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Department of Pharmacy

PHARMA HIGHLIGHTS

ISSUE 54 | MARCH 2019

Vaccination Helps Prevent Diabetes

According to a new study by researchers in Melbourne, a drop in the number of young children diagnosed with type I diabetes could be associated with the introduction of routine rotavirus vaccination of Australian infants. The researchers investigated the number of Australian children diagnosed with type I diabetes from 2000 to 2015 and found that type I diabetes diagnoses in children aged 0-4 years declined from 2007.

This is the first time the rate of type I diabetes in young children in Australia has fallen since the 1980s. While not conclusively linking the rotavirus vaccine with protection against type I diabetes, the discovery builds on earlier research suggesting that natural rotavirus infection may be a risk factor for type I diabetes.

This decrease in type I diabetes that was detected in these young children after 2007 was not observed in older children aged 5-14. This suggests that the young children could have been exposed to a protective factor that didn't impact older children. This decrease coincided with the introduction of the oral rotavirus vaccine onto the Australian National Immunisation Program. The rotavirus vaccine is routinely given to Australian infants aged 2 and four months to protect them against a severe, potentially life-threatening form of diarrhea.

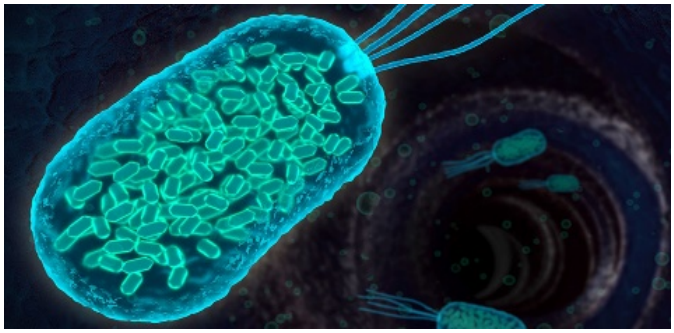
Professor Len Harrison said the discovery followed on from earlier research implicating rotavirus infection in the development of type I diabetes. Subsequent studies in laboratory models suggested rotavirus infection of pancreatic cells can trigger an immune attack against the insulin-producing cells similar to what occurs in type I diabetes.

While not conclusive, this study suggests that preventing rotavirus infection in Australian infants by vaccination may also reduce their risk of type I diabetes. The researchers will be continuing this research to look more closely at the correlation, by comparing the health records of young children with and without type I diabetes.

Source: Science Daily, JAMA Pediatrics

Bacteria and an Immune Molecule Influence Preterm Birth

The World Health Organization notes that spontaneous preterm birth (sPTB) is a major factor in infant death. Researchers have been looking for various ways to identify women at risk of sPTB and treatments to reduce it. Now researchers have shown that the microbes and immune molecules in the cervix and birth canal impacts the risk of sPTB. This research may have critical implications for women and babies. The findings can help physicians identify who is at risk of preterm birth and prevent it from happening. The study, also outlines a strategy for classifying bacteria as protective or harmful.



Here, 2,000 pregnant women donated vaginal swabs at different times during their pregnancies, and the researchers identified the microbes in the 'cervicovaginal microbiota' of these women. They found that seven bacteria were connected to an increase in the risk of sPTB, and that influence was stronger in African-American women. The researchers also observed that an antimicrobial molecule that is part of our immune system, peptide β-defensin-2, reduced the microbiota-associated sPTB, based on ethnicity.

Babies that get through a preterm birth, face a host of other problems including an increased risk of vision loss, intellectual delays, and breathing problems. The ramifications of preterm birth are thought to cost $26 billion per year in the United States, according to estimates by the National Academy of Sciences.

The study opens up new therapeutic avenues that can reduce the number of preterm births.

Source: AAAS/Eurekalert! via UMSOM, Penn Medicine, Nature Communications

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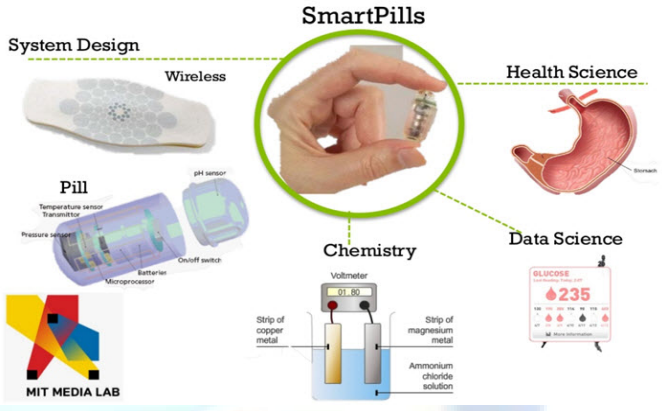
Ingestible Device Takes Vitals for Remote Analysis

The Massachusetts Institute of Technology's (MIT) ingestible electronic device suggests that the doctors of the future may be able to take patients vital signs remotely by having them swallow an ingestible electronic device that measures heart rate and breathing rate whilst it's in the gastrointestinal tract. The researchers expect that the device would remain in the digestive tract for only a day or two, so for longer-term monitoring, patients would swallow new capsules as needed.

In tests along the GI tract of pigs, the researchers found that the device could accurately pick up heart rate and respiratory rate, even when conditions such as the amount of food being digested were varied.

The new sensor, which is about the size of an almond, calculates heart and breathing rates from the distinctive sound waves produced by the heart beat and the inhalation and exhalation of the lungs. The device is built from FDA approved materials and is safe for ingestion.

After identifying components that could be ingested, researchers designed the device using tiny microphones that are used as listening devices to translate these acoustic data into heart and breathing



rates. The researchers also had to devise signal processing systems that distinguished the sounds produced by the heart and lungs from each other, as well as from background noise produced by the digestive tract and other parts of the body.

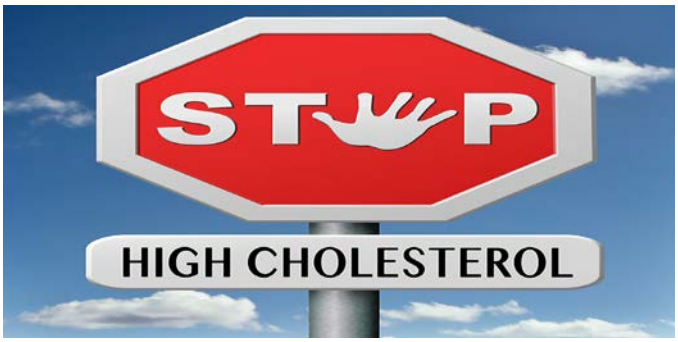
Taking vitals remotely using this type of sensor may be useful for patients whom touching wouldn't be ideal, such as, trauma patients, soldiers in battle, long-term evaluation of patients with chronic illnesses, the researchers say. In the future, the researchers plan to design sensors that could diagnose heart conditions such as arrhythmias, or breathing problems including emphysema or asthma.

Source: Case Western Reserve University, Journal of Physiology

Investigational Drug Reverses High Cholesterol and Non-Alcoholic Fatty Liver Disease

The progress of high cholesterol and nonalcoholic fatty liver disease is associated with an enzyme inhibitor in humans which was recently discovered by a novel molecular pathway. TM5614 was reported in a new research study to obstruct the actions of a multifunctional protein in the body known as plasminogen activator inhibitor 1, or PAI-1. The prospect of whether blocking PAI-1 could reverse diet-induced obesity and its related health problems were the important concern for the researchers. High blood levels of PAI-1 is a hallmark of obesity, type II diabetes and metabolic syndrome, a cluster of risk factors for obesity-related diseases. The study was conducted based on findings that individuals who inherited a loss-of-function mutation in the gene that codes for PAI-1 have developed lower fasting insulin levels than those with unaffected relatives and appear protected from developing diabetes. Therefore, researchers were curious to see if blocking PAI-1 could reverse diet-induced obesity and its related health problems.

The study was conducted using mice with elevated fasting blood sugar levels, insulin and LDL ("bad" cholesterol). It was observed that mice treated with TM5614 showed a reduction in both blood sugar and LDL levels in comparison to untreated mice. Moreover, treated mice showed a "noteworthy" decrease in fatty liver disease.



Source: The Endocrine Society