

Aiming to draw a "Atlas of myeloid cells" including macrophages, neutrophils, and basophils

Elucidation of the relationship between oral health and dementia through epidemiological studies that take into account social pathways

Pioneering the future of Medicine

At the forefront of medical research

Takashi Satoh Professor

Department of Immune Regulation

Completed the doctoral course at the Graduate School of Medicine, Osaka University in 2010, and awarded Doctor of Philosophy in Medicine. Worked as a Specially-Appointed Research Fellow at Osaka University Immunology Frontier Research Center in 2010. Appointed as an assistant professor at the center in 2013, and an associate professor at the center in 2018. He assumed his present position in 2020. In 2017, through a "Study of Functional Diversity of disorder specific macrophage," he proved the presence of multiple macrophages that are specifically involved in various diseases, and received the "Japan Society for the Promotion of Science (JSPS) Prize" and the "Minister of Education, Culture, Sports, Science and Technology Young Scientist Award."

Disorder specific macrophage Their great potential

In recent years, it has been identified that macrophages, which are a type of white blood cells, have subtypes that are specific to respective diseases. Dr. Takashi Satoh, a professor of the Department of Immune Regulation, is leading a study of "disorder specific macrophage."

"Macrophages are immune cells, which were discovered over a century ago. While other immune cells comprise a diversity of subtypes, macrophages were considered to be only one type. Focusing on this point, I consider that, like other immune cells, there may be multiple types of macrophages in the body, and have been researching this area."

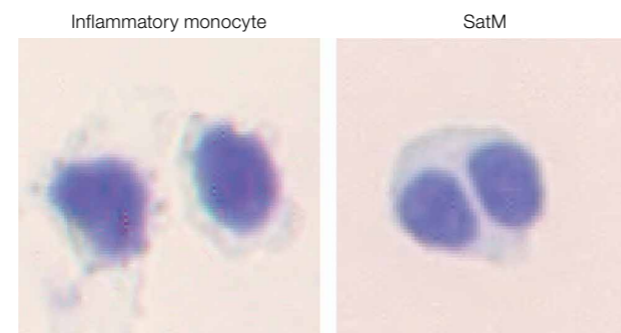
In 2017, Professor Satoh discovered a novel macrophage subtype involved in the development of fibrosis. In 2020, he revealed crosstalk between macrophages and the non-immune system. Since no effective cure has been found for fibrosis, drugs that suppress fibrosis are currently being developed based on these two discoveries.

Professor Satoh is also conducting multiple studies on cancer, dementia, and COVID-19, in addition to fibrosis, under an approach based on disorder specific macrophage.

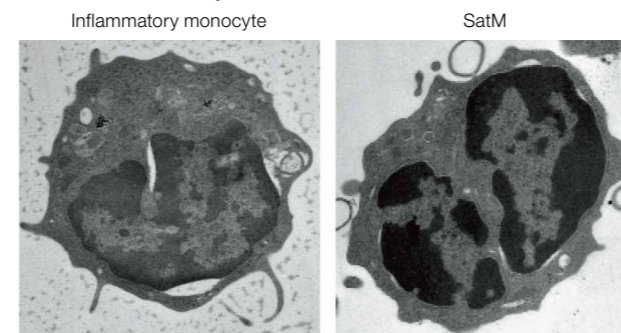
"In our university, where basic research and clinical research are closely related with an atmosphere of openness, I would like to elucidate the diversity of myeloid cells including neutrophils and basophils, as well as that of macrophages. Then, we would like to clarify the interactions among them and the relationships between

them and diseases or the non-immune system, and eventually we would like to create a "myeloid cell atlas" to map the myeloid cells in the human body."

Optical microscope



Electron microscope



A newly discovered macrophage (SatM). SatM is different in shape from normal macrophages.

Jun Aida Professor

Department of Oral Health Promotion

Graduated from the School of Dental Medicine, Hokkaido University in 2003. Completed the doctoral course at the Graduate School of Dental Medicine, Hokkaido University in 2007 (Doctor of Philosophy in Dental Medicine). Worked as a visiting researcher at University College London and an associate professor of the Department of International and Community Oral Health, Graduate School of Dentistry, Tohoku University. He assumed his current position in 2020. His specialties are public health and social epidemiology. He has been engaged in research on oral health inequalities, the relationship between oral and systemic health, social capital, and the health of disaster victims of the Great East Japan Earthquake.

Daily denture cleaning is effective in preventing aspiration pneumonia

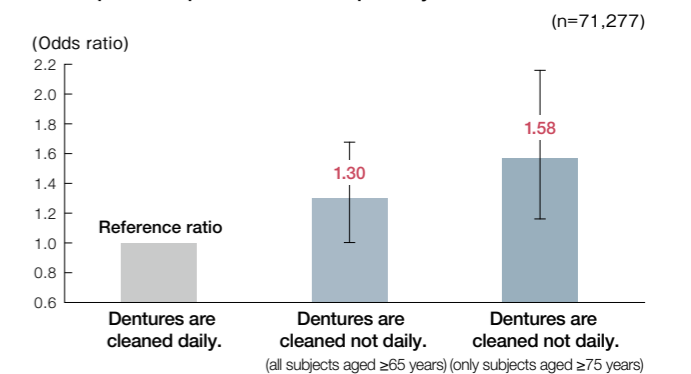
Research on the relationship between oral health and systemic health has been advancing in recent years. In particular, it has been demonstrated that oral care is effective in preventing aspiration pneumonia. However, studies on the relationship between oral health and pneumonia have been conducted only in inpatients and nursing home residents, and no study has been conducted in local elderly residents.

Jun Aida, a professor of the Department of Oral Health Promotion, conducted a cross-sectional study on the relationship between the presence or absence of pneumonia in the past year and the frequency of denture cleaning in approximately 70,000 local elderly residents aged ≥ 65 years. The results revealed that the risk of developing pneumonia in people without daily denture cleaning was 1.30-fold higher in those aged ≥ 65 years, and 1.58-fold higher in those aged ≥ 75 years. "This is the first study showing the possibility that not cleaning dentures and the oral cavity increases the risk of developing aspiration pneumonia. Also in the general elderly, good oral hygiene is likely to contribute to a decrease in the incidence of aspiration pneumonia."

Furthermore, Professor Aida has focused on epidemiological research on oral and systemic health, taking into account not only biomedical mechanisms, but also social pathways in particular. At present, he is working on research on oral health and cognitive decline.

"Social isolation" is a risk factor for dementia. According to Professor Aida's study, it has been demonstrated that elderly people who have few natural teeth and do not use dentures are at higher risk of falling into social withdrawal than those who have 20 or more natural teeth. "We consider that poor oral health is a factor for social isolation, and a verification study on this hypothesis is ongoing. We will proceed with causal inference using advanced analytical methods and elucidate the relationship between oral conditions and dementia in terms of social pathways."

The association of the frequency of denture cleaning on development of pneumonia in the past 1 year.



*Impacts from age, sex, smoking history, income, education history, current number of teeth, ADL, the history of cerebral infarction or dementia, and pneumococcal vaccination are statistically eliminated.

Kusama T, Aida J, Yamamoto T, Kondo K, Osaka K: Infrequent Denture Cleaning Increased the Risk of Pneumonia among Community-dwelling Older Adults: A Population-based Cross-sectional Study. *Sci Rep* 2019, 9(1):13734.