



*Cholera is a clear indicator of inequality among the living population, disproportionately affecting the bottom billion people, the poorest and most vulnerable populations worldwide. Vaccination is a major preventive measure; however, the high cost of cholera vaccines is not affordable for the bottom billion people. Therefore, a thermostable live vaccine would relieve the bottlenecks, cost determinants and result in significant cost savings during mass cholera vaccination campaigns for the bottom billion people. Falling Walls Lab AIMST in Malaysia crowned Dr. Guruswamy Prabhakaran as this year's winner of the competition. Dr Prabhakaran presented his ground breaking idea on cholera.*

**You delivered the winning performance at the Falling Walls Lab competition in Malaysia? What is your innovative idea?**

Cold chain-free live attenuated cholera vaccine:

Cholera, the acute watery diarrheal disease caused by the infection of waterborne bacterium *Vibrio cholerae* serogroup O1 or O139 is endemic and caused epidemics in 69 countries. Large-scale cholera vaccine campaigns are organised worldwide for its prevention. However, all the existing WHO licensed killed oral cholera vaccines are heat sensitive, required in multiple doses and demand 'cold chain supply' at 2-8°C to retain its potency. These mandatory requirements resulted in a high cost of vaccination which poses a significant challenge. Therefore, it is inevitable to develop a single dose and cold chain-free live cholera vaccine which can be stored at room temperature. In this direction, a thermostable live oral cholera vaccine formulation was developed with the patented attenuated *V. cholerae* (VCUSM14P) strain protective against



toxigenic O139 serogroup. The vaccine mimics natural infection, strongly immunogenic, eliminates the repetitive dosing and retains its potency at room temperature ( $25 \pm 2$  °C at  $60\% \pm 5\%$  humidity) for 140 days. Hence, this new Patent filed vaccine represents a better opportunity to increase its outreach for the global immunisation program in low and middle-income countries at a competitive cost.

### **Why should people pay attention to your research project?**

Globally, Cholera is the 2<sup>nd</sup> leading cause of death among the poor:

Cholera is a clear indicator of inequality among the living population, disproportionately affecting the bottom billion people, the poorest and most vulnerable populations worldwide. It is primarily transmitted by contaminated water or food and closely associated with poor sanitation, less access to clean drinking water and electricity in resources poor countries. Vaccination is a major preventive measure; however, the high cost of cholera vaccines is not affordable for the bottom billion people. Therefore, a thermostable live vaccine would relieve the bottlenecks, cost determinants and result in significant cost savings during mass cholera vaccination campaigns for the bottom billion people. Towards this, a prototype live oral cholera vaccine formulation was developed which is stable at room temperature ( $25 \pm 2$  °C at  $60\% \pm 5\%$  humidity) and retains its potency for 140 days. The cost-effective vaccine formulation (Patent filed) is non-reactogenic and immunogenic *in vivo* and protects animals from lethal wild type *V. cholerae* O139 challenge and it would serve the bottom billion.

### **How did you win over the audience?**



- a) I have drawn the attention of the audience with facts and figures/pictures to highlight the living standards of the poorest people who are vulnerable to cholera.
- b) Made a connection with the audience by questioning them why cholera is an epidemic-prone diarrheal disease of global significance even after 200 years?
- c) Rationalized the existing barriers in mass cholera vaccination campaigns and revealed the practical solution with the newly developed cold chain-free live cholera vaccine.

**You will be representing AIMST and Malaysia in the global Falling Walls Lab Finals in Berlin this November? How are you preparing for the event?**

I am excited to participate at the Falling Walls Lab Finale in Berlin, November 2018. I am refurbishing the PowerPoint slides and striving for excellence.

**You are also the winner of the EURAXESS Prize 2018 to visit a research lab anywhere in the EU. What are your plans?**

I have developed a live attenuated cholera vaccine formulation with the recombinant vaccine strain (VCUSM14P) protective against toxigenic O139 serogroup with enhanced colonisation properties to stimulate mucosal and humoral immunity. Therefore, it might be an ideal vehicle to deliver recombinant antigens to the mucosal surface for vaccine development. In this regard, I would like to explore and identify a suitable research institute working on live-attenuated or killed vaccine development for a) *Enterotoxigenic Escherichia coli*,



*Salmonella enteric serovar Typhi (S. Typhi)* and b) on mucosal delivery of DNA vaccine for the viral infections.

**What are you most looking forward to?**

The Ministry of Higher Education, Malaysia funded this research under the Prototype Development Research Grant Scheme (PRGS) – (PRGS/2/2015/SKK10/AIMST/02/1). Further, to scale up and validate the prototype live attenuated cholera vaccine I am looking forward a) to carry out the toxicological studies at GLP compliant test facilities, b) take GMP lot production and c) to work on vaccine development for other bacterial enteric infections through the research collaborations in the EU.

**Where do you see yourself in 10 years in terms of your research career?**

As a Chief Technical Officer (CTO), in coordinating the developmental research on vaccines.