

# New View of Asthma Cause

A newly recognized type of immune cell may play an important role in causing asthma, perhaps explaining why current therapies sometimes fail, reports sciencedaily.com.

These immune cells, known as natural-killer T cells (NKT cells), were found to be abundant in the lungs of patients with asthma, but virtually absent in the lungs of healthy people, supporting recent findings in mice showing a direct causative role for NKT cells.

In 2003, Umetsu and co-investigator Omid Akbari, PhD, both then at Stanford University, showed in Nature Medicine that activation of NKT cells is

required for the development of asthma in mice: Mice that lacked NKT cells did not develop airway hyperactivity, a cardinal feature of asthma. And this year, they went on to show that NKT-cell activation alone is sufficient to cause asthma in mice, even when Th2 cells are completely absent.

Umetsu and Akbari believe that NKT cells may have been mistaken for conventional Th2 cells in the past because they carry many of the same molecular markers. Since NKT cells constitute only 0.1 percent of circulating white blood cells, they were easy to miss; only recently have researchers had the techniques to be able

to isolate and study them.

Th2 cells are part of the adaptive immune system, which requires exposure to antigens before a response can be mounted. They are thought to work through other cells to cause asthma. In contrast, NKT cells are part of the innate immune system, which is inborn and ready to respond rapidly to external threats. In the February PNAS study, activation of NKT cells induced asthma independently of eosinophils and B cells.

"NKT cells are the 'BMWs' of the immune system," says Akbari. "They can produce cytokines very rapidly and directly cause asthma."

# Did Earth Seed Life Elsewhere?

Earthly bacteria could have reached distant planets and moons after being flung into space by massive meteorite impacts, scientists suggest.

The proposal neatly reverses the panspermia theory, which suggests that life on Earth was seeded by microbes on comets or meteorites from elsewhere, nature.com writes.

Both theories envision life spreading through the Solar System in much the same way that germs race around a crowded classroom



A giant collision into the Earth could fling life out to other planets.

## Tragic Drug Trial

Researchers are trying to explain how a prototype drug that manipulates the immune system triggered devastating side effects in a British clinical trial.

The trial shot into headlines last week when all six patients who took an experimental antibody fell rapidly and severely ill. Such an extreme reaction among so many trial participants is extremely rare. The UK medical products regulatory agency swiftly halted the trial and launched an investigation.

According to nature.com, it is not clear whether the problem is due to a manufacturing error, contamination or the wrong dosage. It is also possible that this first trial in humans simply shows we are affected by the drug in a way that animals are not.

The drug, an antibody called TGN1412, is being developed by German company TeGenero with the aim of directing the immune system to

fight cancer cells, or calm joints inflamed by rheumatoid arthritis. The antibody binds to a receptor molecule called CD28 on the surface of the immune system's infection-fighting T cells.

The immediate focus of researchers is on helping the patients, who are suffering multiple organ failure. But scientists note that the trial illustrates how incredibly potent some immune-altering agents can be. Some say that TGN1412, or drugs like it, might still find a use in medicine, if researchers can learn how to harness and direct its power.

There are several possible ways that the drug could have triggered multiple organ failure. It may have stimulated T cells so much that they released an overwhelming flood of inflammatory molecules called cytokines. Or perhaps wayward T cells launched an attack on the body's own tissues, ignoring the safety mechanisms that normally keep this in check.

## Scaly Dino Find Complicates Feather Evolution

Paleontologists working in the same area of Germany yielded a new small theropod dinosaur. The newly complete specimen - dubbed Juravenator starki - is one of just a few known fossils representing this group, which ultimately gave rise to modern birds, explains sciencemag.com.

Indeed, it joins just two partial skeletons of another genus as the only European examples of the tiny carnivores. Unlike the other two specimens, however, it lacks any sign of feathers, complicating what researchers thought they knew about feather evolution.

The Juravenator skeleton measures just 25 inches from snout to tail, with much of that length in the tail itself. Strong scarring and pitting of its bones mark it as a juvenile, however, and adults may have grown another



A new small theropod dinosaur, dubbed Juravenator starki, has been recently discovered in Germany.

six inches. Armed with roughly 151 million years ago in the Late Jurassic period.

## Mood Affects People Differently

The effect of mood on how people process information changes greatly as they age, suggests new research from the Georgia Institute of Technology.

Researchers from Georgia Tech's School of Psychology's Adult Development lab examined how younger and older adults who were induced into a positive or negative mood interpreted the actions of others. They found that older adults who were induced into a negative mood were more likely than younger adults to attribute the actions of an individual to that person alone, rather than considering that situational factors may be affecting their actions. This correspondence bias suggests

that, when in a negative mood, older adults are more internally focused on maintaining an emotionally satisfying experience and thus have difficulty processing external information.

"It may be the case that older adults in a negative mood state are more motivated to downgrade their negative emotions and, thus, not allocate enough processing time to focus on the details of the situation. So this needs to be taken into consideration when imparting information to older adults," Fredda Blanchard-Fields, professor in Georgia Tech's School of Psychology, told sciencedaily.com.

One situation where this knowledge might be useful is when a doctor has to tell a patient

they have a serious illness. "You want to give them time to deal with the fact that they have the illness, to deal with the emotions before you have them make a decision on how to treat it," she said.

That's very different from the way young people handle information. When in a negative mood, young adults were more likely to consider situational factors when assessing an individual's behavior, the study found. Younger adults may not have the same motivational tendencies and thus can tolerate negative emotions more easily and focus on the details of the task. This suggests that they are more externally focused when in a negative mood.

## Cancer Cells Lose Drug Resistance

Drug-resistant tumor cells lose their drug resistance when exposed to low intensity, low frequency electric pulses for three days. A study reveals that treating drug-resistant tumor cells with electric pulses in vitro restores the cells' ability to take up the anti-cancer drug doxorubicin.

According to sciencedaily.com, the research group led by Luca Cucullo and Damir Janigro from the Cleveland Clinic Lerner College of Medicine, Ohio, USA exposed rat and human tumor cells to very low intensity (7.5 microamps) 50 Hertz alternating current pulses, with a ten-second interval, for three days in vitro. Such electrical stimulation is known not to damage cells but to decrease the proliferation of tumor cells. The tumor cell lines used over-express the MDR1 protein, which makes them resistant to anti-cancer drugs such as doxorubicin. Following the three days of electrical stimulation, the cells were exposed to increasing concentrations of doxorubicin for three hours.

The results show that electrical stimulation led to an increased uptake of doxorubicin, which caused the cells to die, even at low doxorubicin concentrations. Exposing the cells to an electric current was more effective than treating the cells with an MDR1 inhibitor. These findings suggest the potential application of electrical stimulation to improve the efficacy of existing chemotherapeutic treatments.

## Space Probe Supports Dark Universe

Researchers have released the first data in three years from a NASA satellite that is mapping the faint afterglow of the Big Bang. The much anticipated results support the idea that our Universe contains a good chunk of 'dark' material, and fits the theory that it expanded rapidly in its first moments.

The Wilkinson Microwave Anisotropy Probe (WMAP) was launched in 2001 to study the radiation left behind when the energy of the Big Bang condensed into matter. This happened about 400,000 years after the Universe was born and so the radiation, known as the cosmic microwave background, bears the imprint of the baby Universe's structure.

According to space.com, the results support the strange theory that we live in a Universe dominated by invisible dark matter and dark energy, a force that drives space to expand.

The project has also revealed the first all-sky maps of the polarization of the microwave background, which provide information about the Universe's first stars and about the rapid expansion of space-time immediately after the Big Bang.

The satellite produced a full-sky map of temperature fluctuations in the background, and astronomers used it to deduce details of the Universe's age, shape and composition. Since then, the WMAP team has been working on an analysis that comprises the original data and two further years of observation.

The team says that the age of the Universe (13.7 billion years old) can now be calculated to within 60 million years rather than 200 million. And there are stronger hints than in 2003 that the Universe did indeed inflate rapidly at its birth.

## Ultra-Fierce DoS Computers Vulnerable

A shattering new form of the 'denial-of-service' computer attack could be on the rise, according to a company that controls some of the internet's core infrastructure.

According to news scientist.com, in a conventional DoS attack, computers are used to send an overwhelming amount of data to a target machine, disguised as legitimate network traffic. This barrage prevents genuine messages from reaching the target and can even cause its servers to crash. Such attacks are sometimes used to extort money from commercial websites that depend on being online to operate.

The new DoS variant hijacks a key part of the internet's address system - the Domain Name System (DNS) - to amplify an attack and make it harder to defeat. DNS servers act as a directory

service for internet users, so their data requests are routed to the correct destination.

To initiate the new type of attack, a message is sent to a DNS server with a forged return address, matching that of the target computer. The DNS server processes this as a valid request and "returns" the results to the target.

The return contain much more information than the initial request, meaning a few thousand forged messages can result in gigabytes of information being sent to the target. In this way the torrent of data the target computer has to deal with is much greater than if it had been attacked directly.

Experts say DNS servers can be reconfigured not to allow such requests to be used, but a recent survey found that 80 percent of DNS servers are vulnerable.

## Holey Fiber

Fiber optic cables used to be simple: just long, thin glass strands for light to travel down. But now chemists have discovered a method to grow thin wires of metal inside them. This could revolutionize optical electronics by making all-in-one devices within a single optical fiber, writes sciencemag.com.

In 1996, researchers discovered that by adding long, tiny tunnels - called holes or pores - that run the length of the fiber, they could modify the prop-

erties of the light. Holey fibers have yet more potential; the pores can be lined with useful materials, such as semiconductors. At first, researchers assumed that it would be difficult to coat the 1-micron-wide holes without clogging them.

They baked holey optical fibers in a 500 degree Celsius furnace while forcing a hot gas of germanium hydride through the pores. The high temperature and pressure allowed solid germanium to crystallize along

the walls of the pores. These germanium wires still had a tiny central hole just a few tens of nanometers wide running through their middles that allowed light to pass. But they could arrange the wires in such a way that light passing through generated a current. They have already built a simple transistor within a fiber using the technique, and they predict that eventually optical fibers will contain the whole host of basic electronic devices.

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