Department of Pharmacy
BRAC UNIVERSITY
Inspiring Excellence
PHARMA HIGHLIGHTS
ISSUE 43 | APRIL 2018

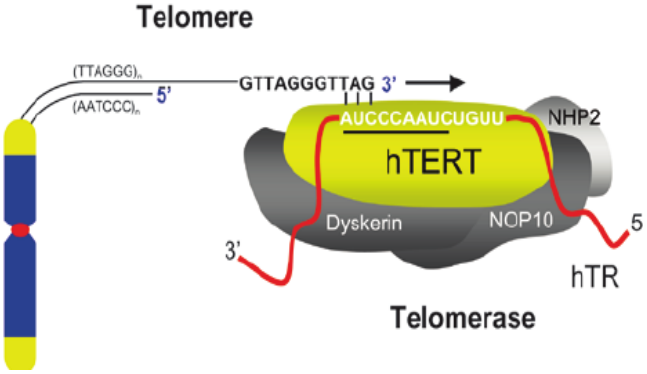
Inhibition of Cellular Telomerase Activity shows new promise in Cancer Prevention

Researchers hypothesize that the inhibition of telomerase, a DNA polymerase of special ribonucleoprotein structure responsible for maintaining genomic integrity in normal cells, could be opportunistic in reducing the ability of cancer cells to replicate. A study in April 2018 by Hajj. J, et al. found that a long non coding RNA sequence named H19 has the capability of impeding telomerase function within cells.

Cancer cells are capable of restoring telomere length via enzyme telomerase. This enzyme, which presents a challenging target for drug development, functions by adding bases to the telomeres. While this enzyme is usually always active in sperm and egg cells, the supply of telomerase becomes limited in other body cells, and therefore there is a gradual decrease in the activity and length of the enzyme with each cell division.

While telomere length is measured to be around 3000 base pairs in adults and an estimated 8000 base pairs in newborn children, its length remains fixed in tissues where cell division does not repeatedly occur. Each division that occurs in a normal cell results in the loss of about 30 to 200 base pairs, implying that cells are capable of dividing a maximum of 50 to 70 times before dying.

However, researchers have identified that there is a reactivation of telomerase in most tumour cells, which ensure that these cells maintain the adequate telomere



length needed for genetic stability and strong proliferative ability. While reactivation of telomerase alone is not enough to convey carcinogenicity to the cell, cells which preserve effective telomere lengths show indefinite growth capacity.

With research pertinent to the diagnosis, prognosis and treatment of cancer rising, scientists are focused on finding new techniques to prevent telomerase in cancer cells from replicating inordinately.

Source: Molecular Cancer, Genetic Science Learning Center, Salk

Researchers discover new bacterial resistance mechanism against peptide antibiotics

A research group from the Hong Kong University of Science and Technology (HKUST) have unveiled a mechanism by which certain bacteria obtain resistance against the class of antibiotics named non-ribosomal peptide antibiotics. This class of antibiotics includes drugs such as vancomycin, teixobactin and polymyxin, most of which possess D-amino acids and function against a broad spectrum of bacteria. The findings were published in Nature Chemical Biology.

While the overuse of antibiotics usually corresponds to the promotion of the emergence of resistant bacteria, scientists continue to identify the less familiar mechanisms by which bacteria gain resistance against certain antimicrobials. Scientists at HKUST discovered a variety of enzymes, called D-stereospecific peptidases (DRPs), which are abundant within the body's internal environment and strongly contribute to the ability of certain bacteria to negate the effects of peptide antibiotics possessing D- amino acids. Researchers have consequently warned of the dangers associated with the transfer of such resistance genes to opportunistic pathogens, owing to the broad sprectra of antibacterial resistance presented by DRPs.

According to lead author Pei-Yuan Qian, Chair Professor of the Division of Life Science, HKUST, the researchers applied the investigation across 5585 complete bacterial genome domains in order to come to the conclusion of the presence of a mechanism of resistance brought about through the hydrolytic cleaving activity of D-stereo specific peptidases. The investigation was experimentally validated utilizing gene editing tools (CRISPR/Cas9) and subsequent chemical and enzymatic analyses.

Source: AAAS/Eurekalert! Via Hong Kong University, United Nations, Nature Chemical Biology

Department of Pharmacy

BRAC UNIVERSITY
Inspiring Excellence

PHARMA HIGHLIGHTS

ISSUE 43 | APRIL 2018

AF Treatment Zaps Faulty Heart Tissue

Currently, catheter-based cardiac ablation is only recommended when all the other treatments of atrial fibrillation (AF) are poorly working. However, a new study from the University of California - Davis, indicates how a combination of cardiac ablation and medication can be beneficial as a primary treatment to early stage AF patients as well, especially in reducing the long-term possibilities of stroke and death. Cardiac ablation is a procedure which uses catheters, which are long and flexible tubes, to deliver energy to the heart. This energy is usually in the form of either heat or extreme cold. These catheters reach the heart through blood vessels in the groin, and this is what makes the procedure less invasive than other forms of heart surgery.

Although, initial studies on the safety and benefits of cardiac ablation on early AF patients produced inconsistent results, these were later attributed to the inadequate methodologies and limited population diversity. In addition to being conducted over a broader time period, the new study took into account a large population of multi-ethnic participants with similar health statuses, eliminating various variables.

Researchers studied and compared the results of two groups of four thousand diverse AF participants. One group was treated with ablation, while the other was not. After 30 days, the group who received cardiac ablation displayed a reduced occurrence of stroke and death.

Source: American Heart Association, Mayo Clinic, University of California - Davis Health System.

Nasal Brush Test for Asthma Diagnosis

Accuracy in diagnosing mild-to-moderate asthma can be difficult, as current diagnostic tools like as pulmonary function testing (PFT), are either not available or not able to distinguish between asthma and other similar respiratory diseases.
Scientists from Mount Sinai have developed a new nasal brush test that's easy, affordable, and accurate.

Machine-learning algorithms applied to genetic data obtained from nasal brush test results from people with and without asthma allowed the detection of a genetic biomarker of asthma consisting of 90 genes. This biomarker is the basis for the success of new nasal brush test and supplementary data analysis to differentiate asthma from other respiratory disorders, such as allergic rhinitis, upper respiratory infection, and cystic fibrosis.
The nasal brush test only takes seconds to collect the data and is minimally invasive. This could be of great benefit to time-strapped clinicians and other primary care providers which could greatly aid asthma diagnosis and patient outcomes through early and accurate diagnosis without the limitations of time and resources.
Scientists now plan to continue research into both the biomarker and the nasal test by conducting clinical trials. In addition, data scientist Dr. Gaurav Pandey suggested the benefits of combining computational methods and biomedical data in developing diagnostic tools.

Source: Johns Hopkins Medicine, Mount Sinai Hospital/Mount Sinai School of Medicine.