



Royal Veterinary College
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Innovation China UK
中英科技创新计划

Infectious Diseases

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The Challenge of Infectious Disease

Infectious disease represents the greatest challenge to mankind

- From 2007, more than 50% of the world's population now lives in cities
- Deforestation together with climate change is altering human – animal reservoir relationships
- Rapid development of new viral and bacterial strains
- Rapid air travel

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A new pathogen is now emerging at a rate of approximately one per year

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Chronic infections such as Hepatitis B (HBV), Hepatitis C (HCV) and HIV are threats to public health

The Problem of Hepatitis B

- A major viral infection of the liver acquired
 - By children borne to carrier mothers
 - As a result of drug abuse
 - Through blood transfusion or use of contaminated instruments and needles
- In Asia over 10% of the adult population are carriers of hepatitis B virus (HBV) and at risk of developing cirrhosis and liver cancer
- China has very effective childhood immunisation programmes to prevent new infections
- There remain >50 million adult carriers at risk of serious liver disease
- Antivirals are not the answer

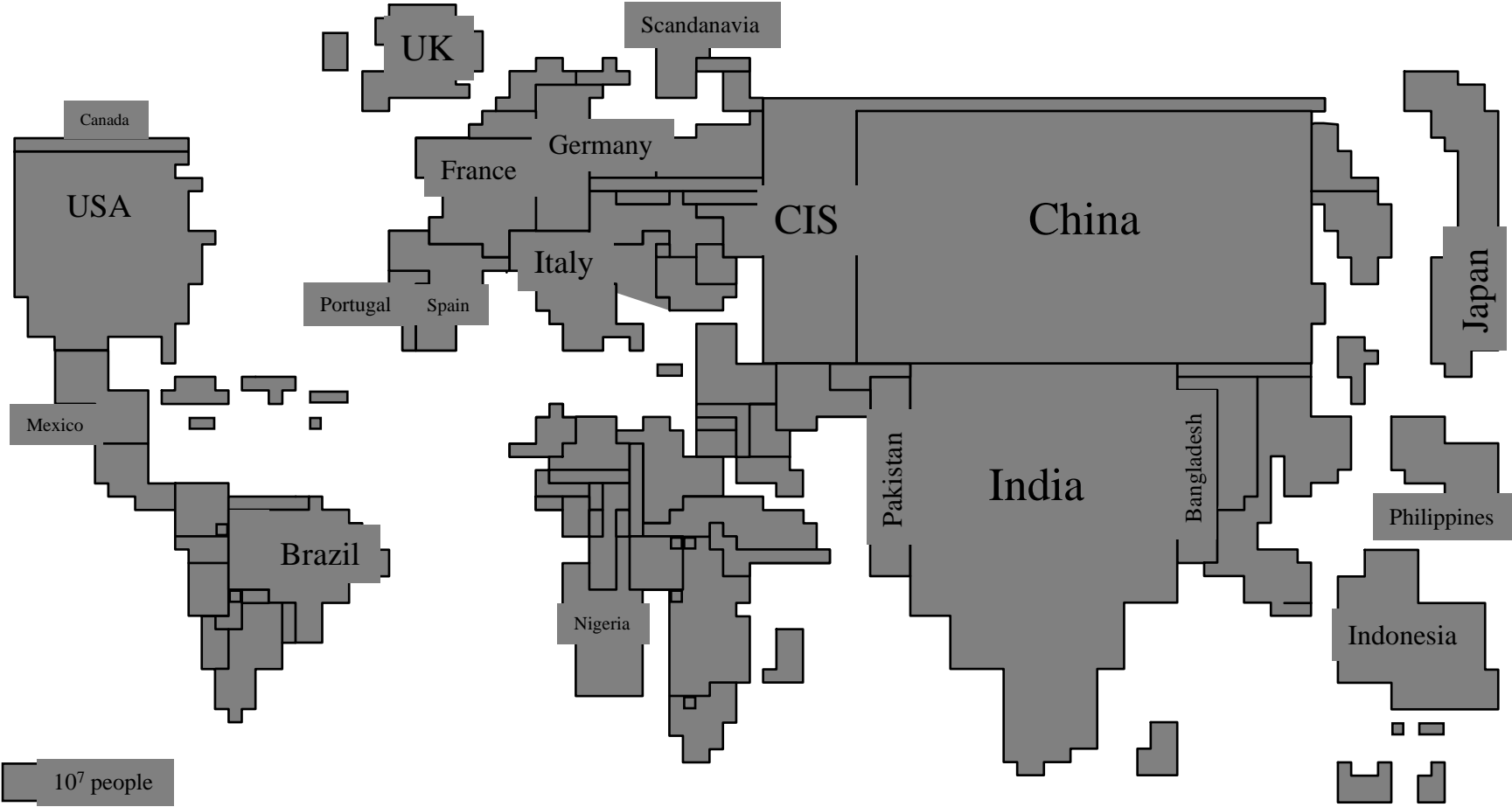
Hepatitis B Therapeutic Vaccines

- Global vaccine market estimated at \$5.5b with expected growth of 13.5% p.a. to in excess of \$10bn by 2010
- The market share for therapeutic vaccines will rise progressively over the next 3-5 yrs
- Cost of treating chronic hepatitis B is \$700m p.a. in the USA alone, \$10,000 per patient
- Globally over 1.2 million new HBV infections per year, 200,000 in the USA
- By 2010, 5 million people worldwide will require treatment
- Estimated cost per dose of a therapeutic vaccine \$500

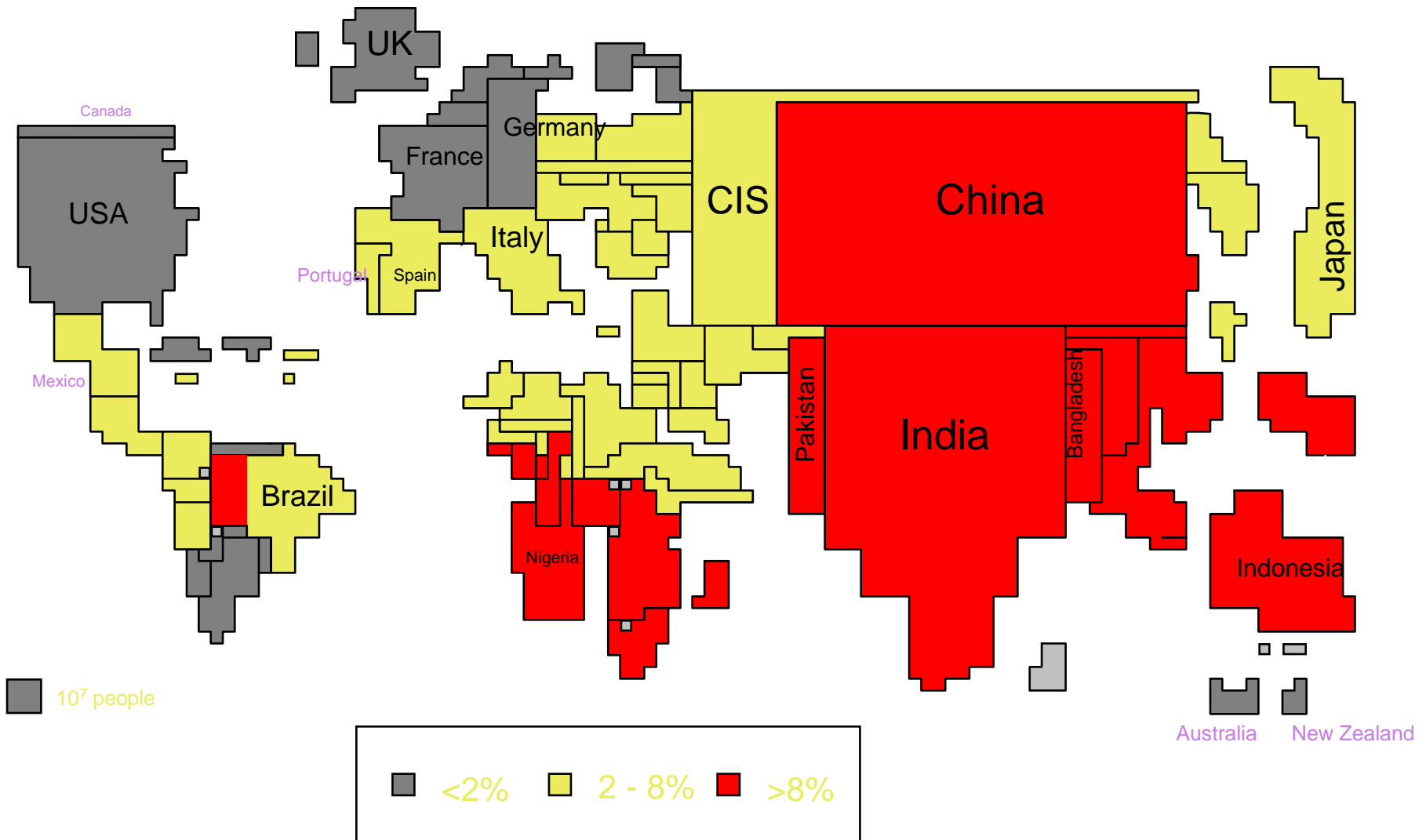
Developing an effective post exposure vaccine for treating chronic hepatitis B

- Collaborative project between Professors Wen YuMei, Yuan ZhengHong at the Shanghai Medical College of Fudan University and myself at RVC
- Wen and colleagues have developed an immune complex immunogen combining viral envelope protein and specific antibodies – technology licensed to Yudan Biotechnology in Pudong
- We have developed new technologies for vaccine delivery with promise for post-exposure prophylaxis
- Aim is to capture the complementary expertise and technology to develop a novel post-exposure therapeutic vaccine

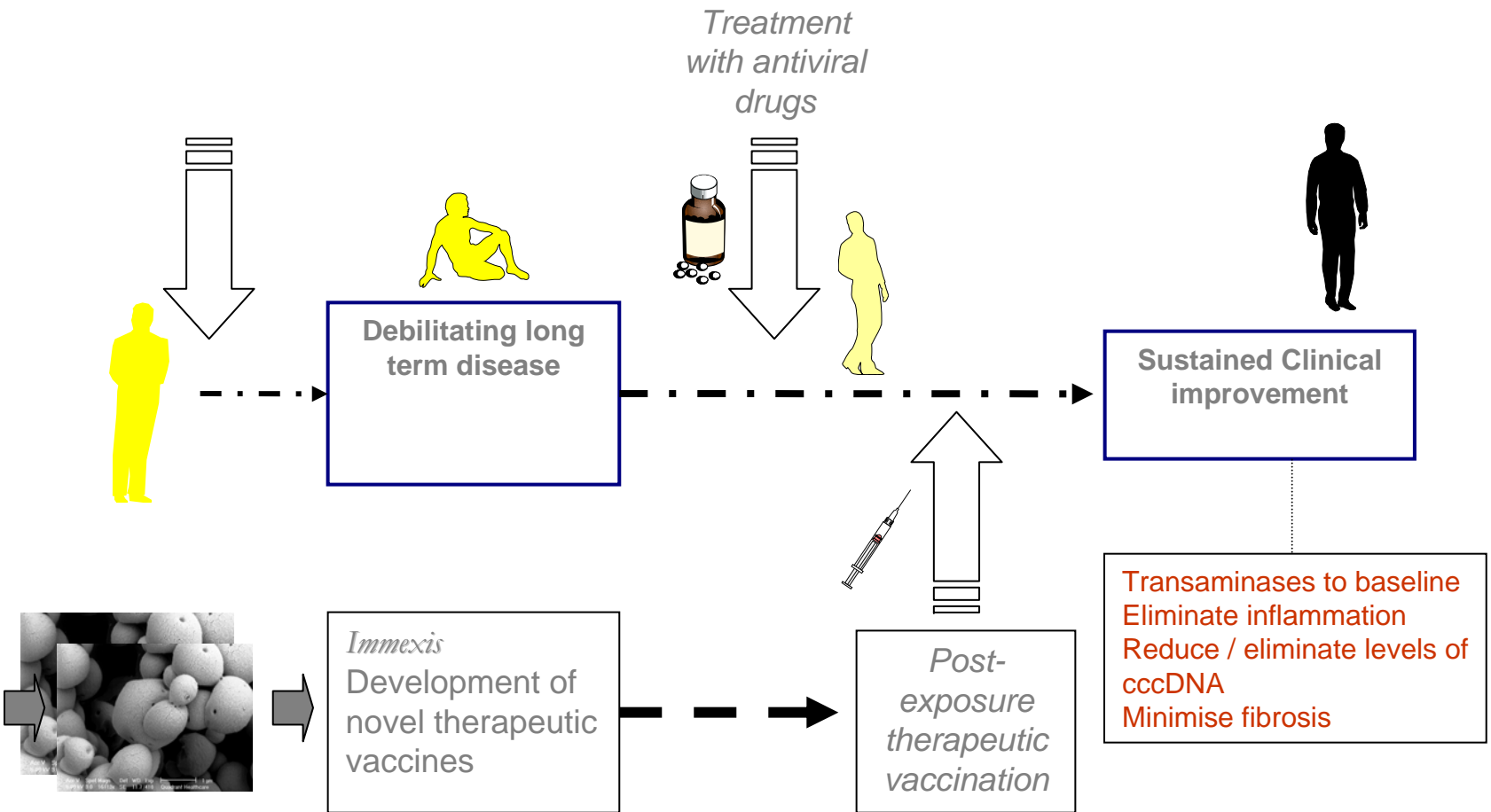
The World's Population



Global Prevalence of Hepatitis B Carriage



The Concept of Post-Exposure Immunisation for Chronic Hepatitis B

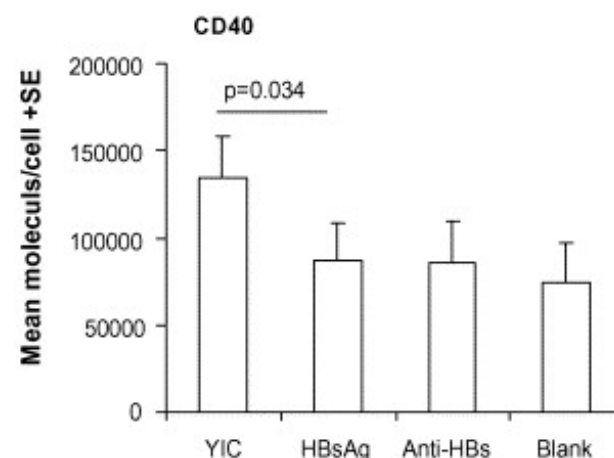
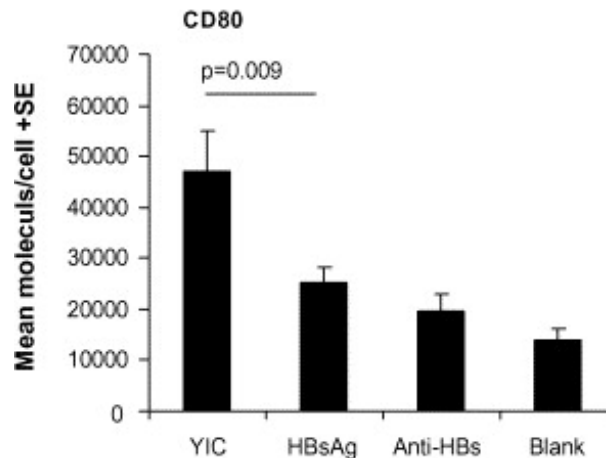
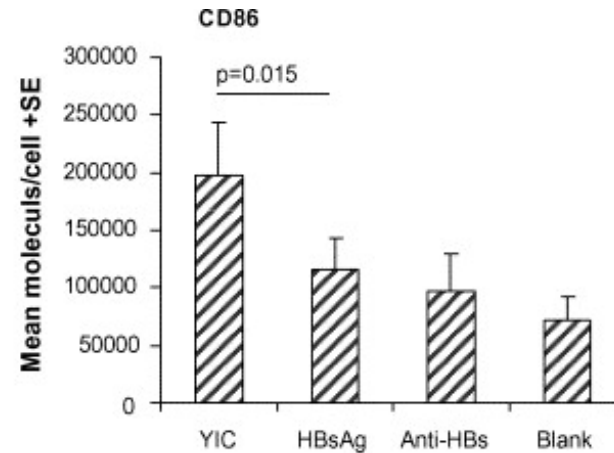
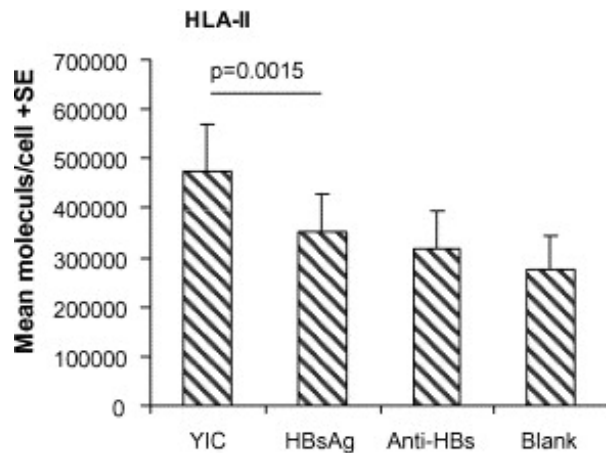


Immune Complex Immunogen

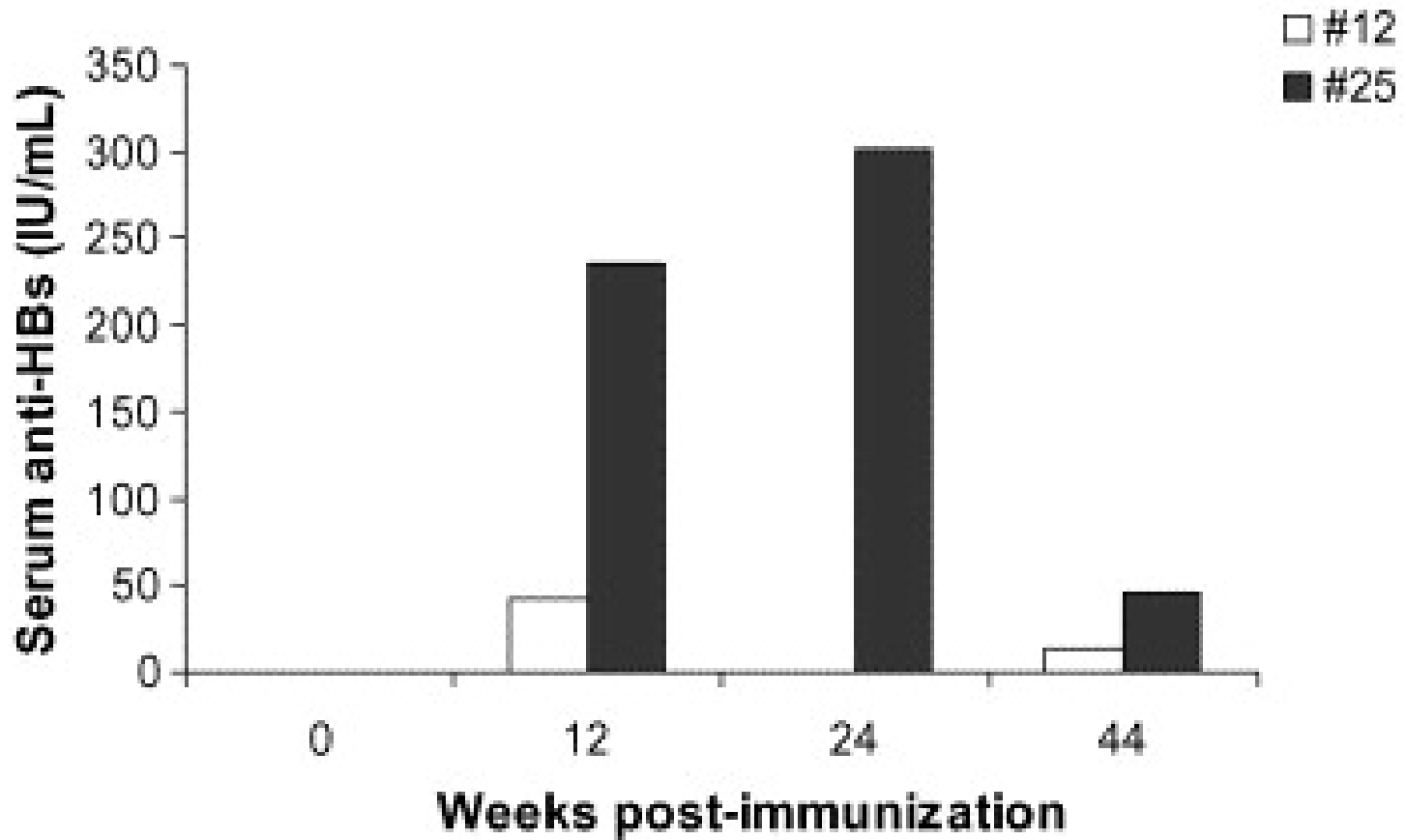
(Professor Wen YuMei, Shanghai)

- Take existing licensed hepatitis B vaccine used for preventative immunisation of children in China
- Complex this with human antibodies to the surface protein (HBsAg) of the virus
- Inject into adult virus carriers
- ... expected result is the stimulation of cells required for eliminating virus from the liver
- Phase 1 trials conducted; phase 2a in progress
- Issues relate to quality and specificity of antibody and delivery of the immune complex (“YIC”)

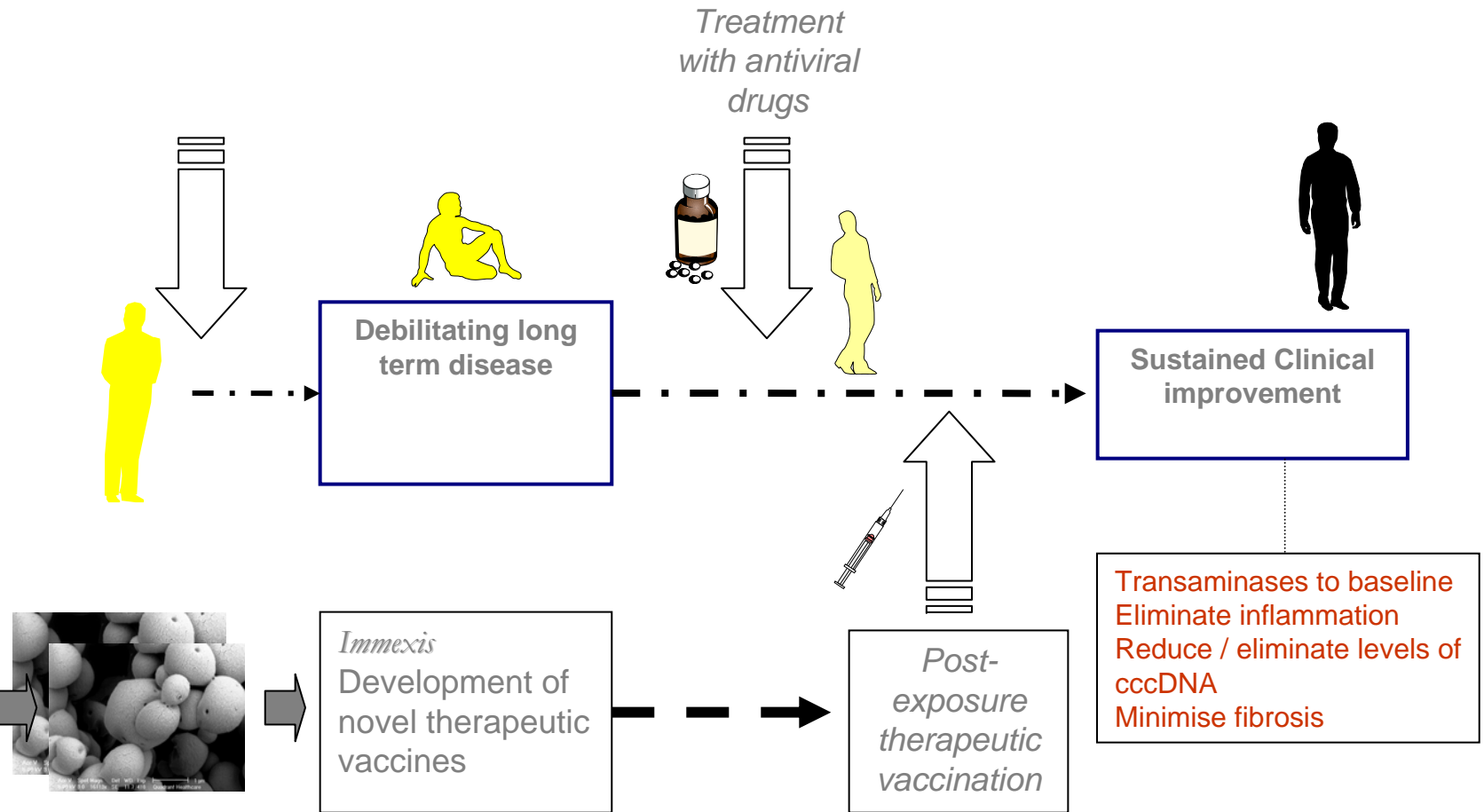
Post-exposure prophylaxis of chronic hepatitis B



Post-exposure prophylaxis of chronic hepatitis B



The Concept of Post-Exposure Immunisation for Chronic Hepatitis B



Conclusions

- Post-exposure prophylaxis expected to result in new therapeutic approaches to chronic infectious diseases
- Utilises the skills and experience of two groups that has collaborated since 1980
- Further development is required regarding
 - (a) internationally accepted source of anti-HBV antibodies
 - (b) standardisation of methods and potential scale-up
 - (c) incorporation into a delivery vehicle
- Extension possible to other infectious diseases of importance to China e.g. hepatitis C

Inoculation practiced since circa 1100AD



“ this foreign art of vaccination may be carried out in all provinces, for it will truly prolong life.”

*Yuen Yuen, Governor-General,
Liang Kwang Provinces, 1817*

谢谢!