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Position

Team Leader (Laboratory Head)
Laboratory for Protein Conformation Diseases
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Education

1999	Kyoto University, Department of Molecular Engineering, Ph.D.

Work experience

1996 – 1999	JSPS Predoctoral Fellowships (DC1)
1999 – 2002	Special Postdoctoral Fellow of Science, RIKEN Brain Science Institute, Japan
2002 – 2006	Postdoctoral Fellow, Howard Hughes Medical Institute and University of California-San Francisco, Department of Cellular and Molecular Pharmacology, USA
2003 – 2005	JSPS Postdoctoral Fellow for Research Abroad
2005 – 2009	PRESTO Researcher, Japan Science and Technology
2006 – 2011	Laboratory Head, Tanaka Research Unit, RIKEN Brain Science Institute, Japan
2011 – present	Laboratory Head, Laboratory for Protein Conformation Diseases, RIKEN Brain Science Institute, Japan

Award

2008	The Young Scientists' Prize, The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology

List of six selected publications

(1) Ohhashi Y, Ito K, Toyama BH, Weissman JS, and **Tanaka M.** Differences in prion strain conformations result from non-native interactions in a nucleus. *Nature Chem. Biol*. 6, 225-230 (2010).

(2) Nekooki-Machida, Y., Kurosawa, M., Nukina, N., Ito, K., Oda, T., and **Tanaka, M.** Distinct conformations of *in vitro* and *in vivo* amyloids of huntingtin-exon1 show different cytotoxicity. *Proc. Natl. Acad. Sci. U. S. A.*, 106, 9678-9684 (2009).

(3) **Tanaka, M.**, Collins, S.R., Toyama, B.H., and Weissman, J.S. The Physical Basis of How Prion Conformations Determine Strain Phenotypes. *Nature*, 442, 585-589 (2006).

(4) **Tanaka, M.**, Chien, P., Yonekura, K., Weissman, J.S. Mechanism of cross-species prion transmission: An infectious conformation compatible with two highly divergent yeast prion proteins. *Cell* 121, 49-62 (2005).

(5) **Tanaka, M.**, Chien, P., Naber, N., Cooke, R., and Weissman, J.S. Conformational Variations in an Infectious Protein Determine Prion Strain Differences. *Nature* 428, 323-328 (2004).

(6) **Tanaka, M.**, Machida, Y., Niu, S., Ikeda, T., Jana, N.R., Doi, H., Kurosawa, M., Nekooki, M., and Nukina, N. Trehalose alleviates polyglutamine-mediated pathology in a mouse model of Huntington disease. *Nature Med*. 10, 148-154 (2004).

List of full publications

[Original Articles]

(1) Tonoki, A., Kuranaga, E., Ito, N., Nekooki-Machida, Y., **Tanaka, M.**, Miura, M. Aging causes distinct characteristics of polyglutamine amyloids *in vivo*. *Genes Cells* 16, 557-564 (2011).

(2) Foo, C.K., Ohhashi, Y., Kelly, M.J., **Tanaka, M.**, Weissman, J.S. Radically Different Amyloid Conformations Dictate the Seeding Specificity of a Chimeric Sup35 Prion. *J. Mol. Biol.* 408, 1-8 (2011).

(3) Ohhashi Y, Ito K, Toyama BH, Weissman JS, and **Tanaka M.** Differences in prion strain conformations result from non-native interactions in a nucleus. *Nature Chem. Biol*. 6, 225-230 (2010).

(4) Nekooki-Machida, Y., Kurosawa, M., Nukina, N., Ito, K., Oda, T., and **Tanaka, M.** Distinct conformations of *in vitro* and *in vivo* amyloids of huntingtin-exon1 show different cytotoxicity. *Proc. Natl. Acad. Sci. U. S. A.*, 106, 9678-9684 (2009).

(5) McDobald M., Kendall A., **Tanaka M.**, Weissman JS, Stubbs G. Enclosed chambers for humidity control and sample containment in fiber diffraction. *J. Appl. Cryst.*, 41, 206-209 (2008).

(6) Krzewska J, **Tanaka M**, Burston SG, Melki R. "Biochemical and functional analysis of the assembly of full-length Sup35p and its prion-forming domain" J. Biol. Chem., *282*, 1679-1686 (2007).

(7) **Tanaka, M.**, Collins, S.R., Toyama, B.H., and Weissman, J.S. The Physical Basis of How Prion Conformations Determine Strain Phenotypes. *Nature*, 442, 585-589 (2006).

(8) **Tanaka, M.**, Chien, P., Yonekura, K., Weissman, J.S. Mechanism of cross-species prion transmission: An infectious conformation compatible with two highly divergent yeast prion proteins. *Cell* 121, 49-62 (2005).

(9) **Tanaka, M.**, Chien, P., Naber, N., Cooke, R., and Weissman, J.S. Conformational Variations in an Infectious Protein Determine Prion Strain Differences. *Nature* 428, 323-328 (2004).

(10) Venkatraman, P. Wetzel, R. **Tanaka, M.**, Nukina, M., and Goldberg, A.L. Eukaryotic Proteasomes Cannot Digest Polyglutamine Sequences and Release Them Intact during Degradation of Polyglutamine-Containing Proteins. *Mol. Cell* 14, 95-104 (2004).

(11) **Tanaka, M.**, Machida, Y., Niu, S., Ikeda, T., Jana, N.R., Doi, H., Kurosawa, M., Nekooki, M., and Nukina, N. Trehalose alleviates polyglutamine-mediated pathology in a mouse model of Huntington disease. *Nature Med*. 10, 148-154 (2004).

(12) **Tanaka, M.**, Machida, Y., Nishikawa, Y., Akagi, T., Hashikawa, T., Fujisawa, T. and Nukina, N. Expansion of polyglutamine induces the formation of quasi-aggregate in the early stage of protein fibrillization. *J. Biol. Chem*. 278, 34717–34724 (2003).

(13) **Tanaka, M.**, Matsuura, K., Yoshioka, S., Takahashi, S., Ishimori, K., Hori, H., and Morishima, I. Activation of Hydrogen Peroxide in Horseradish Peroxidase Occurs within approximately 200 μs Observed by a New Freeze-Quench Device. *Biophys. J*. 84, 1998-2004 (2003).

(14) **Tanaka, M.**, Machida, Y., Nishikawa, Y., Akagi, T., Morishima, I. Hashikawa, T., Fujisawa, T. and Nukina, N. The Effects of Aggregation-Inducing Motifs on Amyloid Formation of Model Proteins Related to Neurodegenerative Diseases. *Biochemistry* 41, 10277-10286 (2002).

(15) **Tanaka, M.**, Morishima, I., Akagi, T., Hashikawa, T. and Nukina, N. Intra-and intermolecular beta-pleated sheet formation in glutamine-repeat inserted myoglobin as a model for polyglutamine diseases. *J. Biol. Chem*. 276, 45470-45475 (2001).

(16) Jana, N.R., **Tanaka, M.**, Wang, G-h., and Nukina, N. Polyglutamine length-dependent interaction of Hsp40 and Hsp70 family chaperones with truncated N-terminal huntingtin: their role in suppression of aggregation and cellular toxicity. *Hum. Mol. Genet.* 9, 2009-2018 (2000).

(17) **Tanaka, M.**, Ishimori, K. and Morishima, I. Luminol Activity of Horseradish Peroxidase Mutants Mimicking a Proposed Binding Site for Luminol in *Arthromyces ramosus* Peroxidase. *Biochemistry* 38, 10463-10473 (1999).

(18) Lindgren, A., **Tanaka, M.**, Ruzgas, T., Gorton, L., Gazaryan, I., Ishimori, K. and Morishima, I. Direct electron transfer catalysed by recombinant forms of horseradish peroxidase: insight into the mechanism. *Electrochem. Commun*. 1, 171-175 (1999).

(19) **Tanaka, M.**, Ishimori, K. and Morishima, I. Structural Roles of the Highly Conserved Glu Residue in the Heme Distal Site of Peroxidases. *Biochemistry* 37, 2629-2638 (1998).

(20) Morimoto, A., **Tanaka, M.**Takahashi, S., Ishimori, K., Hori, H., and Morishima, I. Detection of a Tryptophan Radical as an Intermediate Species in the Reaction of Horseradish Peroxidase Mutant (Phe-221 -> Trp) and Hydrogen Peroxide. *J. Biol. Chem.* 273, 14753-14760 (1998).

(21) **Tanaka, M.**, Ishimori, K., Mukai, M., Kitagawa, T., and Morishima, I. Catalytic Activities and Structural Properties of Horseradish Peroxidase Distal His42 -> Glu or Gln Mutant. *Biochemistry* 36, 9889-9898 (1997).

(22) Mukai, M., Nagano, S., **Tanaka, M.**, Ishimori, K., Watanabe, Y., Morishima, I., Ogura, T., and Kitagawa, T. Effects of Concerted Hydrogen Bonding Distal Histidine on Active Site Structures of Horseradish Peroxidase. Resonance Raman Studies with Asn70 Mutants. *J. Am. Chem. Soc*., 119, 1758-1766 (1997).

(23) **Tanaka, M.**, Nagano, S., Ishimori, K., Morishima, I. Hydrogen Bond Network in the Distal Site of Peroxidases: Spectroscopic Properties of Asn70 -> Asp Horseradish Peroxidase Mutant. *Biochemistry* 36, 9791-9798 (1997).

(24) **Tanaka, M.**, Ishimori, K. and Morishima, I. The Distal Glutamic Acid as an Acid-Base Catalyst in the Distal Site of Horseradish Peroxidase. *Biochem. Biophys. Res. Commun*. 227, 393-399 (1996).

(25) Nagano, S., **Tanaka, M.**, Ishimori, K., Watanabe, Y., and Morishima, I. Catalytic Roles of the Distal Site Asparagine-Histidine Couple in Peroxidases. *Biochemistry* 35, 14251-14258 (1996).

(26) Nagano, S., **Tanaka, M.**, Watanabe, Y., and Morishima, I. Putative Hydrogen Bond Network in the Heme Distal Site of Horseradish Peroxidase. *Biochem. Biophys. Res. Commun*. 207, 417-423 (1995).

[Reviews and Books]

(1) **Tanaka, M.** A protein transformation protocol for introducing yeast prion particles into yeast. *Methods in Enzymology (Guide to Yeast Genetics: Functional Genomics, Proteomics and Other Systems Analysis)*, 470, 681-693 (2010).

(2) **Tanaka, M.**, and Weissman, J.S. An efficient protein transformation protocol for introducing prions into yeast. *Methods in Enzymology (Amyloid, Prions, and Other Protein Aggregates, Part B)*, 412, 185-200 (2006).

(3) **Tanaka, M.**, Machida, Y., and Nukina, N. A novel therapeutic strategy for polyglutamine diseases by stabilizing aggregation-prone proteins with small molecules. *J. Mol. Med.* 83, 343-352 (2005).

(4) **Tanaka, M.**, Morimoto, A., Ishimori, K., and Morishima, I. Structure-Activity Relation of Horseradish Peroxidase as Studied with Mutations at Heme Distal and Proximal Sites. *Pure & Appl. Chem*. 70, 911-916 (1998).

(5) Nagano, S., **Tanaka, M.**, Ishimori, K., Morishima, I., Watanabe, Y., Mukai, M., Ogura, T., and Kitagawa, T. Catalytic roles of the distal site hydrogen bond network of peroxidases. *Oxygen*

Homeostasis and Its Dynamics. Ishimura, Y., Shimada, H., and Suematsu, M. (eds.), Springer-Verlag; Tokyo, 354 (1997).