could then relay visual signals to the brain.

As the chip can draw droplets of fluid in as well as out, it could also enable researchers to take samples in real time, giving them a chemical picture of what goes on in living tissues during certain processes. And it could deliver small amounts of drugs precisely where they are needed, such as dopamine in the brains of patients with Parkinson's disease.

However, the device is still several years away from clinical trials. Before that, scientists need to look into the important aspects as to how these chips interact with the body, its biocompatibility, clogging of micro channels and so forth.

Source: Stanford University

Viruses mutate to escape innate immunity too

The scientific study on viral immunity is emerging with new concepts. Latest research findings indicate that viruses undergo mutations in the course of a single infection and these mutants escape immune control as a result of selection pressure. A group of researchers led by Wayne M Yokoyama of the US-based Howard Hughes Medical Institute found that the mouse version of cytomegalovirus (MCMV) is capable of mutating to evade Natural Killer (NK) cells-the first line of immune defense. Significantly, this study was the first example of a virus mutating to escape innate immunity.

NK cells are major weapons of the innate immune system, the component of the immune system that attacks infections first. This more generalized component of the immune system quickly springs into action to knock down infections. In the process, it provides time for the immune system's more specific second line of defense, known as acquired immunity, which must adapt and proliferate to target a particular invading virus or microorganism.

Although viral mutations have been known in some cases like HIV but they allowed the virus to circumvent the acquired immunity only. Also, previous studies suggested that only RNA viruses underwent mutation and escaped, rather than DNA viruses like CMV, whose replication is believed to be less prone to rapid mutation.

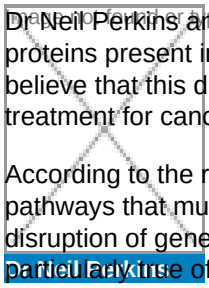
The scientists showed that in the normal course MCMV makes a protein called m157. The presence of this viral protein on the surface of an infected cell allows NK cells to recognize and destroy it. The subsequent experiments and analysis of the researchers revealed that some percentage of the virus eventually overcame the innate immunity of the mice after having developed mutations in the gene for m157 that rendered the virus essentially "invisible" to NK cells. They also found that there were different m157 mutations in different mice, suggesting that mutations were independently developing in each infected mouse, allowing the viruses to escape detection by NK cells.

The discovery may help explain why people with AIDS or others with compromised immunity may suffer severe infections from viruses that they would otherwise defeat. Yokoyama and his colleagues now seek to extrapolate their findings to human CMV to determine whether the virus is undergoing the same type of mutation to evade the innate immune system. Such findings in humans, he said, could lead to new treatment strategies to combat viral infections.

Source: Howard Hughes Medical Institute

Proteins promote and prevent cancer

Cancer researchers at the Scotland-based Dundee University have found that a group of proteins previously believed to cause cancer can also be used in the fight against the disease.



Dr Neil Perkins and his team in the School of Life Sciences at the Dundee University have shown that NF-kappaB, a group of proteins present in every cell in the human body, can assist some cancer therapies such as chemo and radiotherapy. They believe that this discovery will allow clinicians to predict more accurately how tumors will respond to cancer therapy improving treatment for cancer patients.

According to the researchers, specific control of gene expression requires a balance between positive and negative acting pathways that must be correctly integrated for normal cellular function. And many diseases ultimately result from the disruption of gene expression through the inappropriate activation or inhibition of specific transcription factors. This is particularly true of the mechanisms leading to cancer where many of the processes underlying tumourigenesis have been found to result from mutation or constitutive activation/repression of the transcription factors that regulate cellular proliferation and programmed cell death.

This discovery was made in a laboratory with cell culture. Neil and his team are presently investigating mechanisms of transcriptional regulation in vivo. They aim to characterize these regulatory mechanisms both functionally and biochemically as well as develop reagents to assess their significance at the cellular level and determine their potential as targets for the treatment of cancer and inflammatory diseases.

Source: Dundee University