

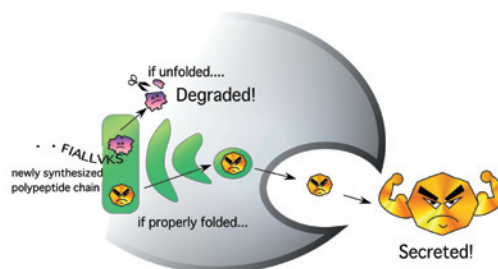
# Protein Engineering using Cellular Quality Control System

- Improvement of productivity of proteins by removing S-S bonds -

**Yoshihisa HAGIHARA**

Special Division for  
Human Life Technology  
hagihara-kappa@aist.go.jp  
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As renaturation of disulfide (S-S) bonds is difficult issue in a large-scale production of proteins, the method to remove S-S bonds with minimum stability loss will be a useful tool to increase the productivity of recombinant protein. We are developing a screening method utilizing a cellular quality control system to identify stable protein mutants from a large number of sequences. This method was used to screen amino acid pairs substituted for the disulfide bond (S-S bond) between positions 14 and 38 in bovine pancreatic trypsin inhibitor. The mutants selected by this screening showed higher stability than simple Ala/Ala substitution and retained inhibitory activity at physiological condition.



Schematic representation of “cellular quality control system” in yeast. Newly synthesized polypeptide chains with secretion signal are first inserted into ER membrane and transferred to the ER. In ER, the quality control machinery recognizes the structural status of the synthesized polypeptide chains. If these polypeptides fail to fold into the native structure, these are transferred to cytosol and degraded. If the synthesized polypeptides form rigid native structure, they go through the secretory pathway. Using this cellular recognition mechanism, we can know the “foldability” of a certain sequence by monitoring its secretion efficiency.

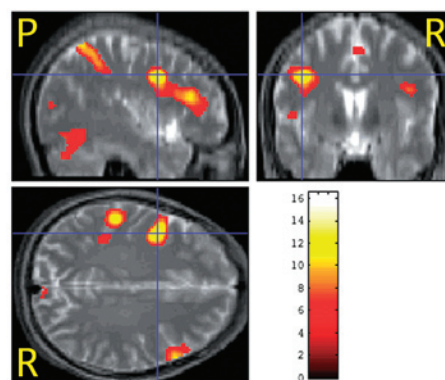
## Information and Communication Technology

# Active Role of Motor Function in Human Communication

**Kayako MATSUO**

Life Electronics  
Laboratory  
e-mail:  
kayako.matsuo@aist.go.jp  
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Human communication employs every means available to be realized. Using functional magnetic resonance imaging (fMRI), we revealed that motor function plays an important role for character/letter processing. Exner’s area, a language area located at the left premotor area, was found to be important for association between character and sound. This suggests that the character-sound association may share its mechanism with that of motor generation. We also revealed that motor execution reduced activation in visual areas and Exner’s area during character processing. These findings can be utilized for designing new information systems for input-output units such as character-oriented portable terminals.



Sagittal, axial and coronal views of activation in Exner's area