Stop AMR Global Media Monitor

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Summary: The Magistral Phage – A Belgian initiative

As antimicrobial resistance continues to grow, spread and kill in the environment, scientists, aside from looking for new antibiotics, are also studying a well-known group of organisms and their possible participation in our fight against AMR: viruses.

In these COVID-19 times viruses may have a negative connotation but, unlike COVID or the flu, these one do not infect humans. They are specific to bacteria and are called bacteriophages – "bacteria eaters" – and most commonly referred to as 'phages'.

Phages are considered a crucial and sustainable element in the fight against AMR. Phages evolved jointly with bacteria under a parasite-host system of interaction. The long co-evolution history made each phage deeply specialized to a particular bacteria strain. This specificity means that we need to identify which bacterium is responsible for the infection if we want to use phages efficiently. Bacteria, just like with antibiotics, can grow resistance against phages but, unlike antibiotics, phages can then mutate to infect the resistant bacteria. It has led to an unbelievable continuous "arms race of co-evolving infectivity and defence mechanism".

In 2016, the Belgian Minister of Social Affairs and Public Health recognized the lack of legislation around the use of phages in the medical domain and that more research on phages is needed while giving the possibility to patients to have access to efficient treatments. Belgium therefore has granted a special accreditation to a short-list of quality control laboratories to certify the safety of medical preparations containing "non-authorized ingredients". As too many phages naturally occur to authorize them all juridically, it was the most suitable alternative.

In conclusion, because of this new framework, Belgian researchers hope that it is only a matter of time before the legislative context and clinicals results permit the phage therapy to regain its justified place as an established antibacterial tool.

For further legislative details, please read the source article.

Source: Sciensano, the full article on which this summary is based, was originally published on 6 February 2018, in the journal "*Viruses*"

Childhood vaccination is possible solution to increasing global antibiotic resistance

Researchers at the University of Berkeley discovered that increasing vaccination in the children population can mitigate the raise of AMR around the world.
By focusing on low- and middle-income countries while comparing effectiveness of antibiotics and vaccines, they discovered that a universal vaccination policy of two common vaccines (rotavirus and pneumococcal conjugate) could prevent 40 million cases of antibiotic-treated illnesses and, in the meantime, reduce AMR spread as a significant reduction of antibiotic consumption will parallelly be observed.
The study also stated that those poorer regions of the world will suffer more in the future as antimicrobial resistance continues to increase.

Source: The Daily Californian, 3 May 2020

New antibiotic developed to fight 'superbug' lung infections could be used to treat ventilator-associated pneumonia in COVID-19 patients

A new antibiotic developed to fight 'superbug' lung infections could be used to treat ventilator-associated pneumonia in COVID-19 patients, a study has suggested. In both mice and in-vitro human cells, this drug prevents the development of potentially fatal lung infections and could be used to protect patients suffering of cystic fibrosis.
As secondary infection is one of the leading causes of death after a COVID-19 infection, this drug offers hope to drastically reduce COVID-19's deaths rates.
The powerful drug is an engineered drug, a synthetic version of naturally occurring antimicrobial proteins.
Researchers admitted that it was not their first purpose as they initially wanted to develop a more stable version of WLBU2, a protein with a high toxicity level in its natural version and non-toxic, even at high dose, in its engineered version.

Source: MailOnline, 1 May 2020

Supercomputer simulations present potential active substances against coronavirus

Multiple drugs were identified as potential candidates against COVID-19 by a supercomputer. It simulated the binding action of about 42,000 different substances to certain proteins of SARS-CoV-2 and found some compounds that could be able to prevent the infection.
In particular, compounds from 4 drugs to treat a hepatitis C viral infection were identified, probably because hepatitis C and COVID are similar in that they are both a single-stranded RNA type of virus.

in the research results now need testing in laboratory experiments and clinical studies.

Source: EurekAlert!, 5 May 2020

Discovery of bacterial enzyme activity could lead to new sugar-based drugs

The discovery of a novel bacterial enzyme activity leads the path toward new drugs. The enzyme "N-acetylgalactosamine" is capable to transform abundant betasugars into high-value and hard to produce alpha-sugars with interesting therapeutic properties.

The enzyme is found in the human gut microbiome, where it helps to degrade sugar in mucus, on which the bacteria can then feed. The mucus is composed of a complex sugar presenting interesting anti-cancerous properties and is therefore used in the most common cancer antigens. As the alpha-sugars are difficult to synthesize sufficiently for vaccines, the enzyme could be optimized for biotechnological production

"We are very excited to have discovered how this human symbiont uses so far unknown chemistry to feed on human sugars. Now that we understand the chemistry behind this mode of action, we can change the enzyme to make valuable sugars," says David Teze, interim Group Leader of Enzyme Engineering at The Novo Nordisk Foundation Center for Biosustainability (DTU Biosustain) and first-author of this publication.

Source: EurekAlert!, 4 May 2020

A close relative of SARS-CoV-2 found in bats offers more evidence it evolved naturally

Multiple hypotheses exist about the origins of SARS-CoV-2. While the scientific world believes that the virus came from bats, as a natural host, the origin is still unclear. On May 10, in an article published in the journal *Current Biology*, researchers described a new virus, RmYN02. This virus is closely related to SARS-CoV-2 in some regions of its genome and contains insertions of amino acids at the junction of the S1 and S2 subunits of the virus' spike protein in a manner like SARS-CoV-2. If RmYN02 is not directly linked to the evolution process of SARS-CoV-2, it demonstrates that the unusual insertion found inSARS-CoV-2 can naturally occur in the evolution of the coronaviruses.

As the virus was discovered in bat samples alongside another similar virus, researchers believe that sampling a larger number of wildlife species will potentially help us to discover closely related or direct ancestors ofSARS-CoV-2.

Source: EurekAlert!, 11 May 2020

Twin antibodies show neutralizing activity against SARS-CoV-2

Scientists discovered in a patient who recovered from COVID-19, a pair of neutralizing antibodies. Those antibodies, while interacting with the SARS-CoV-2 virus, inhibit its capacity to enter host cells.

Treating mice with these antibodies resulted in a reduction of virus concentration, suggesting a possible therapeutic property - in addition to informing the design of small molecule therapeutics and vaccine candidates to fight COVID-19.

Source: EurekAlert!, 13 May 2020

Gut microbiome influences ALS outcomes

A new gut-brain connection has been discovered in the amyotrophic lateral sclerosis neurodegenerative disease (ALS). Researchers discovered this association while studying mice presenting a common mutation inducing ALS. While influencing, with antibiotics or fecal transplantation, the gut microbiome, researchers enhanced in a positive or negative way the disease symptoms. Those findings provide a potential explanation of why, despite presenting the mutation, some people do not present any sign of ALS. The results pave the way toward a possible therapy and add weight to previous discoveries linking microbiome with a range of different neurological conditions.

Source: EurekAlert!, 13 May 2020

Officials report more patients in Listeria outbreak linked to cheese

At least 11 people, from which 2 have died, have been infected by Listeria after eating contaminated cheese. In Switzerland, a total of 28 cases of listeriosis have been reported since the beginning of the year, with the first patient expressing symptoms at the end of January.
The new infections were found in 5 men and 6 women, aged from 66 to 86 years old. The infection was detected in 7 regions of the country.
10 further infections are still under analysis to see if they belong to the outbreak cluster. The incriminated cheese products were recalled by the producers.

Source: Food Safety News, 14 May 2020

CARB-X awards Day Zero Diagnostics $6.2M to develop a new test that would diagnose deadly superbug infections faster and determine what antibiotic would be most effective

CARB-X awarded up to US$6.2 million to Day Zero Diagnostic. This funding will help them to develop a diagnostic system assisting physicians, in a matter of hours, to find which antibiotics are most likely to threat the bacterial infection.

This test will combine machine learning and whole-genome sequencing to identify the bacterial species and its drug-resistance profile while by-passing the growing phase of the bacterial culture. This is the innovation permitting to drastically reduce the requested time before identifying efficiently the pathogen.
Day Zero Diagnostic is also eligible for an additional $18.7 million if the project meets certain criteria during its development.

This is the 60th project funded by CARB-X since its creation, reaching a total amount of more than $220 million to support innovative antibacterial research. The Chief of Research stated about the project: “New technologies, like the diagnostic under development by Day Zero, if successful, could transform the way physicians diagnose and treat drug-resistant infections, and save lives."

Source: Carb-X, 11 May 2020

Salmon sector halves antibiotic use

The Global Salmon Initiative (GSI) published an encouraging report showing a decrease of 50 % over the course of the last seven years in antibiotic use. The CSO of the initiative expressed her excitement, saying that the reduction of antibiotics was a key priority for the initiative. Even though the decrease varies regionally, coordinated efforts, from an environmental or fish health and welfare point of view, benefit everyone. She explained that this success is mainly possible because of the strong commitment of GSI's members in improving antibiotic stewardship, disease control and best practice sharing.
The GSI report provides data across 15 key indicators and can be accessed here.

Source: The Fish Site, 11 May 2020