



Report of the 5th Academic Symposium “Aiming to Overcome Intractable Itch” in Juntendo University

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The Institute for Environmental and Gender-Specific Medicine, Juntendo University Graduate School of Medicine (founding director; CEO Hideoki Ogawa), was founded in 2002, supported by a grant from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan. Since 2013, we have been focusing on intractable itch supported by Strategic Research Foundation Grant-aided Project for Private Universities from MEXT. We have been conducting research on elucidating the pathogenesis of intractable itch and developing preventive and therapeutic methods, and the results of our research have been highly evaluated both in Japan and overseas. After the end of the above support project, Asia's first itch research center, Juntendo Itch Research Center (JIRC), was established at our institute to promote research in this field and to return the results of our research to society. In addition, our institute has held four academic symposiums about “Aiming to overcome intractable itch” since 2014 in order to develop itch research in Japan. The 5th Symposium, which was the first since JIRC was established, was held on December 7, 2019. In this “What's New from Juntendo University, Tokyo”, we report selected aspects of the 5th Symposium and advances in the field of itch research.

Key words: atopic dermatitis, brain imaging, glial cells, omega-3 fatty acid, opioids

Background

Intractable itch, which is resistant to conventional treatments, causes sleep disturbance and psychological stress (depression, anxiety, and even suicidal feelings), which lead to poor performance in school or at work and reduce the quality of life (QOL). Such reduction of QOL diminishes motivation to pursue an industrious life and social activities, affecting socioeconomic activity^{1) 2)}. Based on this background, several itch research centers were established worldwide and began to focus on revealing the mechanism of intractable itch, aiming for its prevention and treatment.

The Institute for Environmental and Gender-Specific Medicine, Juntendo University Graduate School of Medicine (founding director; CEO Hideoki Ogawa, M.D., Ph.D.), was founded in 2002, supported by a grant of High-Tech Research Center Project for Private Universities: matching fund subsidy from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan. Currently, Prof. Kenji Takamori (M.D., Ph.D.), a director of Institute for Environmental and Gender Specific Medicine in Juntendo University, is engaged in the themes, 1) elucidation of pathogenic mechanisms of allergic diseases, autoimmune diseases and cancer, in which environmental and genetic factors

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are intricately intertwined, and 2) improvement of QOL in patients with those diseases.

Since 2013, Prof. Takamori and collaborators have been focusing on intractable itch supported by Strategic Research Foundation Grant-aided Project for Private Universities from MEXT (Grant number S1311011). So far, we have discovered some neural cells or mediators involved in the pathogenic process of diseases with intractable itch, which should be targets for therapeutic strategies.

To promote continued research in this field beyond the above-mentioned support, we established Juntendo Itch Research Center (JIRC) on the 1st of August, 2019, which is a center associated with our institute. In this research center, building on the basis of our previous findings, we are aiming to elucidate the molecular and cellular basis of intractable itch and develop medical care including an evaluation system, while educating young researchers and graduate students in both basic science and clinical fields. This research center expects to establish a framework of translational research to develop new treatments for intractable itch, improving QOL and socioeconomic activity.

To further advance this research area, which remains ongoing, we have held symposium regarding itch research since 2014 at Juntendo University^{3) 4)}. In December, 2019, we held the 5th Academic Symposium “Aiming to overcome intractable itch” at Juntendo University. In brief, we here report selected aspects of this symposium.

Short report

On 7th December, 2019, the 5th symposium was held in the Century Tower at Juntendo University (Figure-1). There were 113 attendees (50 from Juntendo University and 63 from elsewhere) at the symposium which included nine lectures by leading scientists including itch researchers (Table-1).

In his opening speech, Dean Nobutaka Hattori, Faculty of Medicine and Graduate School of Medicine, Juntendo University explained the worldwide importance of the itch research project, and that achievements of this organization are expected to contribute to improvement in patients suffering from intractable itch. Finally, he told us he expected us to actively exchange views in this symposium (Figure-2).



Figure-1 The 5th Symposium on Intractable Itch in the Century Tower at Juntendo University (7th December, 2019)

In the Introduction, Director Kenji Takamori of Juntendo Itch Research Center (JIRC), Institute for Environment and Gender-Specific Medicine, Juntendo University described the background of establishment of the JIRC. He talked about the aims and members of the JIRC and emphasized the importance of elucidating the pathogenic mechanisms and developing preventive and therapeutic methods to treat intractable itch.

Prof. Ryusuke Kakigi of the National Institute for Physiological Sciences described the central mechanism of itch in humans using functional brain imaging.

Prof. Hiroshi Matsuda of the Division of Animal Life Science, Institute of Agriculture, Tokyo University of Agriculture and Technology presented his research on establishment of an atopic dermatitis model NC/Tnd mouse and explained its usefulness.

Associate Prof. Toshiro Takai of Atopy Research Center, Juntendo University Graduate School of Medicine overviewed his research area regarding relationships between protease antigen and allergy.

Assistant Prof. Miho Shiratori-Hayashi of Department of Life Innovation, Graduate School of Pharmaceutical Sciences, Kyushu University introduced us to the knowledge that her research group recently had discovered itch-related molecules such as lipocalin-2 (LCN2) and P2X3 receptor. She also discussed the roles of glial cells in the processing of itch signalling.

Dr. Chisa Nakashima of Department of Dermatology, Kyoto University Graduate School of Medicine presented research detailing the involvement of neuro-immune communication in the pathological mechanism of allergic skin diseases such as atopic dermatitis and contact dermatitis.

Prof. Takehiko Yokomizo of the Department of

「難治性“かゆみ”の発症機構解明と予防・治療法開発の研究基盤構築」	
環境医学研究所・順天堂かゆみ研究センター	
第5回 学術シンポジウム ～難治性かゆみの克服を目指して～	
日時： 2019年 12月 7日（土） 13:00～	
場所： 順天堂大学 本郷・お茶の水キャンパス センチュリータワー 南10階講義室	
13:00	総 合 会 ：海老原 伸行（順天堂大学大学院医学研究科 環境医学研究所 副所長） 挨 拶 ：服部 信孝（順天堂大学大学院医学研究科長） イントロダクション ：高森 建二（順天堂大学大学院医学研究科 環境医学研究所 所長） 座 長 ：倉石 泰（和歌山県立医科大学 産官学連携推進本部 URA・学長特命教授） 古江 増隆（九州大学医学部皮膚科学教室 教授）
13:10	「かゆみの脳内認知機構：機能的MRIを用いた研究」 柿木 隆介（自然科学研究機構生理学研究所統合生理研究部門 教授）
13:40	「アトピー性皮膚炎モデルマウスの確立とその有用性」 松田 浩珍（東京農工大学大学院農学研究科動物生命科学部門 特任教授）
14:10	「プロテアーゼ抗原とアレルギー」 高井 敏朗（順天堂大学大学院医学研究科 アトピー疾患研究センター 准教授）
14:40	「痒みの神経基盤とグリア細胞」 白鳥 美穂（九州大学大学院薬学研究院 ライフイノベーション分野 助教）
15:10	「さまざまな皮膚アレルギー疾患マウスモデルにおける末梢神経と免疫細胞の動態」 中嶋 千紗（京都大学大学院医学研究科 皮膚科学 学振特別研究員）
15:40～16:00 休憩（コーヒープレイク）	
	座 長 ：長瀬 博（筑波大学 国際統合睡眠医科学研究機構 特命教授） 平林 義雄（理化学研究所脳科学総合研究センター ユニットリーダー）
16:00	「オメガ3脂肪酸と痒み」 横溝 岳彦（順天堂大学大学院医学研究科 生化学・細胞機能制御学 教授）
16:30	「GPCRヘテロ複合体形成による神経機能の制御」 上窪 裕二（順天堂大学医学部薬理学講座 准教授）
17:00	「オピオイドによるかゆみ過敏の誘発とその調節機構の解明」 古宮 栄利子（順天堂大学大学院医学研究科 環境医学研究所 特任助教）
17:30	「IL-31による痒み伝達の分子基盤」 福井 宣規（九州大学生体防御医学研究所 教授）
18:00	講 評 ：五十嵐 靖之（北海道大学大学院 先端生命科学研究院 招聘客員教授）
18:10	閉 会 の 辞 ：櫻井 隆（順天堂大学大学院医学研究科 細胞・分子薬理学講座 教授）
18:30 ～	情報交換会（順天堂医院 1号館1階 ヒルトップ）

Table-1 Program of the 5th Academic Symposium “Aiming to overcome intractable itch” (7th December, 2019)

Presenters	Topic titles
1. Ryusuke Kakigi	Central mechanisms of itch perception: Research using functional MRI
2. Hiroshi Matsuda	Establishment of atopic dermatitis model mouse and its usefulness
3. Toshiro Takai	Protease antigens and allergy
4. Miho Shiratori-Hayashi	Neural basis of itch and glia
5. Chisa Nakashima	Dynamics of peripheral nerves and immune cells in mouse models of various skin allergic diseases
6. Takehiko Yokomizo	Omega-3 fatty acid and itch
7. Yuji Kamikubo	Control of neuronal function by GPCR heterocomplex formation
8. Eriko Komiya	Elucidation of opioid-induced itch hypersensitivity and its regulatory mechanism
9. Yoshinori Fukui	Molecular bases of itch transmission by IL-31



Figure-2 Opening speech of Dean Nobutaka Hattori in the 5th Symposium on Intractable Itch in the Century Tower at Juntendo University (7th December, 2019)



Figure-3 Prof. Yasuyuki Igarashi of Hokkaido University commented on our project regarding intractable itch in the 5th Symposium

Biochemistry (I), Juntendo University reported recent findings regarding effects of omega-3 fatty acid intake on pruritus in allergic model mice.

Associate Prof. Yuji Kamikubo of the Department of Cellular and Molecular Pharmacology, Juntendo University reported about regulation of neuronal function by G-protein-coupled receptor (GPCR) heterocomplex formation.

Assistant Prof. Eriko Komiya of Juntendo Itch Research Center (JIRC), the Institute for Environment and Gender-Specific Medicine, Juntendo University Graduate School of Medicine reported about the control mechanism of opioid-induced itch hypersensitivity.

Prof. Yoshinori Fukui of Division of Immunogenetics, Department of Immunobiology and Neuroscience, Medical Institute of Bioregulation, Kyushu University made a presentation regarding the molecular basis of IL-31-induced itch from skin to spinal cord.

Prof. Yasuyuki Igarashi of Hokkaido University commented on this symposium and JIRC (Figure-3). First, he praised Prof. Takamori for establishing Asia's first wonderful itch research center. Then he provided his comments and expectations that itch research will be conducted jointly between Juntendo University and Kyushu University to help people suffering from itch throughout the country. He also commented that since young researchers are studying itch and joining this field, this research area will continue to develop in the future.

In his closing speech, Prof. Takashi Sakurai of the Department of Cellular and Molecular Pharmacology, Juntendo University commented that all of the presentations had been excellent and had given us new insights regarding itch research. He said he hopes that itch research will continue to grow around this JIRC.

Conflicts of interest

The authors declare they have no conflicts of interest.

Acknowledgments

We thank members of our institute and university for helping us to hold the 5th Academic Symposium "Aiming to overcome intractable itch"

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