

Multiple Sclerosis in China

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Aims and Objectives

Multiple Sclerosis (MS) is an incurable disease, characterized by demyelination in central nerve system resulting from myelin sheath being attacked by immune system. As a result, MS patients may suffer severe neurological disabilities such as damaged sensation, difficulties with movement and memory impairment. So far the real cause of MS is still unknown. European and Northern American countries show significantly high prevalence of MS (eg in Scotland, 200 cases in the 100,000 population) compared to the rest of the world. In contrast, the prevalence of MS in China is very low (<2 per 100,000 persons). The recent economic boom in China has changed people's lives there dramatically, as shown in living conditions, medical care, food structures, migration and interracial marriages, and interestingly reported MS cases have been increasing along with the development of the country. Investigating the reasons behind the rising cases of MS in China will provide new insight into the etiology of MS in general.

With the help of this small grant, we aimed to:

- 1) Set up collaborations among molecular neurobiologists, clinical neurologists and statisticians from Britain and China;
- 2) Collect and analyse published data on MS that have occurred in China
- 3) Offer training of cutting-edge molecular and cellular techniques to the lab members of Chinese collaborators
- 4) Look into the potential methods to collect, compare and analyze the samples from MS patient in China and in the UK

Cross disciplinary

The collaborations have involved scientists specialized in different fields. Individual team members look into MS from genetic, clinical and statistical perspectives respectively, and the formed partnership enables all team members to work together across boundaries, exchange ideas and techniques and share data and resources. Contributions made by different members are reciprocal, complementary and inspirational to one another. The long term aim of this cross disciplinary collaboration is to reveal the causes for MS in China and compare the genetic differences between the Chinese Patients and British patients, which will benefit the understanding of MS worldwide.

Activities

1. Dr. Li and Dr. Xue had met each other every month to discuss the progress of the grant and analyzed output data
2. Dr. Li had visited Beijing in April, 2010 for one week and discussed the collaboration with leading Chinese Neurologist Prof. Xiaozhong Peng, who is chairing several Chinese National Program grants, in Chinese Academy of Medical Sciences (CAMS); Dr. Li held a scientific seminar in CAMS, advised the students on their on-going projects and gave them training on cutting-edge molecular and cellular techniques
3. After the visit, Dr. Li has been co-supervise two graduate students of Prof. Peng, Mr. Bin Zhou and Miss Yanfang Pan. They have been collecting MS data in Chinese population and perform some pilot experiments.
4. Meanwhile, Dr. Li had set up collaboration with other Chinese Neurologists – for example, Dr. Yifang Zhang in Guangdong people's Hospital in South China.
5. Dr. Xue had visited Beijing in April, 2011 for 10 days. He had meeting with Prof. Peng and discussed the future collaboration. He also visited the Department of Epidemiology and Biostatistics of CAMS, exchanging research expertise, common research interests and potential collaboration.

6 After the completion of the grant

- 1) Investigate the method to drive fibroblasts into Oligodendrocytes (MS targeting cells) via the iPSC (Induced pluripotent stem cell) stage in mouse MS model, which will be used to analyze the genetic differences between MS patients in China and in Britain by converting patient fibroblasts into Oligodendrocytes
- 2) Choose Xinzhou District in Northern Central China which has a 3 million population, 99.86% of which are Han ethnic, with a low migration rate compared to most other areas in China, as future MS study target

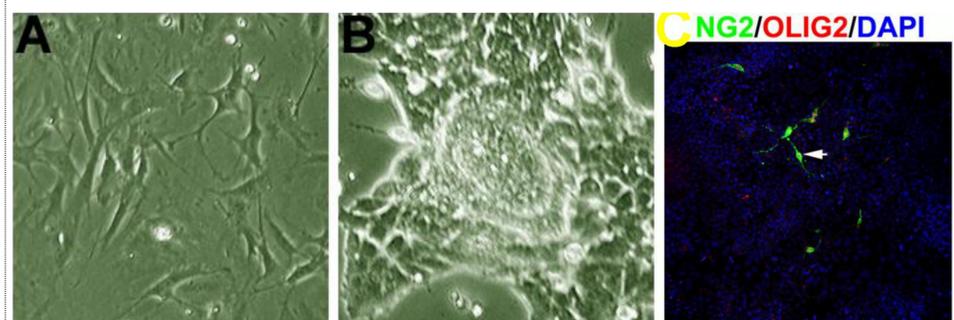


Fig 1. A, Fibroblast; B, iPSC; C, Oligodendrocyte differentiation from iPSC.

Outputs and impacts

- 1) we have set up the close scientific collaboration team; we are currently preparing for 2 manuscripts (one is about statistic analysis of MS in China; another one is about converting fibroblast into Oligodendrocyte); we are also writing grant applications to Chinese Foundations to support our future collaboration activities.
- 2) graduate students and research scientists in collaboration labs have obtained cutting-edge knowledge to study MS
- 3) after the running of this grant, we set up a clinical collaboration site in Xinzhou District Hospital where the MS have yet to be reported
- 4) just one month after this grant started, the Ministry of Health of the Chinese government issued the first ever MS diagnosis guideline and began to set up 8 MS-diagnosis training centres nationwide; this grant gave us a chance to bring such a guideline together with MS-related laboratory techniques to remote areas such as Xinzhou District.

Conclusions

- By summarizing the published MS data, we come to the following conclusions: MS in China - women are in higher risk than men; spinal cord is the more common target for MS; almost all of MS cases don't show family history.
- We can successfully induce fibroblasts into Oligodendrocytes. This technique will be used to explore the genetic defects in MS patients and has the potential to be used for stem cell replacement therapy in the future.

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