出國報告（出國類別：國際會議）

第 4 屆全球結核病疫苗論壇

服務機關：衛生福利部疾病管制署
姓名職稱：謝宛庭 研究助理
派赴國家：大陸上海
出國期間：2015/4/20-4/25
報告日期：2/15/5/6

摘 要

第 4 屆全球結核病疫苗論壇(The Fourth Global Forum on TB Vaccines)於 2015 年 4 月在中國大陸上海召開，為涵蓋從基礎研究到臨床試驗、生產、使用和宣傳等各方面課題的非營利性研討會，由 Stop TB Partnership Working Group on New TB Vaccines 主辦，美國的 Aeras、荷蘭的 the Tuberculosis Vaccine Initiative (TBVI)和當地組織協助負責會議的籌畫和實施，來自 32 個國家的代表參加，會議中公佈有關結核病疫苗研發的最新研究資料，探討該領域的關鍵問題，同時藉由互動交流促成新的夥伴關係。結核病仍是全球公共衛生主要威脅之一，世界衛生組織(WHO)訂定 2050 年根除結核病的目標僅靠治療與控制結核病並不足以達成，研發防止兒童和成人感染、發病及傳播疾病的疫苗扮演關鍵性角色，同時可藉此破除結核病與貧困的循環，目前尚有十餘種候選疫苗處於臨床試驗的不同階段，仍需要全球共同投注更多資源和心力加速研發，並俟新型結核病疫苗研發成功，即將其納入結核病防治國家型計畫。

目 次

壹、目的

藉由參加第 4 屆全球結核病疫苗論壇(The Fourth Global Forum on TB Vaccines)瞭解全球結核疫苗研發進展及各方面相關課題，俾利增加我國引進新技術及參加國際研發之機會，並據以評估相關結核病防治政策。

貳、過程

行程

日期	工 作 日 誌	地　　點	行 程 內 容
2015/4/20	啟程	台北→上海	路程
2015/4/21~ 2015/4/24	開會	上海	開會
2015/4/25	返程	上海→台北	路程

會議及實地參訪行程

日期	行程及會議內容	重點報告
2015/4/21	Opening & Plenary& Breakout & Poster Sessions	Opening and breakout sessions：Future trends in TB epidemiology in China and the potential impact of novel TB vaccines targeted at older individuals：A modelling study
2015/4/22	Satellite & Morning & Plenary& Breakout & Poster Sessions	Plenary session：Immune correlates and the development of a growth Inhibition assay
2015/4/23	Morning & Plenary& Closing Sessions	Plenary session：TB vaccine development using recombinant viral vectors
2015/4/24	Site Visits	Shanghai Public Health Clinical Center

大會議程

Tuesday 21 April 2015

8:30 – 10:15	**OPENING SESSION**
Plenary Hall	Co-Chairs: Tom Evans, Aeras (USA) | Nick Drager, TBVI (The Netherlands) | Heping Xiao, Shanghai Pulmonary Hospital, Tongji University Medical School (China) | Zhenghong Yuan, Fudan University (China) **Welcome Remarks from the World Health Organization** Fabio Scano, Coordinator for Disease Control, WHO Beijing (China) | Mario Raviglione, Director, Global TB Programme, WHO (Switzerland) *by videoaddress* **Chinese BCG pioneers for TB prevention** Ping Chen, Director of NIAID Office in China, Office of Global Research, NIAID, US NIH (China) **TB disease burden and control strategy in China** Lixia Wang, Director, Professor, National Center for Tuberculosis Control and Prevention, Chinese Center for Disease Control and Prevention (China) **Main challenges and achievements of TB control in China** Lixing Zhang, Honorary President, Chinese Anti-Tuberculosis Association; Honorary member, International Union Against Tuberculosis and Lung Disease; Professor, Beijing Research Institute for Tuberculosis (China) **MDR-TB in China** Wen Gao, Party Committee Secretary, Huadong Hospital Affiliated to Fudan University; Director, Chinese Tuberculosis Society, Chinese Medical Association; Vice President, China Thoracic Association, Chinese Medical Doctor Association (China) **Partnership, philanthropy and TB in China** Wenjun Sun, Senior Program Officer, Tuberculosis, Bill & Melinda Gates Foundation (China)
10:15 – 10:45	**KEYNOTE ADDRESS**
Plenary Hall	Glenda Gray, South African Medical Research Council (South Africa)
10:45 – 11:15	**Coffee/Tea Break**
11:15 – 12:45	**PLENARY SESSION 1: Engaging the BRICS: Basic Research to Manufacturing**
Plenary Hall	Co-Chair: Jack Zhang, PATH (China) | Marian Jacobs, former Faculty of Health Sciences, University of Cape Town (South Africa) *Roundtable discussion featuring:* Luciana Leite, Instituto Butantan (Brazil) Igor Krasilnikov, St. Petersburg Institute of Vaccines & Sera (Russia) Soumya Swaminathan, National Institute for Research in Tuberculosis (India) Lan Bi, China National Biotec Group Company Limited (China) Glenda Gray, South African Medical Research Council (South Africa) Haibin Niu, Shanghai Institutes for International Studies (China)
12:45 – 13:45	Lunch
13:45 – 15:15	**PLENARY SESSION 2: Immunopathogenesis of Tuberculosis**
Plenary Hall	Co-Chair: Mark Doherty, GSK (Denmark) | Baoxue Ge, Shanghai Pulmonary Hospital, Tongji University School of Medicine (China) **TB vaccine antigen selection** Joel Ernst, NYU Langone Medical Center (USA) **Cytokine responses to TB: Implications for pathogenesis** Katrin Mayer-Barber, NIAID/NIH (USA) **Exsudative lesions and encapsulation determine the development of human pulmonary tuberculosis and supports the need for experimental modelling in big mammals** Pere-Joan Cardona, Institut Germans Trias i Pujol (Spain) **Anti-TB immunity components and mechanisms in primates** Zheng W. Chen, University of Illinois College of Medicine Chicago/Institut Pasteur of Shanghai (USA/China)

15:15 – 16:30	**POSTER SESSION**
Foyer	Coffee/Tea served
16:30 – 18:00	**BREAKOUT SESSION 1: Immunopathogenesis and Novel Mechanisms of Vaccine Activity**
Plenary Hall	Co-Chairs: Warwick Britton, University of Sydney (Australia) | Zheng W. Chen, University of Illinois College of Medicine Chicago (USA) and Institut Pasteur of Shanghai (China) **Lung resident and the circulating pro-inflammatory MAIT cells characterize pulmonary tuberculosis** David Lewinsohn, Oregon Health & Science University (USA) **COX inhibitors downregulate Tregs in tuberculosis: a potential adjuvant for vaccines** Anne Margarita Dyrhol-Riise, Oslo University Hospital (Norway) **Searching for the mechanisms of protection and attenuation of MTBVAC** Carlos Martin, University of Zaragoza (Spain) **H1/IC31®-vaccine induced long term CD4+ memory T cell responses in HIV infected volunteers correlate with antiviral innate immune activation** Claudia Daubenberger, Swiss Tropical and Public Health Institute (Switzerland)
Hall 8	**BREAKOUT SESSION 2: Epidemiological Research**
	Co-Chairs: Richard White, London School of Hygiene and Tropical Medicine (UK) | Xin Shen, Shanghai CDC (China) **Epidemiology of latent tuberculosis infection in China: A large-scale multi-center prospective study** Lei Gao, Institute of Pathogen Biology, Chinese Academy of Medical Sciences and Peking Union Medical College (China) **Future trends in TB epidemiology in China and the potential impact of novel TB vaccines targeted at older individuals: A modelling study** Rebecca Harris, London School of Hygiene and Tropical Medicine (UK) **High tuberculosis burden among people living with HIV in Southern Mozambique** Alberto García-Basteiro, Manhiça Health Research Center (Mozambique) **RePORT India Consortium- Objectives and Future Directions** Vidya Mave, Byramjee Jeejeebhoy Government Medical College (India)
18:30	Informal Social Evening – Hongmei Lu *Busses depart Everbright Hotel for Hongmei Lu at 18:30, 19:00, 20:00, 21:00* *Busses depart Hongmei Lu for Everbright Hotel at 19:30, 20:30, 21:30, 22:30* *Participants will be responsible for their meals and expenses.*

Wednesday 22 April 2015

7:15 – 8:15	**SATELLITE SESSION: Global TB Vaccine Partnership**
Hall 8	Co-chairs: Tom Evans, Aeras (USA) | Nick Drager, TBVI (The Netherlands) *Panelists:* Ole Olesen, EDCTP (The Netherlands) Helen McShane, University of Oxford (UK) Barry Walker, Aeras (USA)
8:30 – 9:15	**MORNING SESSION 1: New Horizons in Challenge Studies for TB vaccine R&D: Human challenge and low-dose NHP challenge models**
Plenary Hall	Chair: Wen-zhe Ho, Wuhan University Center for Animal Experiment /ABSL-III Laboratory (China) and Temple University (USA) **Developing a human challenge model for vaccine testing** Sarah Fortune, Harvard School of Public Health (USA) **Defining vaccine success in non-human primate models: Are we there yet?** Philana Ling Lin, University of Pittsburgh (USA)

9:15 – 10:45	**PLENARY SESSION 3: Biomarkers and Correlates**
Plenary Hall	Co-Chairs: Tom Ottenhoff, Leiden University Medical Center (The Netherlands) | Willem Hanekom, Bill & Melinda Gates Foundation (USA) **Potential of HLA-E as a novel presentation molecule for vaccine design against TB** Tom Ottenhoff, Leiden University Medical Center (The Netherlands) **Using the cattle model of bovine tuberculosis to define biomarkers of vaccine efficacy or disease progression** Martin Vordermeier, Animal Health and Veterinary Laboratories Agency (UK) **Immunodiagnosis of TB disease** Gerhard Walzl, Stellenbosch University (South Africa) **Immune correlates and the development of a growth inhibition assay** Helen Fletcher, London School of Hygiene and Tropical Medicine (UK) **TB candidate vaccine development based on genome-wide high-throughput screening for immunogens** Lijun Bi, Chinese Academy of Sciences (China)
10:45 – 11:15	**Coffee/Tea Break**
11:15 – 12:45	**BREAKOUT SESSION 3: Novel Approaches to Animal Models for TB Vaccine R&D**
Plenary Hall	Co-Chair: Ann Rawkins, Public Health England (UK) | Philana Ling Lin, University of Pittsburgh (USA) **Is the age-old dogma that memory CD4+ T cell mediate protection against tuberculosis true? Clarifying the role of memory T cells in protection against mycobacterial infection** Pia Steigler, University of Otago (New Zealand) **Variable BCG efficacy in NHP rhesus populations: pulmonary BCG provides protective effects where standard intradermal vaccination fails** Frank Verreck, Biomedical Primate Research Center (The Netherlands) **Ultra low dose aerosol challenge model: proof of concept and comparison of outcome in rhesus and cynomolgus macaques** Sally Sharpe, Health Protection Agency (UK) **What does the guinea pig tell us about tuberculosis?** Angelo Izzo, Colorado State University (USA)
Hall 8	**BREAKOUT SESSION 4: Novel Antigen Delivery Strategies**
	Co-Chairs: Stefan Kaufmann, Max Planck Institute for Infection Biology (Germany) | Amit Misra, Central Drug Research Institute (India) **Enhanced protective immunity against Mycobacterium tuberculosis by single mucosal vaccination with a recombinant Sendai virus vectored vaccine is associated with robust secondary CD8+ T cell responses in the lung** Zhidong Hu, Shanghai Public Health Clinical Center (China) **Lentiviral-based therapeutic vaccine for multidrug-resistant tuberculosis: identification of latent stage immunogens** Mohamad F Jamiluddin, Theravectys (France) **Recombinant vaccine by taking advantage of characteristics of human parainfluenza type 2 virus vector** Yasuhiro Yasutomi, National Institute of Biomedical Innovation (Japan) **Randomized double-blind placebo-controlled phase 1 trial of intranasal TB/FLU-04L tuberculosis vaccine in BCG-vaccinated healthy adults aged 18 - 50 years** Marina Stukova, Research Institute of Influenza (Russia)
12:45 – 13:45	**Lunch**
13:45 – 15:15	**PLENARY SESSION 4: Concepts and Approaches in Clinical Research & Development**
Plenary Hall	Co-Chairs: Gavin Churchyard, Aurum Institute (South Africa) | Wenhong Zhang, Huashan Hospital Affiliated to Fudan University (China) **Testing novel concepts through clinical trials** Tom Evans, Aeras (USA) **Respiratory mucosal boost immunization: A new approach to protect against pulmonary tuberculosis** Xuefeng Yu, CanSino Biotech (China) **Community mobilization for a phase IIb adult TB vaccine trial in western Kenya** Grace Kiringa, KEMRI (Kenya) **Testing novel vaccine candidates in combination trials** Iman Satti, University of Oxford (UK)
15:15 – 16:30	**POSTER SESSIONS**
Foyer	Coffee/Tea Served

16:30 – 18:00	**BREAKOUT SESSION 5: Next Generation TB Vaccines and Vaccine Concepts**
Plenary Hall	Co-Chairs: Barry Walker, Aeras (USA) | Douglas Lowrie, Shanghai Public Health Clinical Center (China) **TBVAC2020: a unique pipeline for the discovery of novel TB vaccine candidates** Olivier Neyrolles, CNRS-University of Toulouse (France) **Novel Mycobacterium tuberculosis live attenuated vaccines provide significant protection against aerosol infection with M. tuberculosis Beijing strain** Sarah Marcus, University of Wisconsin-Madison (USA) **CMV-vectored vaccines** Louis Picker, Oregon Health and Science University (USA) **Recombinant influenza A viruses expressing CD4+T-cell epitopes induce protective immunity against M. tuberculosis and boost immunity to BCG** Warwick Britton, University of Sydney (Australia)
	BREAKOUT SESSION 6: Clinical Research: Data and Findings
	Co-Chairs: Gavin Churchyard, Aurum Institute (South Africa) | Helen McShane, University of Oxford (UK) **Vaccination of healthy adolescents in a TB endemic setting with M72/AS01E has a clinically acceptable safety profile and induces a potent and durable T cell response** Adam-Penn Nicholson, South African Tuberculosis Vaccine Initiative/University of Cape Town (SATVI/UCT) **DAR-901 inactivated whole cell mycobacterial booster vaccine: Phase I dose escalation study** C. Fordham von Reyn, Geisel School of Medicine (USA) **Development of a phase 1 human study to evaluate AdHu5Ag85A vaccine delivered by aerosol** Fiona Smaill, McMaster University (Canada) **From Mouse to Man: Safety, immunogenicity and efficacy of a candidate tuberculosis vaccine ID93+GLA-SE** Rhea Coler, Infectious Disease Research Institute (USA)
18:30	Gala Dinner at Seagull Palace *Busses depart Everbright Hotel at 18:30* *The Global Forum thanks the LGT Bank Hong Kong and Ms Katrina Chang, Founder & CEO of TaipeiING and Consul of Shanghai & Taipei for Ordre des Coteaux de Champagne for the donation of wine from Hofkellerei des fursten von Lichtenstein, the winery of the Prince of Lichtenstein*

Thursday 23 April 2015

8:30 – 9:15	**MORNING SESSION 2: Developing TB Vaccines for What Purpose? Prevention of Disease, Prevention of Infection, and Immunotherapy Indications**
Plenary Hall	Chair: Carlos Martin, University of Zaragoza (Spain) **Prevention of infection, prevention of disease, and immunotherapy** Mark Hatherill, South African Tuberculosis Vaccine Initiative (South Africa) **Potential population level impact of new TB vaccines: Prevention of disease, prevention of infection, and immunotherapy** Richard White, London School of Hygiene and Tropics Medicine (UK)
9:15 – 10:45	**PLENARY SESSION 5: TB Vaccines in Clinical Development**
Plenary Hall	Co-Chairs: Ann Ginsberg, Aeras (USA) | Zhaojun Mo, Guangxi Center for Disease Prevention and Control (China) **First-in-human Phase 1 study results of MTBVAC, a live-attenuated vaccine from human origin** François Spertini, Centre Hospitalier Universitaire Vaudois (France) **BCG-based whole cell vaccines** Stefan H.E. Kaufmann, Max Planck Institute of Infection Biology (Germany) **TB vaccine development using recombinant viral vectors** Helen McShane, University of Oxford (UK) **TB subunit vaccines, memory and immunity in the lung** Peter Andersen, Statens Serum Institut (Denmark) **Mycobacterium Vaccae® used for LTBI prevent TB disease clinical research** Jiang Pu, Anhui Zhifei Longcom Biopharmaceutical Co., Ltd (China)

10:45 – 11:15	**Coffee/Tea Break**
11:15 – 12:45	**PLENARY SESSION 6: Regulatory and Access Issues for New TB Vaccines**
Plenary Hall	Co-Chairs: Mike Frick, Treatment Action Group (USA) | James Southern, Biological Surveys (South Africa) **The research on preclinical evaluation of tuberculosis vaccines** Miao Xu, Institute for Biological Products Control/National Institutes for Food and Drug Control (China) **Developing new TB vaccines: Regulatory considerations** Roshan Ramanathan, Center for Biologics Evaluation and Research, Food and Drug Administration (USA) **Title TBD** Morakot Papassiripan, Biologics Sub-division, Food and Drug Administration (Thailand) **Access considerations in the development of vaccines to address immunization needs in low resource settings** Lucia Fernandes Aleixo, Médecins Sans Frontières (China)
12:45 – 13:45	**Lunch**
13:45 – 15:15	**PLENARY SESSION 7: Advancing the Pipeline: A Vision for the Next Decade**
Plenary Hall	Co-Chairs: Marja Esveld, Ministry of Health (The Netherlands) | Nick Drager, TBVI (The Netherlands) *Roundtable Discussion Featuring:* Laurent Bochereau, Delegation of the European Union to China (China) Willem Hanekom, Bill & Melinda Gates Foundation (USA) Kei Katsuno, Global Health Innovation Technology Fund (Japan) Michel Kazatchkine, UN Secretary-General's Special Envoy on HIV/AIDS in Eastern Europe and Central Asia (Switzerland) Ole Olesen, European & Developing Countries Clinical Trials Partnership (The Netherlands)
15:15 – 16:15	**CLOSING SESSION**
Plenary Hall	Co-chairs: Nick Drager, TBVI (The Netherlands) | Heping Xiao, Shanghai Pulmonary Hospital, Tongji University Medical School (China) | Zhenghong Yuan, Fudan University (China) **Global Plan to Stop TB 2016-2020** Jon Liden, Stop TB Partnership (Switzerland) | David Lewinsohn, Oregon Health and Science University/Chair, Stop TB Partnership Working Group on New Vaccines (USA)

Friday
24 April 2015

	SITE VISITS (Registration Required)
9:00 – 12:00	Shanghai Institute of Biological Products
9:00 – 13:00	Shanghai Pulmonary Hospital
13:00 – 18:00	Shanghai Public Health Clinical Center
Full Day	The Center for Animal Experiment at Wuhan University *Departs evening of 23 April, returns evening of 24 Apri*

會議性質

全球結核病疫苗論壇(The Global Forum on TB Vaccines)為涵蓋從基礎研究到臨床試驗、生產、使用和宣傳等各方面課題的非營利性研討會，邀集研究者、政策制定者、捐款人、倡議者和其他對新結核病疫苗研發感興趣的相關人士共同與會，主要目標有：

- 評估結核病疫苗領域進展，商討戰略，推動該領域不斷發展；
- 分享結核病疫苗研究核心問題的最新資料和結果；
- 激勵探討結核病疫苗研究的未來發展方向，特別著重於《Blueprint for TB Vaccine Development》中描述的關鍵問題和挑戰；
- 促進各領域相關人士及全球的合作，加快並改進結核病疫苗研究。

第 1 屆於 2001 年 6 月在瑞士日內瓦舉行，逾 70 名與會者參加，討論認為未來 10 年結核病疫苗將從研發階段進入人體臨床試驗階段，會議摘要包括當時結核病疫苗研發關鍵問題的要點和建議發表在《Tuberculosis》期刊上。

TB Vaccines
A Second Global Forum

第 2 屆於 2010 年 9 月在愛沙尼亞塔林舉行，來自 30 個國家的 200 名代表與會，回顧過去十年結核病疫苗的研發進展，並確定未來十年研發之優先順序別，彙編入修訂後的《Blueprint for TB Vaccine Development》，於 2012 年 3 月發表在《Tuberculosis》專刊上。

TB VACCINES
THIRD GLOBAL FORUM
Progress Collaboration Sustainability
Cape Town, South Africa
25-27 March 2013

第 3 屆於 2013 年 3 月在南非開普敦召開，來自 25 個國家的 265 名與會者參加，會議主題包括生物標記物和保護療效的關聯因素初期研究、後期臨床實驗以及新

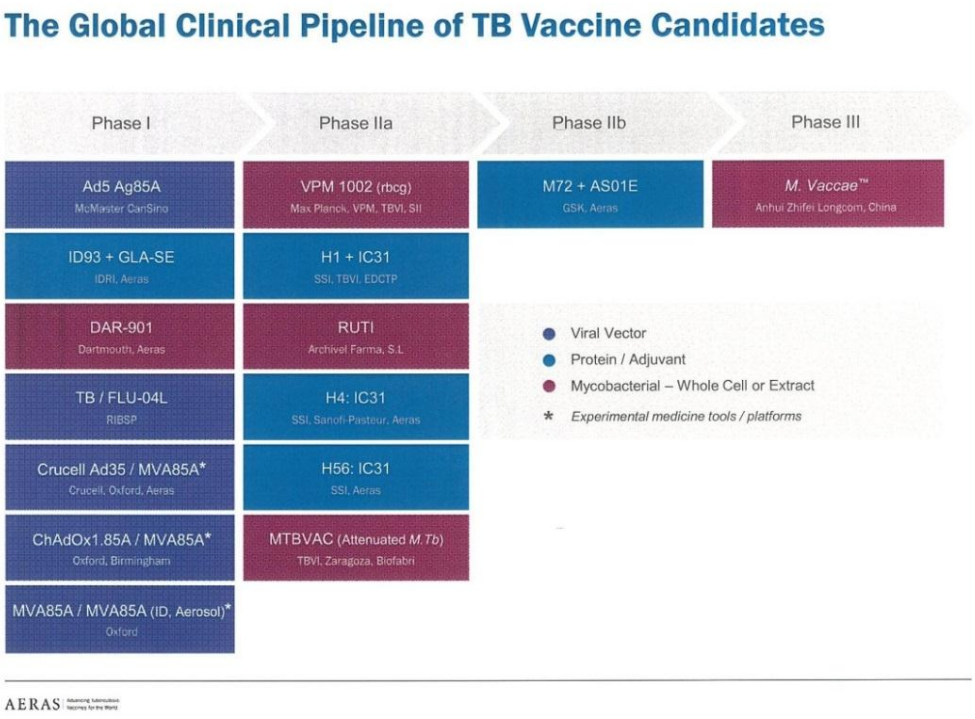
結核病疫苗使用的相關問題，該次論壇被認為是回顧《Blueprint for TB Vaccine Development》的進展、確定可以促進 Blueprint 描述核心的關鍵活動和新夥伴關係的機會。

本次為第 4 屆全球結核病疫苗論壇，由 Stop TB Partnership Working Group on New TB Vaccines 主辦，美國的 Aeras 和荷蘭的 the Tuberculosis Vaccine Initiative (TBVI) 為此次會議提供組織支援，並且與一個當地的主辦組織以及顧問小組合作，負責會議的籌畫和實施。於 2015 年 4 月在中國大陸上海召開，來自 32 個國家的代表參加，論壇公佈有關結核病疫苗研發的最新研究資料，探討結核病疫苗研發領域的關鍵問題，同時藉由互動交流促成新的夥伴關係。

<u>會議內容</u>

結核病仍是全球公共衛生主要威脅之一，每年約有 900 萬人罹病，140 萬人因此失去生命，世界衛生組織(WHO)訂定 2050 年根除結核病（每百萬人小於 1 例）之目標，而單靠治療與控制結核病並不足以實現此目標，研發防止兒童和成人感染發病及傳播疾病的疫苗扮演關鍵性角色，並可藉此破除結核病與貧困的循環。卡介苗(Bacillus Calmette-Guérin，BCG)是將牛結核分枝桿菌人工繼代培養而成的活性減毒疫苗，1921 年開始使用於人體上，為目前唯一的結核疫苗，在許多國家廣泛使用，但卡介苗存在諸多問題及爭議，如：保護效果，使得新型結核疫苗的開發甚為迫切。

本次全球結核病疫苗論壇於中國大陸召開的原因之一是目前全球唯一處於第Ⅲ期臨床試驗的結核病候選疫苗由中國大陸贊助研發，稱為 Vaccae™，而目前尚有十餘種候選疫苗處於臨床試驗的不同階段，包括葛蘭素史克的 M72+AS01E 正在非洲的一些地方進行第Ⅱb 期試驗。疫苗可依不同目標族群及疾病階段進行設計，前者如：孩童、青少年、成人及老年人，後者如：暴露前的預防感染、暴露後的預防發病與減低復發風險，但均須將安全性、保護效果和長效的保護力納入考量，目前全球結核病疫苗研究方向包括改造現有的卡介苗以及開發有效的新型疫苗，前者如開發重組卡介苗，後者如次單位疫苗、病毒載體疫苗，而為提高結核疫苗的免疫效力，則可採用異源初始－加強(prime－boost)免疫策略。



由於對人體結核分枝桿菌免疫機制尚未完全明瞭、無公認的動物試驗模式可確認有效的免疫反應、動物試驗結果亦無法確保使用於人體有相同效用，加上臨床試驗設計複雜、經費龐大、需要大量的受試者且長時間追蹤等因素，使得疫苗的研發仍有相當大的難度，因此，本次會議希望能藉由各項課題的交流討論而帶來突破性進展。會議探討議題包括下列 15 項：

1. Engaging the BRICS：Basic Research to Manufacturing
2. Immunopathogenesis of Tuberculosis
3. Immunopathogenesis and Novel Mechanisms of Vaccine Activity
4. Epidemiological Research
5. New Horizons in Challenge Studies for TB vaccine R&D：Human challenge and low-dose NHP challenge models
6. Biomarkers and Correlates
7. Novel Approaches to Animal Models for TB Vaccine R&D
8. Novel Antigen Delivery Strategies

9. Concepts and Approaches in Clinical Research & Development

10. Next Generation TB Vaccine and Vaccine Concepts

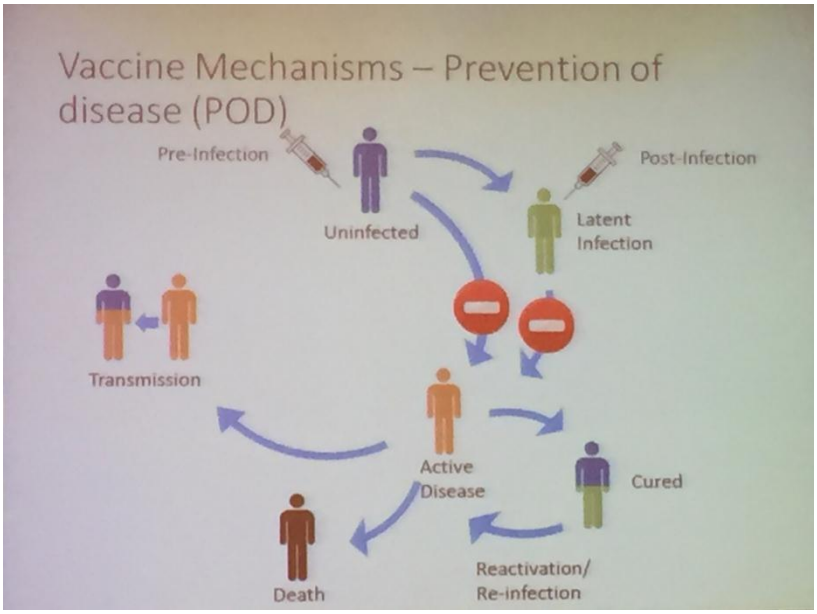
11. Clinical Research：Data and Findings

12. Developing TB Vaccines for What Purpose？Prevention of Disease, Prevention of Infection, and Immunotherapy Indications

13. TB Vaccines in Clinical Development

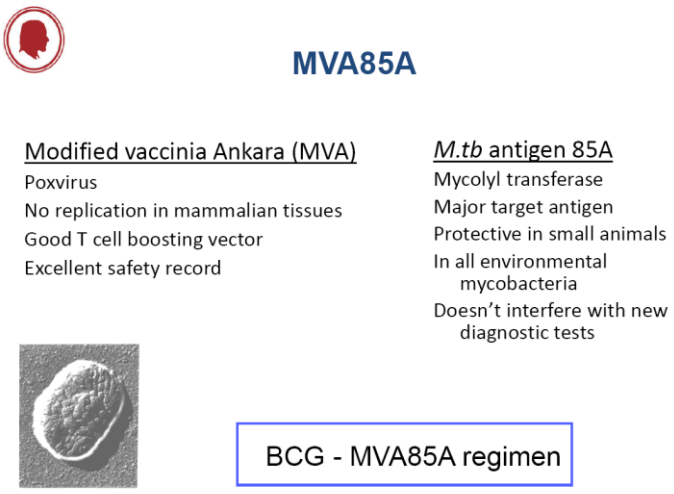
14. Regulatory and Access Issues for New TB Vaccines

15. Advancing the Pipeline：A Vision for Next Decade



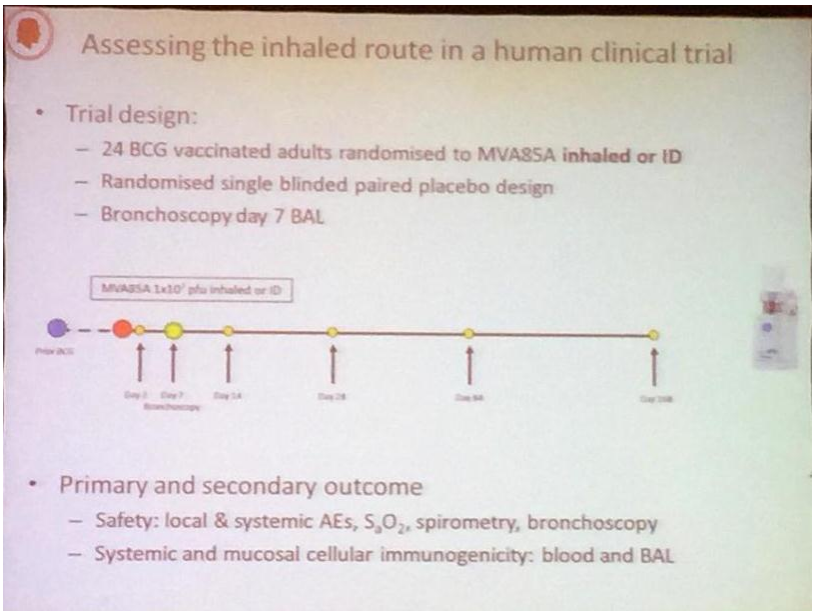
會議中英國倫敦衛生與熱帶醫學院的流行病學家 Rebecca Harris 利用數理模式探索新型結核病疫苗的可能影響，並推估中國大陸未來結核病流行趨勢，初步研究結果預測 1990 年至 2050 年 65 歲(含)以上老年人在中國大陸結核病傳播的比例可能從 18%增加為 53%，結核病負擔由新發生病例數的 13%上升至 71%，顯示疫情受老年人口影響比例愈來愈大，因此，強化老年易感族群相關防治作為具有效益。目前結核病疫苗研發領域著重於開發兒童與青少年使用之疫苗，但目標對象應依各地區流病背景有所差異，中國大陸相較於撒哈拉以南非洲地區罹患結核病的年輕成年人較多，且考量目前結核病的負擔程度以及老年人口數量與比例預期的增長，在 2025 年至 2050 年成為老年人口的族群中，可能在 1990 年之前結

核病仍盛行時期就被感染，隨著年齡增長，原先感染被重新活化的風險提高、發病率增加，而結核病的傳播近年來已大幅下降，被感染的年輕族群相對較低，發病人數也將變得更低，若提供已被結核分枝桿菌感染但尚未發病的老年人 80%效力(vaccine efficacy)、20 年保護作用的疫苗，並且涵蓋 2025 年到 2027 年 55-64 歲人群的 70%，同時納入 55 歲者常規免疫保護項目的一部分，如此一來，2050 年將可減少新發生病例率達 31%，即降低近 1/3 的結核病總體發病率，於 2025 年至 2050 年避免至多 370 萬例結核病，而即使在效力和涵蓋率低於預估值的情況下，也可能防止數十萬結核病病例出現。此論點為首次考慮到向老年人提供新型結核病疫苗的可能影響，凸顯將老年族群納入結核病疫苗試驗以及研發防止感染者發病疫苗的重要性，有助於未來疫苗臨床試驗設計及防治政策規劃之參考。

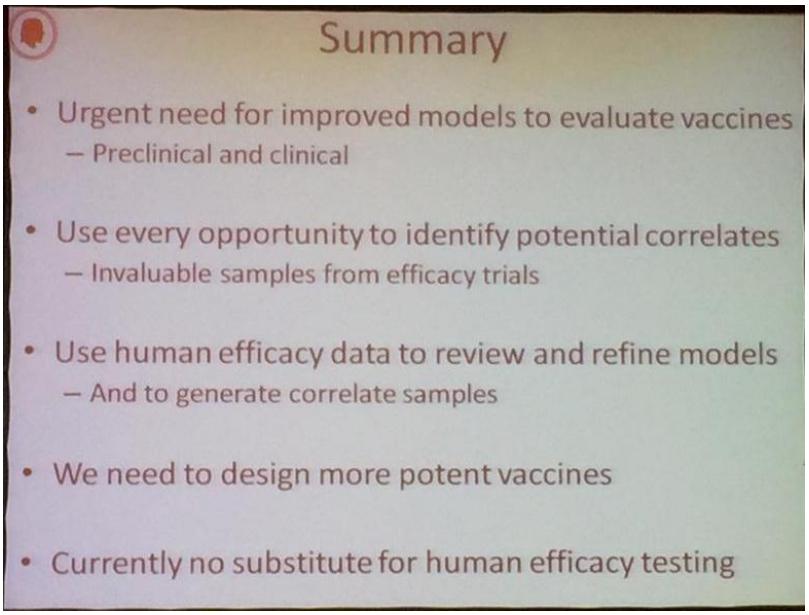


備受矚目的 MVA85A 是英國牛津大學 Helen McShane 及 Helen Fletcher 研究團隊設計以痘病毒為載體表現 Ag85A 的新疫苗，也是第一個進入臨床試驗第 IIb 期的結核病疫苗，研究結果已於 2013 年發表，與當前疫苗卡介苗相比並沒有產生額外的保護效力，但探討試驗數據及釐清失敗的原因仍可提供未來研究有用的資訊。該試驗將南非 4-6 個月齡且出生 7 天內接種卡介苗的非愛滋病毒感染感染健康嬰兒隨機分組，並於 1 劑皮內注射後進行為期 24.6 個月的追蹤訪視，其中

MVA85A 組 1399 名嬰兒，結核病發病比例 2%(32 名)，安慰劑組 1398 名，發病比例 3%(39 名)，雖然相較於安慰劑組，MVA85A 組對於嬰兒保護力稍有提高，但並無統計上之差異。而在南非開普敦和塞內加爾達卡的 650 名 18-50 歲愛滋病毒感染之成年人身上施打 2 劑 MVA85A 所進行的試驗，結果亦顯示無法有效保護對抗結核分枝桿菌的感染及發病。



另外為了比較不同途徑給予 MVA85A 的安全性和免疫原性，對於 24 位 18-50 歲已接種過卡介苗的健康成年人進行了一項隨機分組且雙盲的第 I 期臨床試驗，結果顯示吸入及皮下注射途徑之耐受性和免疫原性均良好，而吸入途徑便利且可誘發黏膜較強的特異性黏膜反應。



實地參訪

2015 年 4 月 24 日前往位於上海市金山區的復旦大學附屬上海市公共衛生臨床中心進行參訪，考察範圍包括：醫院實驗室、臨床試驗單位、結核病房及科研中心的生物安全性 P3 實驗室，該中心於 2004 年 11 月 16 日落成啟用，扮演多項角色，包括：全國傳染病醫師進修教育培訓基地、中國疾病預防控制中心愛滋病臨床進修教育基地、上海市疾病控制中心臨床基地、上海市愛滋病診療中心、

上海市危重孕產婦會診搶救中心、上海市產科肝病監護中心、上海市新發與再現傳染病研究所、國家中醫藥管理局中醫藥防治傳染病重點研究室（臨床基地）建設單位並且為國家級藥物臨床試驗機構資格認定單位。設立宗旨是為了建設具有較強綜合醫療救治能力的傳染病臨床醫療中心，成為上海市肝病、愛滋病、結核等感染與傳染性疾病診療中心和高水準的傳染病研究基地。核定床位 500 張，收治多種法定傳染病病人，如：化膿性及結核性腦膜炎、肺結核、愛滋病、傳染性非典型性肺炎、病毒性肝炎、腸道傳染病等。

參、心得及建議

為達最終消除結核病之目標，新技術、新藥物及新疫苗之研發與應用佔有關鍵性影響，但開發安全有效的結核病疫苗仍存在許多嚴峻的挑戰需突破，本次全球結核病疫苗論壇於議程中安排了 Satellite session：Global TB vaccine partnership 以及 6 大主題的 Forum discussion table sessions，充分提供與會者彼此交流最新資訊和建立合作關係的機會，由於結核病疫苗的開發需要投入大量的人力、物力、經費、資源和時間，為加速研發進展，夥伴結盟關係更顯重要。

本次會議與會代表及研究對象分屬多個不同國家，故研究結果之參採和推論尚需考量各地區流病背景的差異，針對符合各國特色之目標族群規劃與推動最具效益的防治策略，例如：臺灣抗藥性結核病比例及結核病/愛滋病共同感染之情形相較於許多國家疫情均較為和緩，但結核病患中的老年人口所佔比例相當高。疫苗仍為防止疾病發生並且杜絕疫情蔓延最有效也最具成本效益的方法，除結合各界、投入更多資源在於強化預防、診治以及防止結核病傳播等各項策略外，俟新型結核病疫苗研發成功，即將其納入結核病防治國家型計畫。