High tech drugs for Thailand

Biopharmaceutical and animal vaccine production in Thailand and beyond

A revolution in biotechnology is bringing us new types of drugs for diseases ranging from diabetes to cancer. Recombinant Protein Technology involves joining different pieces of DNA together in a cell such as a bacterium, inducing it to make particular proteins that can form the basis for advanced medicines and vaccines.

In Thailand it is thought that only a minority of cancer sufferers have access to medicines derived from this technology, even though the WHO lists them as “minimum medicine needs for a basic health system”. The Thai government has recently set up a biopharmaceutical facility to address this problem.

> “Thanks to GCRF we’ll be able to bring science to the people who really need it the most.”
>
> **Dr Panit Kitsubun, BIOTEC organisation, Thailand**

The goal of this GCRF project is for UK and Thai experts to work together towards state-of-the art protein production in Thailand. The teams will develop powerful production strains and also work on the associated downstream activities to ensure regulatory approval. The ultimate goal is to make low-cost, widely available medicines.

Although the initial transfer of technology will be between the UK and Thailand, there are structures built in to spread the expertise to other countries in South East Asia such as Vietnam and Myanmar. Additionally, both the UK and the ASEAN countries should be able to benefit from the insights learned from trying to drive production costs as low as possible.

For more information visit https://research.kent.ac.uk/gcrfbiopharma/

Establishment of Biopharmaceutical and Animal Vaccine Production Capacity in Thailand and Neighbouring SE Asian Countries

The Team

Colin Robinson and C. Mark Smales, University of Kent

Dan Bracewell and Tarit Mukhopadhyay, UCL

Anne Dell and Stuart Haslam, Imperial College

Richard Coker and Fatim Lakha, London School of H & TM

Anan Jongkaewwattana and Peera Jaruampornpan, Virology and Cell Technology Laboratory, BIOTEC, Thailand

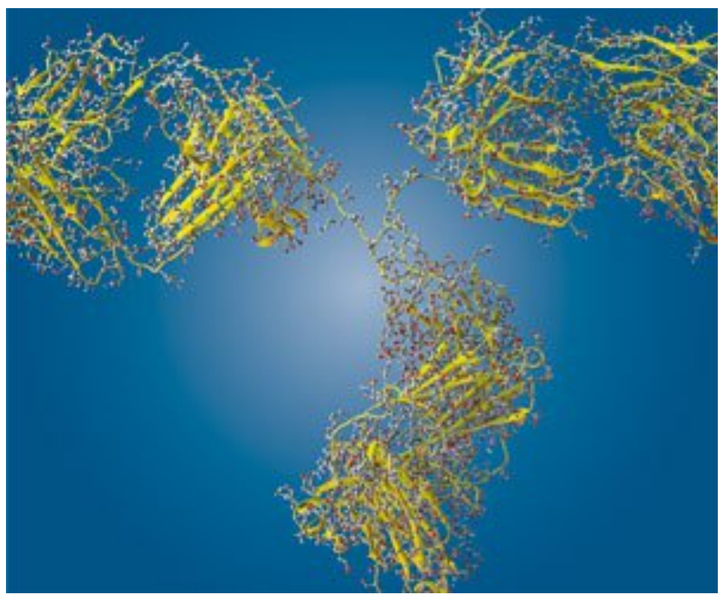
Panit Kitsubun and Franck Courtes, National Biopharmaceutical Facility, KMUTT, Thailand

Development Challenges

Project aims: to develop **animal vaccine** and **biopharmaceutical** production in Thailand, and other SE Asian countries.

Need: **Animal vaccines** are required to combat a range of devastating viral diseases in animals, especially pigs. 200,000 Thai households maintain pigs and viral diseases are a major problem. Thailand imports all of its pig vaccines but they are often ineffective. **Biopharmaceuticals**, are highly effective – but extremely expensive - protein drugs that are increasingly used to treat cancers and inflammatory diseases in high income countries. Only a few % of patients have access in LMICs, because of cost (up to $70k per treatment course).

Solution: **Both product types** rely on facilities for large scale recombinant protein production, a major area of UK expertise. Thailand has recently built a **National Biopharmaceutical Facility** to produce such molecules. This project will deploy UK expertise to produce these molecules in high amounts, at a level of purity required for regulatory approval. We are targeting UN sustainable development goals SDG1 (No poverty), SDG2 (Zero hunger), SDG3 (Global health and wellbeing) and SDG9 (Industry/innovation/infrastructure).

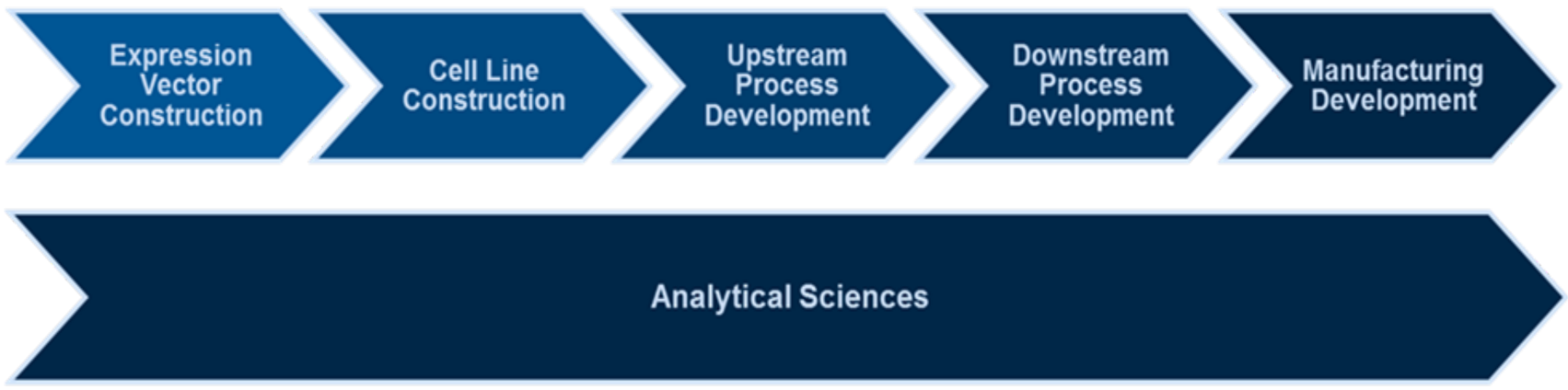


Typical structure of a monoclonal antibody drug, produced in mammalian cell culture. As an example, ***Herceptin*** *improves the 5-year survival of HER2+ breast cancer patients from 2% to 31%.*

Proposed Impact

Recombinant protein production is complex, but the Thai groups are in a position to make the first steps towards self-sufficiency with the support of UK expertise in protein **production**, protein **purification** and protein **analytics** (to ensure that products will be fit for regulatory approval) and will lead to enhancements at every step of the 'value chain' as shown in the diagram below.

Importantly, the UK team also includes experts on **epidemiology** and **healthcare systems** in order to ensure that the project is in line with societal needs. The **impact** will be in the form of (i) lowered personal and state losses from pig diseases, (ii) availability of high-tech medicines to a much wider section of the population, and (iii) the establishment of state of the art production capacity and trained personnel.



Beneficiary Countries

Recombinant protein production on a scale, and at a quality, required for biotherapeutic and vaccine application is extremely challenging. As such, it is better to focus effort initially on one country in the first phase, after which innovations can be transferred to neighbouring SE Asian countries in the second phase. Here, we will rely on a network of contacts developed by the Thai groups and co-I's Richard Coker & Fatim Lakha (LSHTM) to reach beyond Thailand and deliver benefit in the wider region.

For more information visit https://research.kent.ac.uk/gcrfbiopharma/