

## How African salmonella strains are evolving to become more dangerous

Salmonella infections are the culprit behind food poisoning outbreaks, but in sub-Saharan Africa, they often cause drug-resistant, deadly bloodstream infections and meningitis.

A study published in *Cell Host & Microbe* reveals how these so-called African nontyphoidal Salmonella (NTS) strains leave the gut and spread through the body. Loss of a bacterial gene called *ssel* has allowed the African NTS to more efficiently hijack immune cells and travel through the blood to different organs.

‘Our findings underscore that genetic changes in the bacteria, as well as the underlying susceptibility of the host population, are important for the severity of these invasive Salmonella infections in sub-Saharan Africa,’ says senior study author Denise Monack of Stanford University School of Medicine. ‘Since our work highlights the role of genetic differences in Salmonella in driving disease, this supports the need for better diagnostics and a vaccine to protect against these infections.’

While certain Salmonella strains spread throughout the body and cause typhoid fever, the vast majority stay in the gut and cause food poisoning. But in sub-Saharan Africa, NTS strains are evolving to become more like their typhoidal counterparts. NTS infections are among the most common causes of bloodstream infections in children and HIV-infected adults in this region.

These strains have spread across the continent due to the emergence of drug resistance, coupled with the immunological susceptibility of being exposed to HIV, malaria, and malnutrition.

Monack and her team identified genetic factors that differentiate the African NTS *Salmonella Typhimurium* strains from non-African strains that cause food poisoning.

The findings suggest that making *ssel* non-functional allows the bacteria to spread more efficiently from the gut to other parts of the body—ironically, by hitching a ride in immune cells whose normal function is to protect against pathogens.

The researchers are investigating other important changes and mechanisms that allow *S. Typhimurium* to cause bloodstream infections and meningitis.

## Roll Back Malaria appoints new CEO

Medicines for Malaria Venture (MMV) welcomes the appointment of Dr. Kesetebirhan Admasu, a medical doctor, public health specialist and former Minister of Health of Ethiopia, as the new CEO of the Roll Back Malaria (RBM) Partnership.

Dr. Kesete officially commenced his duties last month. He will play a critical role as the global face of the Partnership, including establishing and leading the new team and ensuring that regions and countries are empowered to address the global fight against malaria.

‘I am excited to join RBM Partnership as the CEO,’ Dr. Kesetebirhan Admasu said. ‘I look forward to working with all the RBM partners in the effort to relegate malaria into the history books.’

The RBM Partnership is the global platform, launched in 1998 by the World Health Organization (WHO), the United Nations (UN) Development Programme, UNICEF, and the World Bank,

for coordinated action against malaria. It mobilises resources and forges consensus among partners in the malaria field.

In 2015, the Partnership underwent a restructuring process to enable it to sustain and build on its successes and help deliver on the ambitious goals outlined in the WHO Global Technical Strategy and accompanying RBM Action and Investment to defeat Malaria report.

‘We are delighted to hear that Dr. Admasu has been appointed to lead the newly re-structured RBM partnership,’ said Dr. David Reddy, MMV’s CEO and member of RBM’s Board of Directors. ‘His appointment comes at an important time on the path to defeating malaria. We are 10 years on from the call for eradication and while we have seen much progress since then, much remains to be done. MMV looks forward to working closely with Dr. Admasu and the RBM team to contribute to the global malaria eradication goals.’

## East African region gets US\$18 million funding to fight HIV

Kenya, Uganda and Tanzania are among 13 African countries that will receive US\$55 million from the Global Fund to fight HIV/AIDS, among adolescent girls and young women.

Tanzania will get \$8 million while Kenya and Uganda will receive \$5 million each, leaving the rest to the other countries, namely Botswana, Cameroon, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe.

‘We are at a pivotal moment for women and girls everywhere,’ said Heather Doyle, senior technical advisor on gender at the Global Fund,’ added Dr. Doyle.

The Global Fund’s strategy embraces the UNAIDS Fast-Track target that by 2020, 90% of women and girls will live free from gender inequality and gender-based violence, mitigating the risk and impact of HIV.

Two specific sub-objectives in the Global Fund’s strategy aim to scale-up programmes to support women and girls and reduce health inequalities marked



by age and gender. Reducing HIV incidence among Adolescent Girls and Young Women (AGYW) by

45% over the life of the strategy (2017–2022) is a key target.

Specific approaches under these two sub-objectives include working with countries to develop appropriate initiatives in funding requests and grants to address gender-related barriers to services; and to support the development and implementation of gender-responsive national health strategies.

According to UNAIDS, a large number of new HIV infections in Kenya, South Africa and Swaziland are estimated to occur among adolescent girls, while in Nigeria, Uganda, and Zimbabwe, new infections are common among women in their late 20s.

## Drug to combat malaria in pregnancy also protects against sexually transmitted infections

A drug given to pregnant women in 35 countries worldwide to protect against malaria has been shown also to safeguard against the consequences of gonorrhoea, chlamydia, trichomoniasis, and bacterial vaginosis, according to a new study published in *Clinical Infectious Diseases*.

This study has produced the first compelling evidence that the same preventive treatment reduces adverse birth outcomes attributable to curable sexually transmitted/reproductive tract infections (STIs/RTIs).

The research, led by the London School of Hygiene & Tropical Medicine (LSHTM) with partners the University of Zambia, involved 1086 pregnant women in Zambia.

Researchers investigated the protective effect that different doses of IPTp-SP had on pregnancy outcomes. The analyses confirmed IPTp-SP protects against adverse birth outcomes but of particular interest to the team was the effect the drug had on the infections themselves.

Lead author of this new study, Assistant Professor Matthew Chico from LSHTM, said: 'Sexually transmitted and reproductive tract infections are linked to devastating birth consequences for pregnant women, including spontaneous abortion,

stillbirth and premature and low birth-weight. While sulfadoxine-pyrimethamine has been thought to offer pregnant women protection against other infections, no evidence existed - until now. The findings show that IPTp-SP offers unrecognised potential that extends beyond its life-saving protection against malaria.'

In the trial, researchers worked backwards to categorise women according to the number of doses of IPTp-SP each had received during the antenatal period. Retrospective laboratory analyses confirmed that infections at enrolment, unknown to investigators and women, were equally prevalent across the treatment groups.

Women who went on to receive two or more IPTp-SP doses compared to 0-1 dose had their odds of experiencing any adverse birth outcome (stillbirth, low birthweight, preterm delivery or intra-uterine growth retardation) reduced by 45%, and 13% further with three or more doses. Two doses of IPTp-SP, compared to 0-1, reduced the incidence of preterm delivery by 58%, and 21% further if women received three or more doses.

The authors hope that these results will serve as a catalyst for scaling-up coverage of preventive treatment.

## To test Zika vaccines, scientists need a new outbreak

Researchers are eager to test promising vaccines against Zika, the virus that sparked a global health emergency last year.

But uncertainty over whether the Zika epidemic will continue affects researchers' ability to finish testing vaccines. They need locations with an active viral outbreak to conduct large-scale human trials and make sure the vaccine actually protects against disease.

'On one hand, you don't want to see outbreaks of infection,' says Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases (NIAID). 'But on the other hand, without that testing you might have to wait a long time to make sure that the vaccine works.'

All the vaccines being tested are

in Phase I clinical trials, which means they are being tested for safety in a small number of people. According to a review paper published in the journal *Immunity*, the vaccines represent a variety of scientific techniques to thwart the disease, ranging from inactivating the virus to manipulating its DNA.

The NIAID announced it is launching another Phase I trial for a vaccine made out of proteins found in mosquito saliva. The product is intended to trigger a human immune system response to the saliva and any viruses mixed with it. If successful, the product could protect humans against a number of mosquito-transmitted diseases, including Zika, dengue and chikungunya.

## JUTH to become West Africa's training centre for cochlear implants



The West Africa Post-Graduate College of Surgeons has selected Jos University Teaching Hospital (JUTH), as the regional centre for the training of doctors on cochlear implants.

A cochlear implant is an electronic medical device that replaces the function of the damaged part of the inner ear (cochlear), to provide sound signals to the brain.

Unlike hearing aids, which make the sounds louder, cochlear implants restore the lost activity of the affected part and naturally remove the impairment so as to restore the capacity to hear.

JUTH's Chief Medical Director (CMD), Dr. Edmund Banwat, who announced this, said that a team from the College would soon visit the hospital's temporal bone dissection centre, for final inspection and accreditation.

'After inspecting the facilities and the laboratory, the College will give the final accreditation and the training of physicians on cochlear will commence,' he said.

Twelve doctors are participating in the training that is being undertaken by Jacksonville Hearing and Balance Institute, Jacksonville, Florida, USA.

'So, in the next few months, JUTH will serve as the hub for the training of West African surgeons on ear issues; it means we shall have more people trained to restore hearing to our deaf people,' Dr. Banwat said.

Dr. Banwat said that the impact on healthcare would be massive as the rising number of human resources would reduce medical tourism and check capital flight.

Dr. Banwat thanked the Jacksonville Institute for donating the facilities for the cochlear implants last year, and noted that the partners, by coming to train others, were replicating themselves through young doctors that could perform the surgery.

## WaterAid-Ghana improves access to safe water



It is estimated that the lack of this essential service leads to the death of 500 000 children every year and costs sub-Saharan Africa more than the entire development aid the continent receives.

To help tackle the problem, and in line with efforts to help improve menstrual hygiene in schools and fight maternal mortalities in the country, WaterAid-Ghana, a non-governmental organisation committed to improving access to safe water and improving sanitation and hygiene in poor communities, is extending more potable water supply systems to health and educational facilities in five districts across the country.

Mr. Abdul-Nashiru Mohammed, the Country Director of WaterAid-Ghana, explained that most expectant and lactating mothers often had challenges with water whenever they attended health facilities across the country for healthcare.

He added that making water available at health facilities would minimise the burden on expectant mothers who had to trek in search of water during labour.

'This project is just to make sure that pregnant women, who go to the clinics or the hospitals, would have access to water', he said.

Mr. Nashiru said the provision of water in schools would promote menstrual hygiene among female students. He was of the view that most female students did not go to school during their menstrual period due to lack of water and other sanitation facilities in their schools.

According to him, with the availability of water and sanitation facilities in schools, both teachers and students, especially the female students, would be encouraged to stay in school during their menstruation.

Mr. Nashiru said the project was targeted at improving sanitation facilities for 89 904 people in its operative districts, but more than 150 000 people would have access to potable water by the end of the project.

## Malaria control can benefit from forecasting using satellites

Umeå University researcher Maquins Sewe has established links between patterns of malaria in Kenya and environmental factors (temperature, rainfall and land cover) measurable by satellite imagery.

In his doctoral dissertation, the researcher from the Swedish university shows that conducive environmental conditions occur before increases in hospital admissions and mortality due to malaria, indicating that the satellite information is useful for the development of disease forecasting models and early warning systems.

'When integrated with 'on-the-ground' malaria surveillance and control strategies, forecasting models that use satellite images can help policy makers to choose the most cost-effective responses to reduce malaria burden,' says Maquins Sewe, researcher at the Department of Public Health and Clinical Medicine, Epidemiology and Global Health Unit.

'Since prevailing weather conditions regulate the abundance of malaria-transmitting mosquitos, assessing environmental risks can help predict a rise in malaria infections geographically and allow proactive control efforts to focus on hot areas.'

According to Sewe, satellite-based malaria forecasting might be especially useful in low-resource settings where

data on weather conditions are limited or non-existent. The idea is that an early warning system, based on the use of weather monitoring and malaria surveillance, can provide sufficient lead-time to launch geographically focused cost-effective proactive interventions.

In his research, Sewe used data from the Health and Demographic Surveillance System run by Kenya Medical Research Institute and United States Centre for Disease Control. The data covered the Asembo, Gem and Karemo regions of Western Kenya. In these regions, malaria accounts for 28% of all deaths in children under five-years-old.

The study provides evidence that a progression of changes in environmental conditions and the subsequent occurrence of malaria mortality follow the expected biologic mechanism. Temperature determines both the development of the malaria parasite in the mosquito and the rate at which the mosquito develops from larva to adult, while precipitation provides the necessary breeding places.

'This study contributes to malaria early warning systems with several important components, including risk assessment, a model for integrating surveillance and satellite data for prediction, and a method for identifying the most cost-effective response strategies,' said Sewe.



## African disease burden offers pharmaceuticals opportunity

The growing incidence of Western lifestyle diseases such as cardiovascular disease (CVD), cancer, diabetes and respiratory disease, in addition to infectious and parasitic illness, will present the pharmaceutical industry in Africa with a business opportunity of US\$40.8 billion in 2019.

A report by Frost & Sullivan shows that there has been a paradigm shift in the burden of illness and non-communicable diseases (NCDs) across sub-Sa-

haran Africa, which in turn is driving the demand for chronic prescription drugs.

'An increase in health spending will encourage local manufacture of drugs,' says transformational health research analyst, Saravanan Thangaraj. 'We expect this increase in local formulation and filling to be protected by regulatory and tariff barriers, so international players will be looking for local contract manufacturers and other strategic partnerships.'