

China-U.S. Relations: Trade Diplomacy, and Research
November 14-17, 2005
Beijing, China

Research Roundtable Summary

Session Title: Environmental Concerns and Birth Defects Research in China

Co-Chairs (name and affiliation):

U.S.: Prof. Richard H. Finnell, Institute of Biosciences and Technology, Texas A&M University Health Science Center

Chinese: Prof. Li Zhu M.D., M.P.H., Director
Peking University Institute of Reproductive and Child Health
Peking University Health Science Center

Prof. Xiaoying Zheng, MD, Ph.D.
Director and Professor
Institute of Population Research
WHO Collaborating Center on Reproductive Health and Population Science
Peking University

Other Collaborators:

Dr. Thomas H. Rosenquist, University of Nebraska Medical Center, Dr. Anna Maria Siega-Riz, University of North Carolina School of Public Health, Dr. Jacqueline Gindler, Centers for Disease Control and Prevention- Peking University Institute of Reproductive and Child Health, Dr. Nancy W. Dickey, Texas A&M University Health Science Center, Dr. K.C. Donnelly, School of Rural Public Health, Texas A&M University Health Science Center, Dr. Philip Mirkes, College of Veterinary Medicine, Texas A&M University, Dr. Jiapeng Chen, Institute of Population Research, Peking University, Prof. Xinming Song, Institute of Population Research, Peking University, Dr. Laura Mitchell, Institute of Biosciences and Technology, Texas A&M University Health Science Center, Dr. Ting Zhang, Capital Institute of Pediatrics, Dr. Ren Ai-guo, Peking University Institute of Reproductive and Child Health, Dr. Gong Chen Institute of Population Research, Peking University and Dr. Jianming Wu, Capital Institute of Pediatrics.

Session Summary (include summary of field of research):

The session was devoted to the study of environmental causes of complex birth defects. The topics covered included epidemiological and genetic approaches including gene-environment interactions to study the factors that contribute to the excessively high rates of congenital anomalies in certain regions of China.

China has long recognized the importance of protecting its future generations. This includes minimizing the risk of environmental factors that might be contributing to birth defects. This is increasingly difficult in a highly industrialized society. Understanding the magnitude of the problem is a critical first step in alleviating the risks involved to present and future generations. Several different research groups in China are presently working diligently to document this very problem.

Findings/Recommendations:

While the work conducted by Prof. Li Zhu and his staff at the Institute of Reproductive and Child Health in collaboration with the CDC in the USA produced the strongest evidence to date that women who take the vitamin folic acid in the periconceptional period can reduce the incidence of neural tube defects such as spina bifida in their intervention trial, more recent work conducted in Shanxi Province by the Capital Institute of Pediatrics investigators now show that the prevalence rates of NTDs are in excess of 10% of births, making these the highest in the world! There are clearly environmental and nutritional factors that may be contributing to these excessively high rates. The diets in this province are lacking in sufficient folic acid and vitamin B12. This may contribute to elevations of homocysteine, which is a know risk factor for cardiovascular disease and is also thought to contribute developmentally to birth defect risks. There is thought to be exposure to high levels of PAHs, arsenic and other heavy metals which may also be teratogenic. These represent very complex interactions whose etiologic basis must be dissected out in order to understand their contributory role to the problem of birth defects in Shanxi and other regions of China.

Future Collaborations and Justification:

It is essential to develop a strong and sustained research infrastructure. At the present time, it is very difficult to remove biological samples from China. This has not always been true, but at the present time, it is increasingly difficult to obtain the proper export permits. While ideally all the analyses could be run by our Chinese collaborators, this is just not practical. Good science would predicate that studies be validated in separate laboratories. Unfortunately, even that is not possible. So we should endeavor to establish and sustain strong research facilities in collaborative laboratories in China where the analytical work could be conducted.

There is a strong need to foster collaboration between research groups not competition. Studies of birth defects require large populations followed over many years or decades. This demands cooperation. We hope that the primary affiliates-Peking University, Peking University Health Science Center, Texas A&M University and Texas A&M University Health Science Center faculty and scientists can find the means to work together and identify target areas to pursue. These might include:

- Genotoxic studies of bulky adducts
- Genomewide neural tube defect association studies
- Role of folate receptor autoantibodies on NTD risks
- Maternal nutritional studies
- Apoptotic genes underlying susceptibility to NTDs

Other Information:

The organization of these meetings was flawed and did not permit an exchange of this important information to Chinese students and junior scientists. We hope that the meetings when they take place in future years will be more open and accessible. This will also serve to not only educate, but to foster more collaborations.