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SUMMARY of
2017 RESEARCH RESULTS REPORT
For International Collaborative Research with IPR, Osaka University

Research Title		A closer look into the mechanism of κ-casein fibril formation
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	Present Title	Professor and Director of the Research School of Chemistry
Research Collaborator (Host PI)		GOTO, Yuji

Summary

Alzheimer's, Parkinson's, and Huntington's diseases are age-related, neurodegenerative diseases associated with the deposition in the brain of highly ordered protein aggregates termed amyloid fibrils. Despite this connection, it has been difficult to establish a causative link between the formation of amyloid fibril deposits in neural tissue and the onset and progression of neural decline. κ--Casein, a major milk protein, rapidly forms amyloid fibrils at physiological pH and temperature following chemical modification. In our previous collaboration, we investigated the effects of ultrasonication on fibril formation by micellar κ-casein. The aim of this project is to prepare and monitor fibril formation by monomeric κ-casein in the presence and absence of ultrasonication.

To perform the collaboration, Carver visited IPR from December 2 to 8, 2017 and Bahraminejad, Elmira (PhD Candidate in Biochemistry) visited IPR from November 24 to December 19, 2017.

There are two cysteine residues in κ-casein. In an effort to elucidate the oligomer-fibril transition, we used a cysteine-specific fluorescent probe to monitor the oligomeric state of κ-CN. The utility of the probe was assessed by investigating the relationship between κ-CN's oligomeric state and the fluorescein-associated fluorescence intensity. The results indicated that cysteine-specific fluorescent probe will be a promising approach to monitoring oligomerisation of κ-CN in order to better understand the mechanism of its conversion into amyloid fibrils.

Carver is one of organizers of the Second Joint Symposium between the Institute for Protein Research (Osaka University) and the Research School of Chemistry (Australian National University) held December 3rd -5th, 2017 at IPR. Organizing Committee: John Carver, Yuji Goto, Damien Hall and Haruki Nakamura. Occasion: In 2015 the Research School of Chemistry (RSC) of the Australian National University signed an institutional linkage agreement with the Institute for Protein Research (IPR) of Osaka University in Japan. To mark this occasion a joint symposium was held in Australia in November of 2015. To further cement the pairing of the two research institutes a second RSC-IPR joint symposium was held in Osaka Japan, in late December, at the Institute for Protein Research.

With other international collaborators, we planned and applied for the JSPS Core-to-Core Program, a program designed to create top world-class research centers, and the proposal has been accepted. The program: "An international cutting-edge network for the study of protein aggregation" will continue for 5 years (2017-2022) and we will advance our collaboration on κ-casein fibril formation taking advantage of this program.