

Delivering nitrogen preserved vaccines across Tanzania

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Transporting a vaccine at -140 degrees Celsius on the difficult roads of Sub-Saharan Africa is problematic, but five students in life sciences have gone to Tanzania to attempt to find a solution.

The first effective vaccine against [malaria](#) is currently undergoing [clinical trials](#) in the US, [Europe](#) and Africa, and may soon be distributed to the [inhabitants](#) of Sub-Saharan Africa, especially where the disease is endemic. However, the problem of transporting this vaccine at the right temperature across the dirt roads and [long distances](#) in these regions has still not been resolved.

Flavia Camponovo, a student of [life sciences](#) currently finishing her Bachelor's Degree, is used to humanitarian aid missions. This year, while searching for a project related to her studies, she came across

EssentialMed, a start up with the goal of developing medical materials adapted specifically for southern countries. Along with four other students, Damien Huzard, Naig Chenais, Martin Page and Frédéric Michoud, she is now in Tanzania attempting to find a solution.

Eventually, this project seeks to create an enterprise that deals with the logistics of delivering these vaccines in Tanzania, and that could, in the long term, aid with all the cryogenically preserved biological products in Tanzania and other African countries. The goal of this project, which is also headed by Sanaria, the producers of the vaccine, and the Swiss Tropical and Public Health Institute, directed by Marcel Tanner, is to come up with a simplified business plan at the end of the students' stay. "This is truly an innovative concept that we could repeat if the experience provides conclusive results. I am curious to see their findings," states Klaus Schonenberger, owner of EssentialMed.

Vaccines Transported in Nitrogen

The number of deaths caused by malaria in 2010 is estimated by the World Health Organization to be 655,000, with 91% of these deaths occurring in Africa. Mosquito nets and sprays only go so far, and they do not suffice to eradicate the disease. Moreover, the parasites responsible for the disease have become resistant to many of the anti-malaria medications currently in circulation.

The new vaccine is the first to be truly effective in fighting the parasite. 80% of people who receive the vaccine become immune to the parasite for 28 months following the vaccination. But, since the vaccine is made up of microorganisms, it must be handled carefully to ensure that it remains effective. To maintain the vaccine's viability, it must be transported in liquid nitrogen, which is to say under -140° C. Therefore, the students will be confronted with two main problems: the efficiency of the distribution channels, making sure no time is lost in this delicate

operation, and the specifics of the containers in which the vaccines are stored and transported.

“There already exist methods of cold transport in Africa, for products needed in artificial insemination of mammals and bovine vaccines for example. The goal of our project is to adapt these methods, especially to allow the transport of these products to remote villages,” explains Flavia Camponovo. The team has been there since July 19th, and has begun by exploring the existing distribution infrastructure and the various intermediaries to understand the specifics of this process and what changes must be made.

Tanzania seemingly has infrastructure that is already more vital and better organized than most of the Sub-Saharan countries. This includes central, regional and district storage facilities that furnish the shops of medical establishments in the more remote areas. Each stage of the distribution process must be taken into consideration, and the channels of distribution for these vaccines must be adapted to meet very particular requirements.

A Very Specific Type of Container

The distribution containers must be able to maintain a temperature of -140° Celsius for 30 to 35 days. The students have found an example in the prototypes developed by an American company that has already done research on the logistics, markets and prices for this type of transport. The conditions of transport are an additional constraint when considered in a country like Tanzania, where the essential network of roads is not paved. The containers must resist impact and inversion, and be small enough to be transported by motorcycle. They must also possess systems for security and temperature surveillance, making them exceptionally specialized and complex.

Creating a Business from the Logistics of Delivery

Flavia is motivated by humanitarian goals, and has already taught at schools in Africa and South America, but hopes that this time, her trip will be more geared toward engineering. After a fruitful meeting with Klaus Schonenberger, she has been enthusiastic about pursuing this project proposed by his company, EssentialMed, and returned one week later with four other students in life sciences. “This project allows us to gain personal, entrepreneurial and logistical experience. It could open up many possibilities for the distribution of the vaccine, even if we are not sure that our end result is the best possible solution,” she adds.

Provided by Ecole Polytechnique Federale de Lausanne

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