

(For JSPS Fellow)

Form B-5

Date (日付): 17/12/2016

Activity Report -Science Dialogue Program-
(サイエンス・ダイアログ事業 実施報告書)

- Fellow's name (講師氏名): Chia Wen Lin (ID No. P15105)

- Participating school (学校名): Iwata south high school

- Date (実施日時): 16/12/2015 (Date/Month/Year: 日/月/年)

- Lecture title (講演題目): (in English) Understanding inflammation in autistic brain

(in Japanese) no Japanese title

- Lecture summary (講演概要): Please summary your lecture 200-500 words.

Abstract

Nervous system is composed of **neurons** and **glia** cells to form integral network. Neurons are the basic units in nervous system, however, they never function alone; they organize into different **neural circuits** to process specific types of information. For this reason, neuronal cells have specialized structures called **dendritic spine** and **axonal terminal** for receiving and transmitting messages among each other. Meanwhile, glia cells, including **astrocyte**, **microglia** and **oligodendrocyte**, help neuron to function properly.

Autism Spectrum Disorders (ASD) is complex disorder of brain development (**neurodevelopment disorders**). Both environmental factors and genetic deficits contribute to the pathogenesis of ASD. The most well-known environmental factor is maternal infection during pregnancy. Robust **cytokine** production induced by **inflammatory response** is believed to affect brain development. On the other hand, mutations in genes involved in **synaptic** function are found to cause ASD. In the current study, we are interested in neuroinflammation (brain inflammation) phenomenon observed in autistic patients by Dr. Pardo's group in John Hopkins University. Furthermore, hyper inflammatory responses are observed in peripheral immune system in autistic patients and the extent of inflammation is positively correlated to the severity of autistic symptoms. These findings suggest the common mechanisms behind peripheral and neural inflammation, which cause GI (gastrointestinal) disorders and affect brain development, respectively, in ASD patient. After a preliminary screening, we confirmed BTBR mice as a good ASD model to recapitulate neuroinflammation. In BTBR brain, brain inflammation can be detected as early as E12, which is coincident with microglia genesis in CNS. To dissect which cell type mediating inflammation in brain, primary culture of microglia, **cortical neuron** and astrocyte were first used to analyze their cytokine expression profiles. The results show aberrant activation pattern in microglia and indicate that microglia development might be different in BTBR mice. Further studies are ongoing to investigate the molecular mechanism distinguishing

between BTBR and B6 microglia.

On the other hand, during the analysis of BTBR mice, we accidentally discovered the BTBR strain from RIKEN BioResource Center might be used to model **high functioning autism**. Comparing with BTBR mice from Jackson lab, neuroinflammation can be detected in both strains, however, only JAX BTBR mice have agenesis of **corpus callosum** (AgCC). Subsequent behavioral analysis showed that both BTBR mice have similar levels of social impairments and repetitive behaviors, but RIKEN BTBR has normal spatial learning/memory. Therefore, it is proposed that neuroinflammation, which is common in both strains, may involve in the development of neural circuitry related to social and repetitive behaviors. On the other hand, genes responsible for the AgCC in JAX BTBR may explain the learning disabilities in ASD patients.

- Language used (使用言語): English

- Lecture format (講演形式):

◆Lecture time (講演時間) 120 min (分), Q&A time (質疑応答時間) 15~20 min (分)

◆Lecture style (ex.: used projector, conducted experiments)

(講演方法 (例: プロジェクター使用による講演、実験・実習の有無など))

Gived a talk and used powerpoint slide and projector

◆Interpretation (ex.: assistance by accompanied person, provided Japanese explanation by yourself) (通訳 (例: 同行者によるサポート、講師本人による日本語説明))

There is no Japanese explanation by with key world in Japanes on the slide.

◆Name and title of accompanied person (同行者 職・氏名)

No

◆Other note worthy information (その他特筆すべき事項):

I sent the power point slide and astrast to the school teacher before the talk.

- Impressions and opinions from accompanied person (同行者の方から、本事業に対する意見・感想等がありましたら、お願いいたします。):