Leopoldina
Nationale Akademie
der Wissenschaften

Curriculum Vitae Professor Dr Ryuichi Shigemoto

Name: **Ryuichi Shigemoto**
Date of birth: **8 May 1960**

Research Priorities: Glutamate receptors, calcium channels, synaptic plasticity, memory research, learning processes, electron microscopy

Ryuichi Shigemoto is a Japanese neuroscientist who investigates the molecular foundations of neuronal signal transmission. It is his aim to better understand learning processes and memory formation. The focus of his research lies on receptors and ion channels, which are involved in cell-to-cell signal transmission. Ryuichi Shigemoto and his team also examine the left-right asymmetry of the brain, a long known yet still barely understood phenomenon.

Academic and Professional Career

since 2013	Professor, Institute of Science and Technology Austria (ISTA), Klosterneuburg, Austria
1998 - 2013	Professor, National Institute for Physiological Sciences, School of Life Science, Graduate University for Advanced Studies, Okazaki, Japan
1995 - 1996	Visiting Scholar, MRC Anatomical Neuropharmacology Unit, Department of Pharmacology, University of Oxford, Oxford, UK
1994	Doctorate, University of Kyoto, Kyoto, Japan
1989 - 1998	Assistant Professor, Graduate School of Medicine and Faculty of Medicine, University of Kyoto, Kyoto, Japan
1986 - 1987	Neurologist, Chikamori Hospital, Kochi, Japan
1985 - 1986	Resident for Neurology, Division of Neurobiology and Physiology, Graduate School of Medicine and Faculty of Medicine, University of Kyoto, Kyoto, Japan

1985	Degree in Medicine (MD), Graduate School of Medicine and Faculty of Medicine, University of Kyoto, Kyoto, Japan

Functions in Scientific Societies and Committees

since 2009	Member, Editorial Board, Frontiers in Neuroanatomy
2001 - 2003	Member, Editorial Board, European Journal of Neuroscience
since 1999	Member, Editorial Board, Neuroscience

Project Coordination, Membership in Collaborative Research Projects

2023 - 2026	Co-Head, Collaborative Project “PLASTICAZ”, Austrian Science Fund (FWF), Austria and French National Research Agency, France
2019 - 2022	Head, Subproject “LGI1 antibody induced pathophysiology in presynaptic nerve terminals”, Research Unit 3004, German Research Foundation (DFG), Germany
2018 - 2024	Subproject “Immunoelectron Microscopy”, U24-project “Recombinant Immunolabels for Nanoprecise Brain Mapping Across Scales”, NIH National Institute of Neurological Disorders and Stroke, Bethesda, USA
2016	Advanced Grant, European Research Council (ERC)

Honours and Awarded Memberships

since 2022	Member, German National Academy of Sciences Leopoldina, Germany
since 2017	Member, Academia Europaea
2004	SORST Researcher Award, Japan Science and Technology Agency, Japan
2000	Top 30 Scientists in Japan – in recognition of authoring multiple high-impact papers in the period from 1981-1998, International Scientific Indexing (ISI) Citation Laureate Award

Research Priorities

Ryuichi Shigemoto is a Japanese neuroscientist who investigates the molecular foundations of neuronal signal transmission. It is his aim to better understand learning processes and memory formation. The focus of his research lies on receptors and ion channels, which are involved in cell-to-cell signal transmission. Ryuichi Shigemoto and his team also examine the left-right asymmetry of the brain, a long known yet still barely understood phenomenon.

The release of neurotransmitters from a nerve cell into the synapse, where they typically act on receptors on the connecting nerve cell and cause an activating or dampening effect, is the primary process of information transmission and computation. Together with his team, Ryuichi Shigemoto studies the localisation of single neurotransmitter receptors, ion channels, and other functional molecules on the cell surface in order to understand the molecular basis of neuronal information processing. Using innovative methods such as SDS-digested freeze-fracture replica labelling, even single membrane proteins in nerve cells can be detected and visualised.

The researchers apply this method in combination with electrophysiological measurements and behavioural methods to investigate the mechanisms of signalling as well as plasticity in the brain on a molecular level. This ability of the brain to constantly reconfigure its structure and functions in order to optimally react to new external stimuli and demands forms the basis of all learning.

In his current research, Ryuichi Shigemoto is focussed on the development of new methods for high resolution electron microscopical visualisation of single molecules in order to show their exact location on the cell surface. The team is particularly interested in receptors and ion channels in the cerebellum, hippocampus, and the interpeduncular nucleus, a group of neurons in the brain. These areas of the brain are involved in long-term memory formation, physiological leaning, and left-right asymmetry of hippocampal and cortical circuitry. Finding out more about these areas helps to deepen the scientific community's understanding of neurodegenerative processes, such as the ones at play in Alzheimer's dementia and Parkinson's disease. Ryuichi Shigemoto's foundational research is very important for developing approaches for early detection and treatment of these diseases, which are increasing in frequency as the population ages.