

THE AAS IMPACT

DELTA Africa: African scientists develop an affordable test for HIV drug resistance

SANTHE at a glance

The Developing Excellence, Leadership and Training in Science in Africa (DELTA Africa), a programme of The African Academy of Sciences, supports the sub-Saharan African Network for TB/HIV research Excellence (SANTHE), a network of African led research focused on advancing African science by fighting HIV/AIDS and TB. The network aims to pioneer new tools using cutting edge scientific research on HIV/AIDS and TB to control these endemics. It is a multinational network of multidisciplinary experts, working together to empower African scientists, to combat HIV, Tuberculosis and HIV/TB co-infection through basic, clinical and translational research. SANTHE funds researchers drawn from Masters, PhD and Postdoctoral levels.



Scientists develop affordable assays for testing HIV drug resistance

Background

Botswana has the fourth highest HIV prevalence in the world, after South Africa, Lesotho and eSwatini. The adoption of the “treat all” public health policy, led to the majority of people living with HIV starting antiretroviral treatment within 30 days of confirming their HIV-positive result.

The increased uptake of antiretroviral treatment led a group of SANTHE scientists to develop cheaper assays for testing for HIV drug resistance. This was accelerated by the introduction of dolutegravir (DTG), a new antiretroviral treatment, which was introduced into Botswana’s public antiretroviral programme.

The prevalence of drug resistance mutations to some antiretroviral drugs such as tenofovir in individuals with treatment failure is over 50%. Pre-treatment drug resistance rates in Africa to some antiretroviral drugs are also rising above the World Health Organizations threshold of 10%. To ensure that HIV infected individuals are not inadvertently placed on a functional single antiretroviral medication, it is important to test for HIV drug resistance to dolutegravir using the new assay.

Description of study

A SANTHE PhD Fellow optimized a HIV drug resistance assay for use in resource limited settings that have a similar HIV strain that is found in Botswana-HIV-1 subtype C. The molecular based assay works by generating many copies of HIV DNA then determining the consensus composition of amino acids at various position in the HIV genome. These are then compared with variations in amino acids with a standard reference to determine if patients have drug resistance mutations in their HIV genome.

The assay was validated against a commercial assay that is currently in use in Botswana and performed better than the commercial assay, detecting more HIV drug resistance mutations while doing so at about a quarter of the cost of the commercial assay.

Impact

- This HIV drug resistance assay will enable patients with a high viral burden taking DTG based regimens to be assessed for DTG resistance mutations at a cheaper price (70% lower cost - from \$100-\$200 to \$40-\$70)
- This affordable assay will enable more drug resistance testing to be performed ensuring that people living with HIV have low viral loads which will reduce the risks of onwards transmission of the virus.