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（For JSPS Fellow）

Form B-5

Date（日付） 18/01/2018
（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）: Jelena Muncan （ID No. P17406 ）

- Participating school（学校名）: Gifu Prefectural Ena High School

- Date （実施日時）: 17/01/2018 （Date/Month/Year:日/月/年）

- Lecture title（講演題目）: Water as a source of information

- Name and title of your company（同行者 職・氏名）

- Lecture format（講演形式）:
  - ◆Lecture time（講演時間） 42 min（分）, Q&A time（質疑応答時間） 3 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 and a laptop

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

Biomedical engineering is a vast engineering field which utilizes engineering principles to solve problems in biology and medicine, and generally help people living healthier and higher quality lifestyle. Early diagnosis is one of the most important research fields today in biomedical science because the earlier the disease is diagnosed the easier is the treatment and disease may even be prevented.

The current medical approaches are focused on finding indicators of disease – so called - biomarkers among proteins, lipids, DNA or other biomolecules. In the earliest phases of any disease the quantity of these biomarkers is very low, and current methods are not sensitive enough to detect such small changes in the organism. Up until recently, water in the human organism, despite being roughly 65-75% of adult human body was not considered at all a biomolecule, despite the acknowledged fact that life as we know it would be impossible without water. However, progress in water science led to amazing discoveries – that water in living cells is not what we typically imagine water to be. The water in living cells, in healthy state is structured and more gel-like. And this state of water is different when cells are damaged, when organism is attacked by viruses or bacteria, or generally experience any change that can lead to development of disease.

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Almost 20 years ago, at Kobe University in Japan, Dr Roumiana Tsenkova established a novel science, called Aquaphotomics, which is exclusively dedicated to research of water, especially with the purpose of disease diagnosis. Aquaphotomics uses a special method, called near infrared spectroscopy to observe water structure. It is completely non-destructive method based on interaction with light, which means that it allows measurements on plants, animals, and humans without any discomfort or pain. Just on the basis of how the water is structured in plant leaves we can detect whether the plant is infected with the virus, or if we measure urine of animals we can predict the pregnancy, and for example by measuring urine, blood or just tissues we can detect whether person has a cancer or not. All that, just based on the changes in the water structure. And as the water in living organisms is very receptive to changes, it is possible to predict the disease or certain physiological changes, long before any symptoms. Even though the measurements are easy and rapid, analysis of data is sometimes difficult and requires special statistical methods and data mining techniques. However, this novel approach – using water structure as a source of information, holds a great promise for the early diagnostics, health and even therapy monitoring.

- Overall advice or comments to future participants in the program（今後の講師へのアドバイス）:
I've heard from another lecturer that he brought with him candies and distributed them to students. This helped everyone relax and sort of created comfortable atmosphere where students were participating more. I think that I would like to do something like that in future. So, that would be my advice. To give something in beginning to form a connection between students and oneself. I formed connection by smiling and paying special attention and praising. But maybe something for all the students in the beginning would be better.

- 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。）