DEVELOPING NEW DRUGS

NEW TOOLS FOR FIGHTING BACTERIAL INFECTIONS

Scientists from the University of Guelph and the University of Alberta used the CLS to help visualize crucial proteins in bacterial capsules. These capsules protect the microbes from our immune system and play a role in their pathogenicity. These structures can also be a great target for treatment and prevention of disease and the creation of new vaccines or antibiotic alternatives. The team investigated key enzymes that are used in capsule formation and were able to analyze the structure in greater detail. Gaining a better understanding of these structures and enzymes allows us to design new tools to fight infections.

BREAKING DOWN WHOOPING COUGH INFECTIONS

According to the Public Health Agency of Canada, an estimated 1,000 to 3,000 people get whooping cough each year in Canada. It is extremely hard to treat, but scientists from the University of Toronto are using the CLS and may have found a new way to vaccinate for this deadly disease. One of the bacteria that cause these infections, bordetella bronchiseptica, forms a protective biofilm inside the individuals it infects, making it incredibly resistant to treatment. Researchers found that bacteria lacking the specific protein BpsB, keeps producing long sugar chains but couldn’t use them to form strong biofilms making whooping cough more vulnerable to treatment.

NEW TARGETS FOR MALARIA VACCINE

A protein molecule essential for the malaria parasite Plasmodium falciparum to go through the sexual stages of its lifecycle was the focus for scientists from SickKids in Toronto in their quest for a biomedical intervention to halt the spread of the deadly disease. Disrupting the parasite’s lifecycle could reduce infections and deaths from malaria because transmission between humans would be blocked by inhibiting parasite development in the Anopheles mosquito. People with malaria produce antibodies that bind the protein so understanding that process at a molecular level provides clues for vaccine design.

TOWARDS A BACTERIAL MENINGITIS VACCINE

Approximately 15-20 per cent of adolescents and young adults in Canada carry meningococci bacteria, the leading cause of bacterial meningitis. As a defense mechanism against the bacteria, the immune system of mammals use a form of nutritional immunity by cutting off access to zinc and preventing their colonization. Zinc plays an essential role in biological processes and thus has an important role in disease. Gram negative bacteria, like those that cause meningitis, produce a protein called ZnuD to uptake zinc more efficiently and overcome the host’s defense mechanism. Researchers from the University of Toronto and the Hospital for Sick Children identified and mapped the structure of three zinc-binding protein intermediates, providing a framework for the rational design of a ZnuD-based vaccine.

UBC SCIENTISTS INTERPRET TUBERCULOSIS STRUCTURE

Every year in Canada there are around 1600 new cases of the bacterial infection tuberculosis reported. Scientists from the University of British Columbia are researching how the bacteria grows in the lungs, to better understand how to treat it. They found that the tuberculosis bacteria can grow on cholesterol, unlike other bacteria that needs glucose to grow. The group was also able to determine the structure of the enzyme that helps the bacteria break down the cholesterol molecule. Being able to understand the structure of enzymes and how they work is a huge part in developing drugs to treat diseases like tuberculosis.

A NEW APPROACH FOR FINDING ALZHEIMER’S TREATMENTS

Researchers from McMaster University have found a new way to look for Alzheimer’s treatments, a disease that affects over 747,000 Canadians. Alzheimer’s is caused by peptides in the brain that cluster into plaques which are toxic to the surrounding tissue. The group developed a synthetic membrane to simulate these clusters: by studying how compounds speculated to help with Alzheimer’s affect peptides in the membrane, the researchers found that one compound not only reduced the size of the clusters, but also prevented them from accumulating in the first place. This development is a new way to test potential treatments and help find a method to prevent Alzheimer’s disease.

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