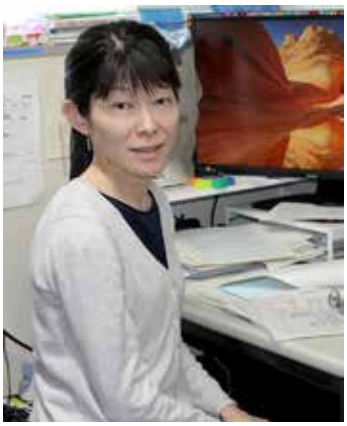

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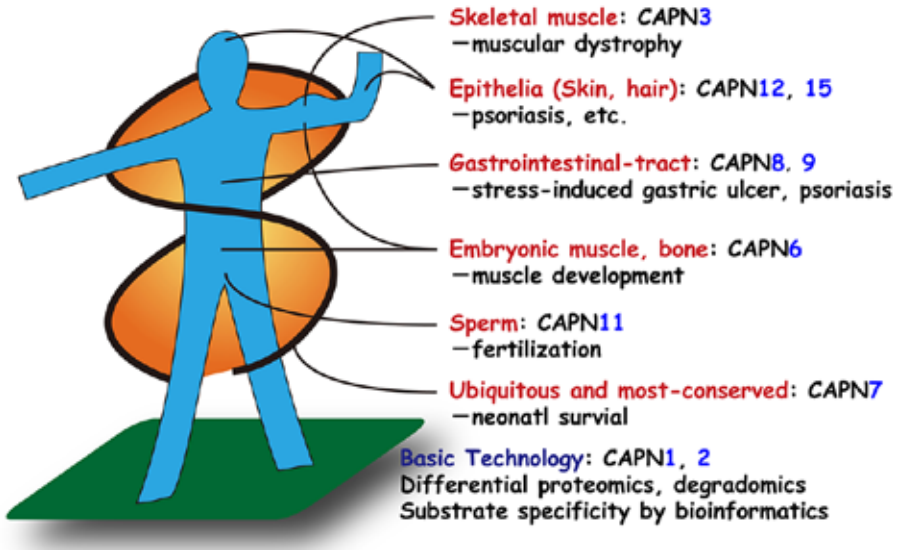
Calpain

Project Leader **Yasuko Ono** Calpain Project

Calpain: Structure-Function Relationships

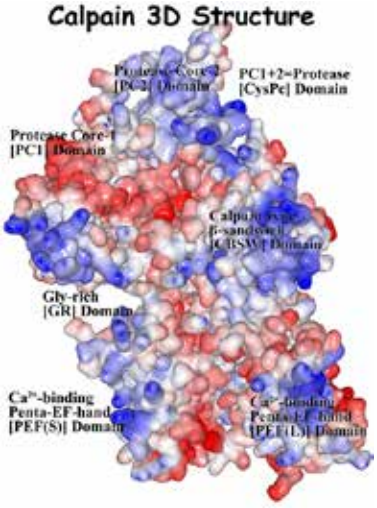
Exploring calpain-mediated biological modulation

Proteins are chains of amino acids, and their functions change by partial cuts. Calpains are enzymes that perform such "cuts" or "limited proteolytic processing" in cooperation with calcium.
Humans have 15 calpain species. Defects of either calpain cause various deficiencies, such as muscular dystrophy, stomach ulcer, and embryonic lethality.



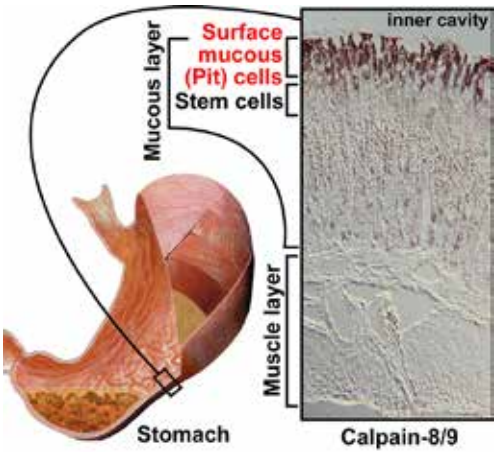
"Translational research involving calpains is still at the development stage. We need to learn more about the calpains themselves, as well as their impact on various physiological systems and molecular pathways." (Nat. Rev. Drug Discov. 2016).

In this project, we aim to understand biology of calpains with wide scope of interest, and translate the knowledge to the development of our health as well as science.

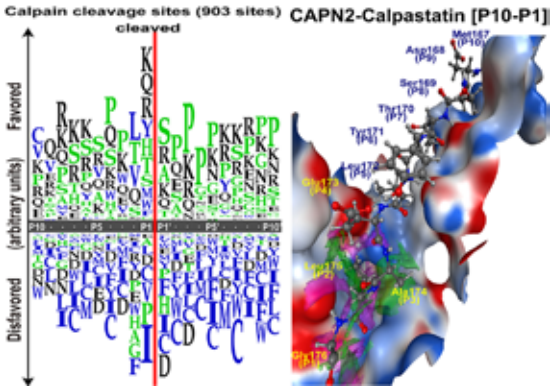


Calpains in health and disease

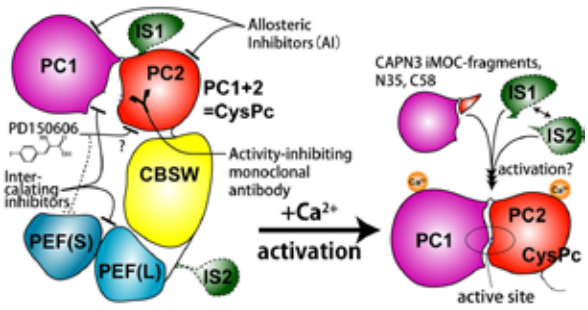
Some calpains predominantly expressed in specific tissue(s) are responsible for genetic diseases; *e.g.*, defects in *CAPN3* cause muscular dystrophy. Other calpains with rather ubiquitous expression pattern lead to lethality if deficient. It is also important to realize that some calpain species express their activity through unique and unexpected mechanisms, such as intermolecular complementation (CAPN3), heterodimerization (CAPN8/9), etc.
To explore how calpains protect our health, analyses of cells/mice lacking the function of specific calpain species or its expected targets are being performed. We are also improving research platform for studying calpains by biochemistry including proteomics, genetics, and bioinformatics.



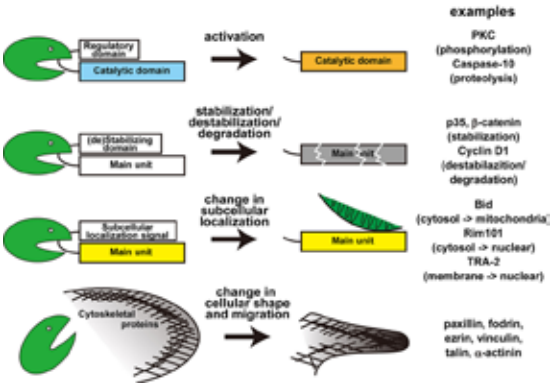
Protection of epithelial cells by heterodimeric calpain, G-calpain



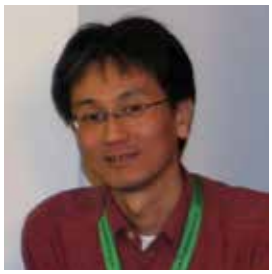
Characterization of calpain-substrate interface



Strategy for activity regulation of CAPN3



Multiplicity of calpain actions



Shoji Hata, Ph.D.

Calpains in epithelial function and tissue development

Fumiko Shinkai-Ouchi, Ph.D.

Proteomic analysis of muscular dystrophy and calpain substrate specificities

Aya Noguchi, Ph.D.

Cross talk of calpain and other proteolytic systems

Calpain