

Form B-5

Date (日付)  
01/11/2011

**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): Ahmed Khandaker Ahtesham (ID No. P11105)

- Participating school (学校名): Nobeoka High School

- Date (実施日時): 01/11/2011

- Lecture title (講演題目): Unique function of 8-nitro-cGMP in sepsis pathology

エンドトキシンショックにおける新規環状ヌクレオチド:ニトロcGMPの  
シグナル制御

- Lecture summary (講演概要):

Please see Annex 1 (next page)

- Language used (使用言語): English

- Lecture format (講演形式):

◆Lecture time (講演時間) 80 min (分), Q&A time (質疑応答時間) 40 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))

Used 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))

None

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

Not Applicable

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

- 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。):

## Annex 1 (Lecture summary)

### Lecture part 1:

Sepsis is a critical clinical syndrome characterized by severe hypotension, hyporeactivity to vasopressors and progressive multiple organ dysfunctions which is responsible for 210,000 cases of death per year only in the United States. Although overproduction of nitric oxide (NO) by inducible nitric oxide synthase (iNOS) has been implicated, the cause of delayed and persistent hypotension and systemic vasodilation during sepsis is still unclear. Recently, Professor Akaike has clarified the physiological formation of 8-nitro-cGMP, a novel derivative of cGMP, and its critical role in the NO signaling. 8-Nitro-cGMP, with its unique electrophilic property, can react with sulfhydryl groups of protein cysteine to cause a novel post-translational modification called S-guanylation. It has also been found that 8-nitro-cGMP can activate protein kinase G (PKG)-dependent vasorelaxation in the organ bath assay. PKG, a cGMP-dependent serine threonine protein kinase, is responsible for the smooth muscle relaxation. It contains several redox-sensitive cysteine residues, which could be a potential target for S-guanylation. I have found that PKG1 alpha indeed undergoes S-guanylation at Cys<sup>42</sup> and Cys<sup>195</sup> residues. On the other hand, I have also found that cGMP and 8-nitro-cGMP both can activate the PKG in the same degree except the activation due to 8-nitro-cGMP remains constant even after desalting the low molecular weight compound from the PKG kinase activity assay reaction mixture. These data suggest that, the S-guanylation of PKG by 8-nitro-cGMP may occur in the sepsis results in the persistent activation of PKG followed by hyporeactivity to vasopressors and delayed and persistent hypotension.

### Lecture part 2:

I am a JSPS post doctoral fellow from Bangladesh who came to Japan at 2006 to get my Phd degree from Kumamoto University. Bangladesh is a beautiful little country situated in Asia between India and Myanmar. Its population is quite high. We have got Independence at 1971. Our mother language is Bengali. We have six different seasons. We have many world heritage spots. Our favorite game is cricket. Our culture is very colorful and the festivals are quite enchanting and joyous. And last but not least we have many delicious cuisines in Bangladesh. Welcome to Bangladesh.