



# UK-China Science Bridges: Accelerating Innovation in Healthcare

## 英中科技桥：加速健康领域的创新

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# Proposed presentation format

- The innovation challenge
- China healthcare strengths
- UK healthcare strengths
- China collaborations at the University of Bradford
- The Bradford Science Bridges Programme
- Innovating with China – important lessons learned
- Summary



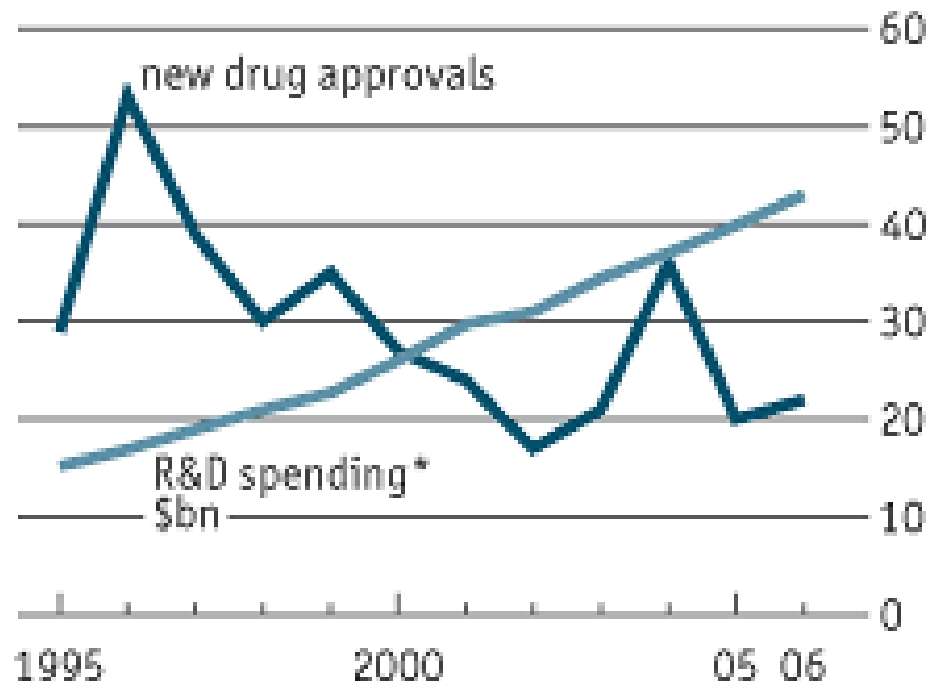
# The innovation challenge

## 创新的挑战



## Bitter pills

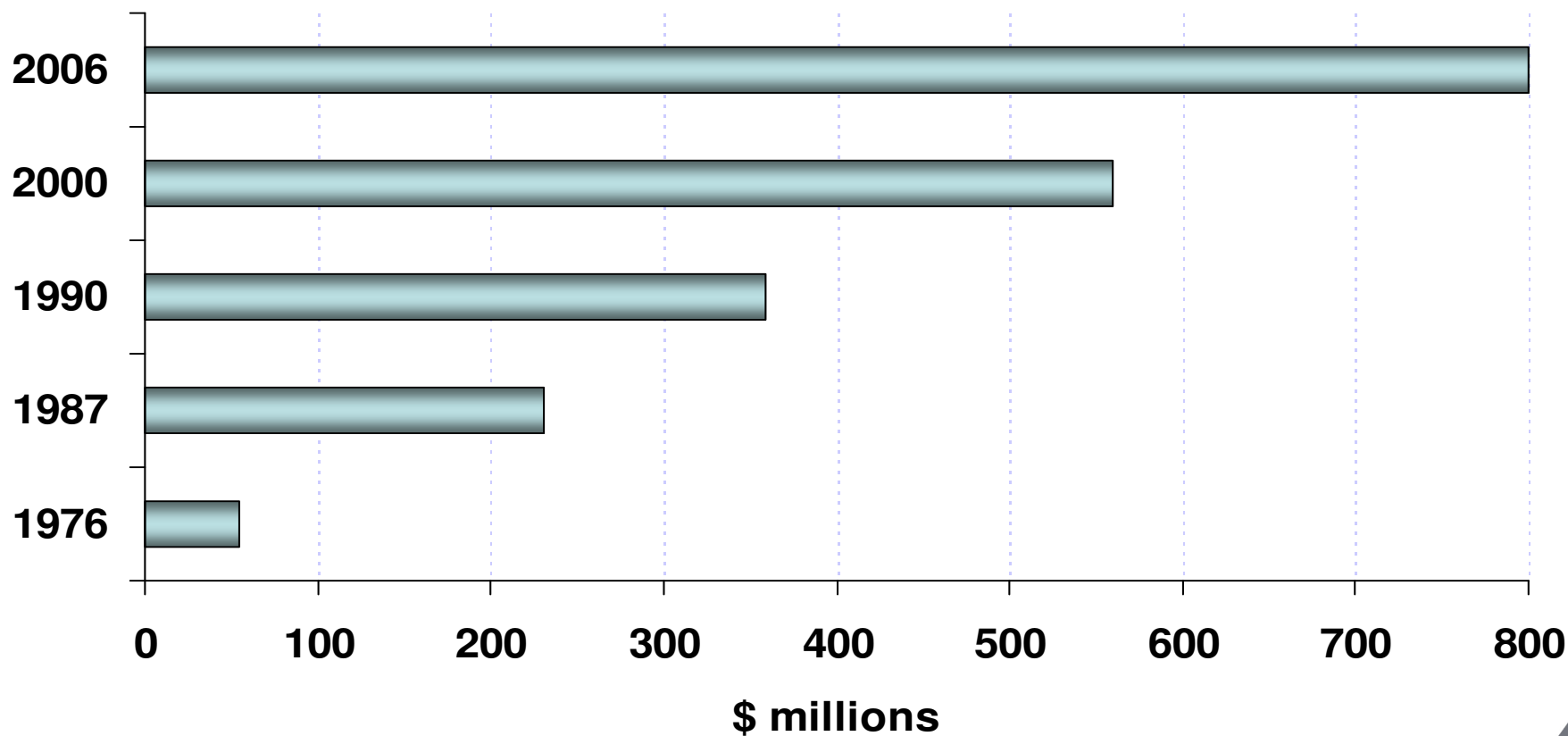
North American pharmaceutical firms':



\*Pharmaceutical Research and Manufacturers of America companies only

Source: PricewaterhouseCoopers

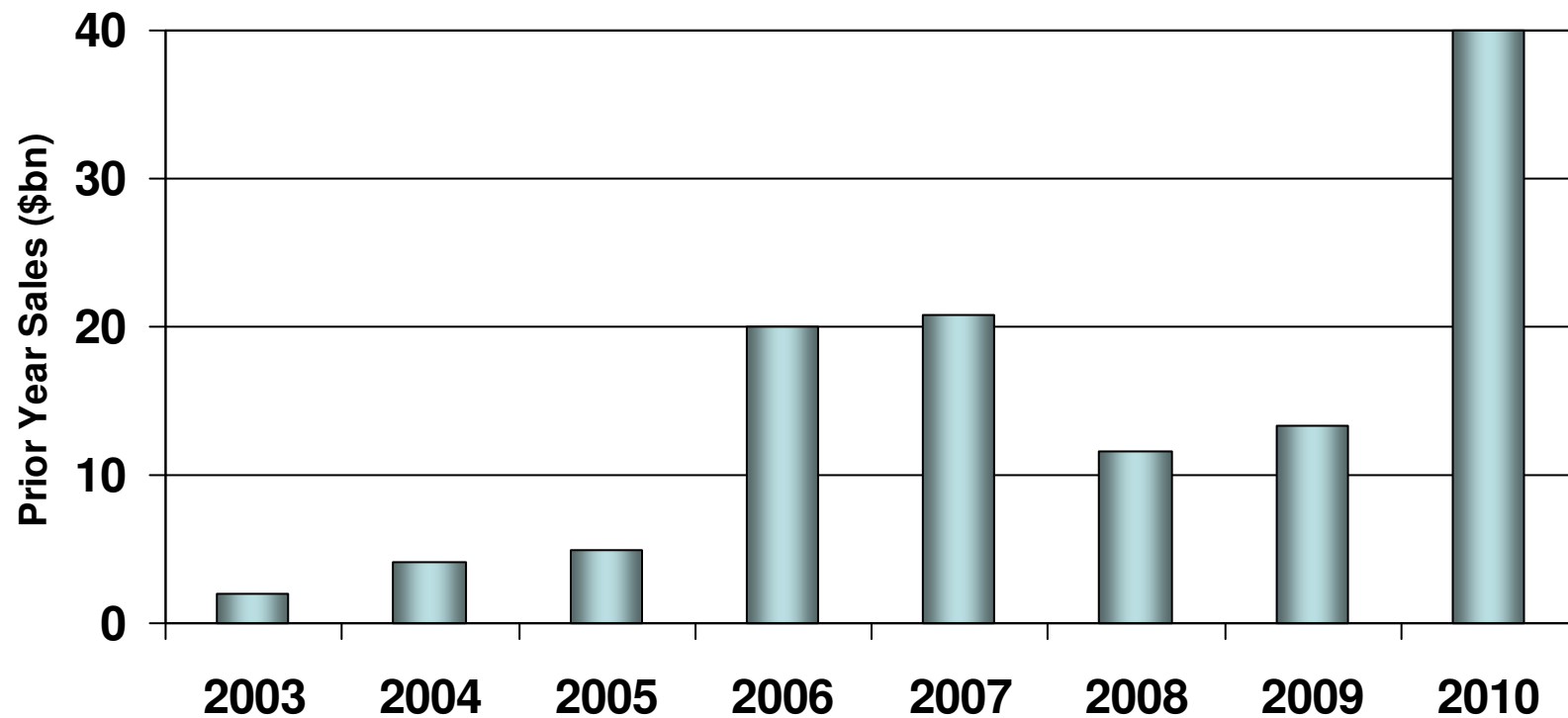
## Average R&D Costs dramatically increasing



Source: EFPIA and PhRMA estimates

# High value of patent expiries.....

## Value by Year of US Patent Expiry





**We need innovation  
more than ever...**  
**我们比以前更需要创新**

**We need to innovate  
in new ways...**  
**我们需要在新的方式上创新**



# China healthcare strengths

## 中国医疗健康领域的优势

# China Healthcare strengths

## 中国医疗健康领域的优势

- Origin of Traditional Chinese Medicine (TCM) 2000 years ago  
中医药有二千多年的历史
- The largest single market in the world (1.3bn population) 全球最大的单一市场 (13亿人口)
- More than 1,000 research organizations  
超过一千个科研机构
- More than 20,000 hospitals  
超过二万个医院

# China Healthcare strengths

## 中国医疗健康领域的优势

- Cost efficiency in R&D (about 20% of that in western countries) 研发的成本优势 (约为西方市场的**20%**)
- 4,000 GMP Pharmaceutical Manufacturing companies 四千个符合**GMP**标准的药厂

# TCM in the West – The opportunity

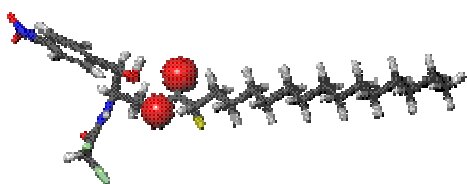
## 机遇

- **Global demand for more effective medicines**  
全球对更有效的医药的需求
- **Increasing popularity of TCM globally – because it works!**  
在世界范围内中医
- **Promise of new cures for diseases which Western medicines are yet to treat successfully (e.g. alzheimers, schizophrenia, diabetes)**  
找到对于当今西药无法治愈的疾病的疗法的希望 (例如, 阿尔茨海默氏痴呆症, 精神分裂症, 糖尿病)
- **China has strong science and excellent facilities**  
中国拥有雄厚的科研实力和优秀的设施资源
- **TCM represents a huge opportunity for China and for health in the West**  
由此可见, 中医对于中国和西方在健康领域中代表着巨大的潜力

# TCM in the West – The Challenge

挑战

- Fundamentally different approaches between Western and Traditional Chinese approaches to medicines development 西医和中医制药方式的基本差别



## Western

- Single agent 单一物质
- Reductive 收敛的
- Purity 纯化
- Evidence based 基于例证的
- Regulatory 受法规限制的



## Traditional Chinese

- Mixtures ('fufang') 混合物 (复方)
- Holistic 整体的
- Natural 自然的
- Experience based 基于经验的
- Reputational 名声

# TCM in the West – The Challenge 挑战

- **Until recently there has been limited collaboration in research between China and West in TCM**  
直到近些年，中西方在中医研究方面的合作仍很有限
- **Regulatory procedures in the West will not be relaxed, and will only be broadened if quality and patient safety can be guaranteed**  
除非质量和安全因素得以保证，西方的法规程序将不会放宽
- **TCM has two routes to the western market:**  
中医的两个进入西方市场的途径：
  - **High street functional foods market (easier to access, low value)**  
商业街上销售的功能性食品（容易进入西方市场，但低价值）
  - **Mainstream pharmaceuticals (difficult to access but \$700bn market)**  
主流药品市场（难进入，但市场价值在六千八百亿美金）



# UK healthcare strengths

## 英国医疗健康领域的优势

## 英国医疗健康领域的优势 UK Healthcare Strengths

[www.sciencebridgeschina.com](http://www.sciencebridgeschina.com)

- 将近1/4的全球前100个医药是在英国发现并开发的  
Nearly a quarter of the world's top 100 medicines were discovered and developed in Britain.
- 一半的全欧洲在研新药是属于英国的  
Half of Europe's current drug pipeline is British
- 一半的欧洲风险投资投到英国  
Half of Europe's VC funding goes to the UK
- 世界上最大的卫生保健提供者—（英国）国民医疗服务制度  
Worlds largest healthcare provider – the National Health Service



# Some UK Cluster Strengths

## Scotland (Edinburgh, Dundee, Aberdeen)

- Human and animal healthcare
- Environmental biotechnology
- Gene therapy
- Protein engineering
- Combinatorial chemistry

## Northern Ireland

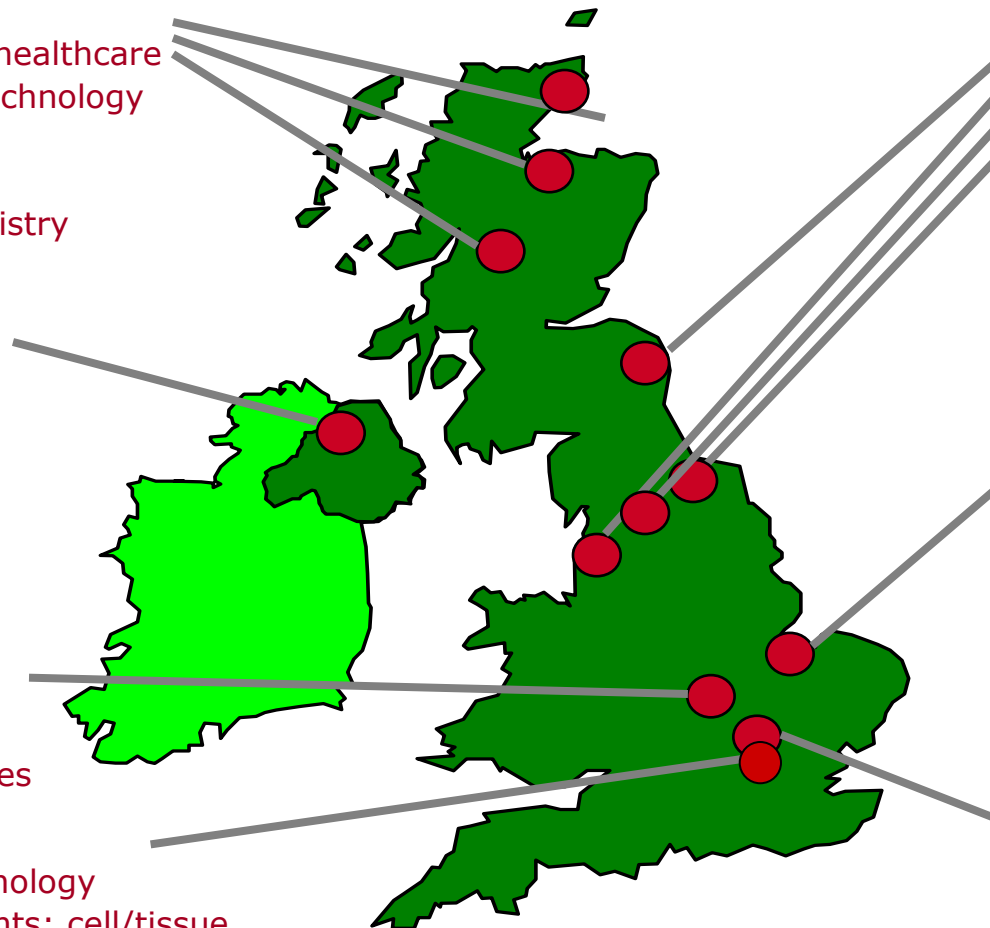
- Diagnostics
- Agriculture
- Veterinary medicine
- Food Sciences
- Environmental

## Oxford

- Proteomics
- Genomics
- Chemical libraries
- Vaccines
- Monoclonal antibodies

## Surrey

- Agricultural biotechnology
- Production of reagents: cell/tissue cultures



## North (Manchester, Leeds, Bradford, York, Liverpool, Newcastle)

- Biohealth informatics
- Genomics and Proteomics
- Medical Imaging
- Clinical Genetics
- Biomanufacturing
- Agricultural/Food Sciences
- Pharmaceutical formulation

## Cambridge

- Biopharmaceuticals
- Drug discovery--genomics, proteomics, bioinformatics, combinatorial chemistry
- Protein/DNA sequencing/engineering
- Biomaterials

## London

- Biopharmaceuticals
- Decoding/transformation of DNA material
- Functions of subcellular organisms
- Functional genomics

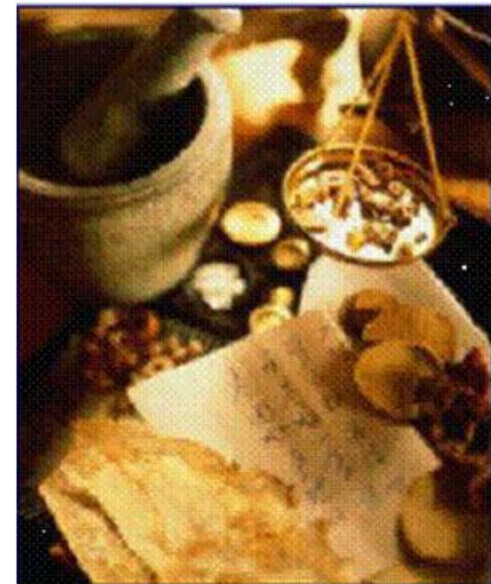
# A reciprocal process – Western R&D in China

## 互惠的过程 – 西方R&D在中国

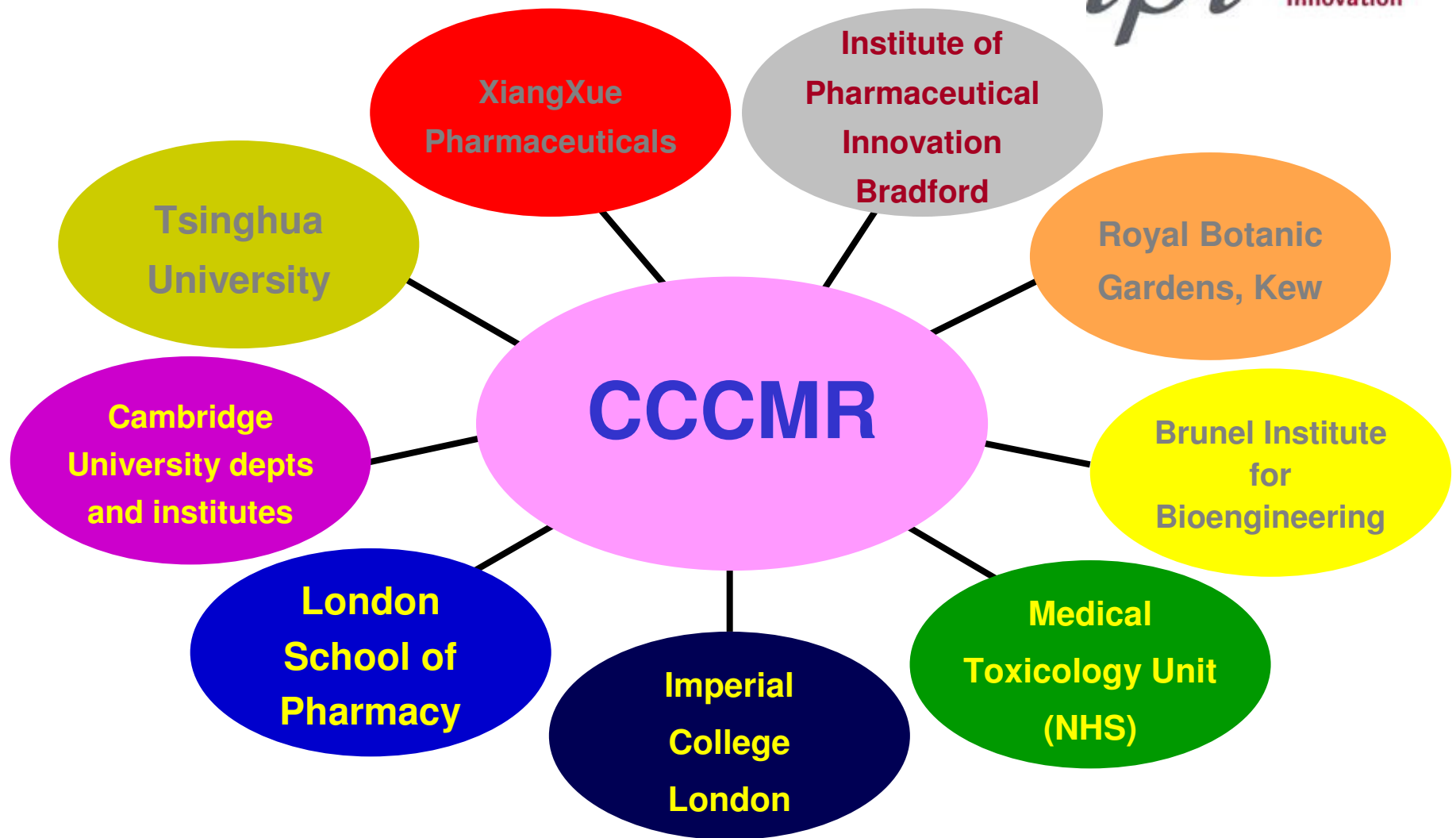
Company	Major locations	Main focus
Pfizer	Dalian, Suzhou and Wuxi	Manufacturing facilities
GSK	Beijing, Chongqing, Tianjin, Suzhou and Pudong	Manufacturing facilities and joint ventures.
AstraZeneca	Shanghai and Wuxi	Clinical development and manufacturing facilities.
Merck & Co	Beijing, Shanghai, Hangzhou, Guangzhou,	Manufacturing and possible joint development projects
Novartis	Beijing	R&D and manufacturing facilities
Roche	Shanghai and Wuxi.	R&D and manufacturing facilities
Sanofi-Aventis	Shenzhen and Beijing	Manufacturing and joint ventures importation and distribution
Lilly	Suzhou, Shanghai Hong Kong	Joint venture manufacturing, sales and marketing and R&D
Wyeth	Wu County Economic Developing Zone, Suzhou, Shanghai	Manufacturing facilities and joint ventures.
BMS	Minghang (Shanghai)	Joint venture manufacturing facilities.
Novo Nordisk	Shanghai	R&D facilities

# Academic TCM research in the UK

- Royal Botanic Gardens, Kew
- Nottingham University
- University of Lincoln
- Brunel University
- Middlesex University
- Imperial College
- Kings College London
- Cambridge University
- Institute of Pharmaceutical Innovation (Bradford)



# Cambridge-based Centre for Chinese Medicine Research





# China collaborations at the University of Bradford Bradford 大学的中国合作

# Bradford大学 - 世界级生命科学研究中心 University of Bradford - World class Life Sciences R&D

- **新药创新研究院：关注于预测制药学，医药产品的设计和改  
善（包括中医药），创造新技术和新公司**

Institute of Pharmaceutical Innovation. Focused on predictive pharmaceuticals, designing and improving medicines (including TCMs), creating new technology and companies

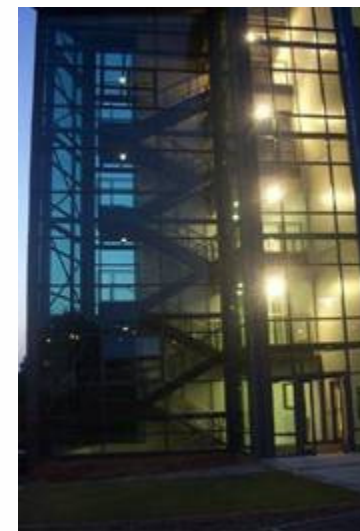
- **癌症药研究所：关注于发现新抗癌药的研究，创造新技术和  
公司以改进对癌症的治疗**

Institute of Cancer Therapeutics. Focused on researching new drugs, creating new technology and companies to improve the treatment of cancer



## Bradford大学 - 世界级生命科学研究研发中心 University of Bradford. World class Life Sciences R&D

- 高分子多学科研究中心：主要关注于在医疗健康领域的先进高分子材料的应用（例如，医疗设备，移植）  
Polymer Interdisciplinary Research Centre. Key focus on healthcare applications of advanced polymeric materials (e.g. Devices, Implants)
- 政府认证的（制药和高分子材料）工业合作中心  
Accredited Centres (Pharmaceutical and Polymers) of Industrial Collaboration
- 中英经贸联合委员会健康领域工作组大学成员  
Academic member of the China-UK Joint Economic Trade Commission Healthcare Working Group



# What is the IPI?

- **A world-class research centre of excellence in predictive pharmaceuticals, focused on accelerating drug development**

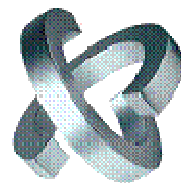
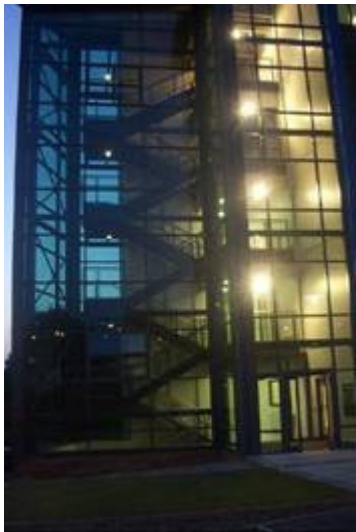
世界一流的擅长于预测制药学的研究中心，致力于加快医药研发的速度

- **A Centre for new Bioscience Businesses**

新生物科学中心

- **An accredited Centre of Industrial Collaboration**

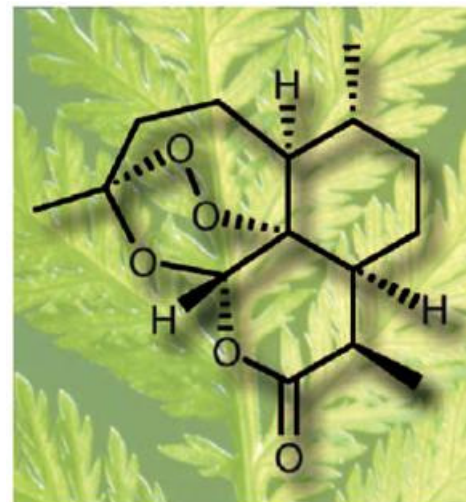
英国政府授权的工业合作中心



Pharmaceutical  
Innovation  
Centre of Industrial  
Collaboration

# IPI support to Chinese Companies

- Collaborative technology development  
技术开发合作
- Contract research consultancy support  
外包研发的支持
- Product positioning (marketing) advice  
产品定位的建议（行销）
- A base in Europe...  
在欧洲的分支...



# IPI support to Traditional Medicine

- **Developing underpinning science**  
开发支撑学科
  - Knowledge engineering - finding new relationships in data  
知识工程 – 在数据中寻找新的相互关系
  - Development of analytical techniques  
分析技术的开发
  - Deformulation and reformulation  
混合物的分离和再合成
- **Contributing regulatory advice to MHRA  
Chemistry and Pharmacy standards**  
向MHRA提供有关化工和制药法规方面的建议
- **Committee for the Internationalization of  
Chinese Medicine**  
中医药国际化委员会



# A collaborative approach to developing new therapies for Type II Diabetes



**Clinical Diagnoses and Sampling**  
临床诊断和取样

**Chemical Analysis Data Preparation**  
化学分析和数据准备

**Data Analysis and Interpretation**  
数据分析何解释





# The Bradford Science Bridges Programme

**Bradford 科技桥项目**

## 英中科技桥奖

[www.sciencebridgeschina.com](http://www.sciencebridgeschina.com)

### What are the UK-China Science Bridge Awards for?

- 由英国研究理事会发起和资助 - 同时中国科技部将此项目定为重点支持领域

Initiated and funded by RCUK (£1.3m grant) - with additional support from China's MoST as a priority international collaboration

- 加速科研知识的发展，深化和强化当前中英的科研创新合作

To **accelerate the deployment of research knowledge, deepen and strengthen** current research innovation links between UK and China

- 通过改善科研和专业技术从科研领域到商业及其他使用者的转化  
by improving the **transfer of research and expertise** from the research base to businesses and other users, and
- 通过建立在中英国际一流大学和高技术公司之间的科学和创新桥梁  
by building **science and innovation bridges** with world-class universities and high-tech businesses between UK and China.

## 项目概括: Programme outline

[www.sciencebridgeschina.com](http://www.sciencebridgeschina.com)

- **开放式创新计划:**  
Open Innovation programme:  
**项目: 包括工业界的参与 (英国和中国)**  
Projects including industry (UK and/or China) where appropriate
  - **可行性论证项目和原型产品开发**  
Proof of concept and prototypes
  - **建立创新型公司**  
Establishment of new innovation companies
  - **新合作关系**  
New partnerships and new collaborations
  - **知识产权: 产生和开发**  
Intellectual Property: Creation and exploitation

## 项目概括: Programme outline

[www.sciencebridgeschina.com](http://www.sciencebridgeschina.com)

- **网络:** 加强现有网络, 并增加其价值—包括商业成员  
**Networks:** Strengthen existing networks, and add value - includes commercial members
- **培训:** 于中国合作伙伴逐步展开互惠的培训计划  
**Training:** Develop reciprocal training with Chinese groups
- **开展向合作伙伴进行知识转移的活动**  
Develop **Knowledge Transfer** to partners
- **政策:** 在本国和国际层面对政策产生影响  
**Policy:** Influence policy at national and international level

# 开放式创新研讨班

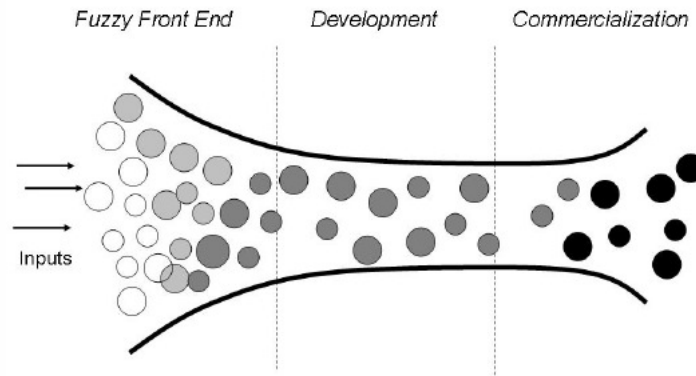
## Open Innovation Workshops

- 为英中学术界和工业界合作创造机会  
Create opportunity for collaborations between UK and China academics and companies
- 激励合作新思路和产生新的（开放式创新）科技桥项目  
Stimulating ideas and the generation of new (Open Innovation) Science Bridges projects
- 为项目的开发和商业化聚集新资源  
（例如，互补性技术，技能和设施）和工业伙伴  
Assemble new resources (e.g. complementary technologies, skills and facilities) and industrial partners for the development and commercialisation of projects

*Additional £1.6m in collaboration  
with China provincial government*

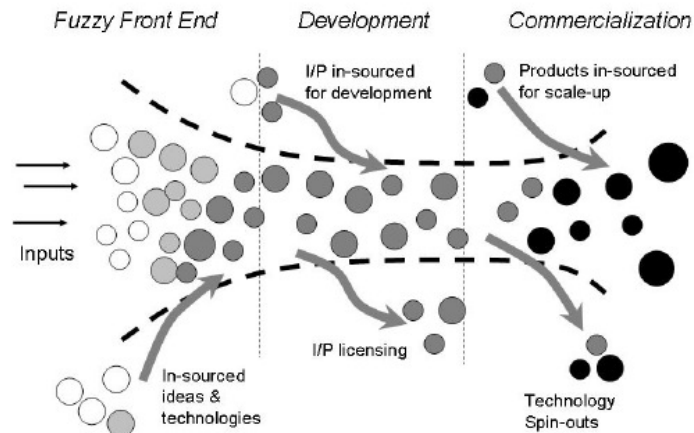
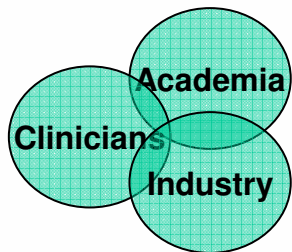


- Closed Innovation



What is 'open innovation'?

- Open Innovation



## 预期成果

## Expected outcomes

- 产生16个新的开放式创新项目，由地方和科技桥计划资助  
16 new open innovation projects, funded locally as well as through Science Bridges activity
- 12个项目商业化  
12 projects commercialised
- 知识产权持有（至少8个新专利申请）和相关收入  
IP holding (at least 8 new patent applications) and associated revenues
- 建立4个新合作公司（英国和中国）  
4 new joint companies (UK and China) established

## Potential projects from this programme

- An improved, supergeneric pharmaceutical
- An established drug with a new route of delivery (e.g. Inhaled, ocular)
- TCM simplified as a chemical medicine for global market
- A new delivery device or technology
  
- An improved pharmaceutical manufacturing process
- A new medical device
- A new diagnostic
- An improved imaging system



Institute of  
Pharmaceutical  
Innovation

# Innovating with China – important lessons learned

## Our case study

- State-owned, leading Chinese institute in nanotechnology 'CI'
- Excellent facilities - complementary strengths with IPI
- IPI had strong links with a newly-appointed CI principal scientist
- Sought to establish a 51%:49% Joint Venture
- 4 face-to-face meetings, 3 teleconferences, daily phone calls
- MoU signed
- Heads of agreement signed
- IPI pulled out when no significant progress made on finalising contract inside 120 days
- Alternative solution sought. Deal signed, laboratory established



# Lessons learned from the CI experience - negatives

- **CI were principally interested in forming a high-profile collaboration with a UK organisation**
  - as a means of increasing chances of securing government funding
- **Although very senior, our ally was new to the CI team**
- **CI's key decision maker not present at all meetings**
- **Dominance of risk averse CI government culture**
- **Negotiations often tended to be one-way**
- **CI had a limited understanding of the value of an IP-based business, and IPI had few tangibles to offer!**

# Lessons learned from the 'CI' experience - positives

- Benefits of having a Chinese national on your team
- Benefits of having an ally in the other team
- Benefits of taking a win-win approach
- CI's willingness to listen to proposals
- Maintaining relationship even when frustrated
- Much to gain working with CI



# Critical success factors - 1

- **A clear product proposition**
  - Chinese preference for tangible offerings
  - Service/consultancy market poorly established
- **Understand who key decision-maker is**
- **Establish credibility**
  - Leverage your brand
  - Use high-profile referrals (e.g. Embassy)
- **Have a workable business model**
  - Selling at low cost, high quality
  - Sourcing at low cost, high quality



# Critical success factors - 2

- **Understand Chinese business culture and practice**

- Guanxi (importance of relationships)
- Language and translation
- Business meal
- Yes means 'I understand you' NOT 'I agree'
- Relationship more important than contract
- JIT...! Schedules are set up at short notice

- **Role of government**

- Restrictions to full capitalist model
- Government provides, enables, supports

- **Patience**



# Pitfalls to avoid

- **Losing patience**
- **Causing loss of face**
- **Translation must always be in context – need technical interpreter**
- **‘Ball-park figures’**
- **Leaving no room to haggle!**
- **Separating product and service/training**
- **Valuing intangibles**
- **Respect for Intellectual Property**
- **Assuming poor quality – low tech**
- **Reading too much into an MoU**
- **Over-reliance on contracts**
- **Being teetotal, non-smoker or vegetarian...!**





# Summary

小结



## Summary 小结

- We need to innovate, and innovate in new ways  
我们需要创新，并且在新的方式上
- China represents an extraordinary resource in healthcare, in both new and traditional approaches  
在现代和传统的手段上，中国代表着卓越的医疗健康资源
- The UK is one of the strongest healthcare R&D markets in the world  
在医疗健康研发市场，英国是全球实力最雄厚的国家之一

## Summary 小结

- The Science Bridges programme aims to accelerate collaboration and innovation to the benefit of both nations and patients world-wide  
科技桥项目将加速合作和创新对两国以及对世界范围病人的贡献
- The key to the programme's success will be a respect for each other's strengths, cultures...and a willingness to give it a go!

# Thank you for listening

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