

Form B-5

Date (日付) 22/12/2017

(Date/Month/Year: 日/月/年)**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): Basit Yousuf (ID No. P16101)
- Participating school (学校名): Tosu Senior High School
- Date (実施日時): 21/12/2017 (Date/Month/Year: 日/月/年)
- Lecture title (講演題目): Bacterial Talk
- Name and title of your company (同行者 職・氏名)
Kyushu University, Hakozaki campus, Fukuoka Japan
- Lecture format (講演形式):
 ◆Lecture time (講演時間) 1:15 min (分), Q&A time (質疑応答時間) 15 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, ppt. presentation
- Lecture summary (講演概要): Please summary your lecture 200-500 words.

Recently, scientists discovered that bacteria can communicate each other and coordinate different behaviors. Bacteria release small chemical molecules into outside environment. These signal molecules can travel a distance and interact with cognate receptors occurring on the bacterial surface. This signal-receptor interaction mediates the bacterial talk and is referred in scientific language as "quorum sensing (QS)". QS control group behaviors such as virulence, sporulation, DNA exchange, and sometimes biofilm formation.

Different pathogenic bacteria such as *Clostridium perfringens*, *Clostridium difficile* and *Staphylococcus aureus* control their virulence (toxin production) through QS. These bacteria cause many deadly diseases which include gas gangrene, diarrhea, and many other severe infections. Some of the strains of these bacteria have now become resistant to different antibiotics and are called as multi-drug resistant (MDR) pathogens.

QS controls production of spores (sporulation) which are exceptionally resistant to environment stresses such as heat, cold and preservatives; these spores mediate different severe infections and are difficult to control by antibiotics. Biofilm is a group of bacteria stick together as well as to the surface often surrounded by extracellular polymeric substances (EPS) composed of extracellular DNA, proteins, and polysaccharides. QS facilitates biofilm formation in many bacteria, making these species extremely resistant to antibiotics.

Virulence, sporulation and biofilm formation are the main behaviors which play critical role in dissemination of serious infections. These behaviors are difficult to be eradicated as there is an increasing trend in the emergence of MDR pathogens and slow development in production of new antibiotics, it has posed a greatest threat to healthcare patients. Antimicrobial resistance is reported to cause 10 million annual deaths at a cost of \$100 trillion to the global economy by 2050. We have identified and chemically synthesized different thiolactone autoinducing peptides as possible QS inhibitors. The QS inhibitors and probiotic (*Clostridium butyricum*) were used to interfere QS of *Clostridium perfringens*, *Clostridium difficile* and *Staphylococcus aureus* to orchestrate these group behaviors which can consequently control virulence caused by these pathogens. This study will provide chemotherapeutic strategies for drug development against multi drug resistant bacteria.

The lecture was divided into five parts 1: self-introduction; 2: About my country and culture; 3: Quorum sensing, and biofilm formation; 4: Pathogens and their virulence behaviors; 5: Quorum sensing inhibitors for control of virulence; 6: Development of antimicrobial chemotherapeutics.

- Overall advice or comments to future participants in the program (今後の講師へのアドバイス):

It was really interesting, to deliver a lecture to young minds, who seemed to be very enthusiastic towards research. It is great experience, you should not miss such an opportunity. I can say you must go and enjoy.

- Other noteworthy information (その他特筆すべき事項):

- Impressions and opinions from a company (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。)

Tosu Senior High School staff was very hospitable and provided us all the support and care. We give our sincere thanks to the staff of school.