Addictive Substance Project

Project Leader Kazutaka IKEDA

Kazutaka Ikeda, the head of Department of Psychiatry and Behavioral Sciences since 2015, has been the leader of the Addictive Substance Project since 2005. He graduated Faculty of Engineering, the University of Tokyo in 1989. After that, he studied under Dr. Kenji Sobue, Dr. Masayoshi Mishina and Dr. Toshiro Kumanishi as a graduate student. He received Doctor of Medical Science in 1995 from Graduate School of Medical Science, Niigata University. He started to work at RIKEN as a researcher under the supervision of Dr. Masao Ito, Dr Ryoji Yano and Dr Hiroaki Niki in 1995. He moved to Tokyo Metropolitan Institute of Psychiatry in 2000 and has leaded a project team since 2002. His current interest is to improve treatment, prevention, and understanding of addiction, pain, and developmental disorders through revealing of mechanisms underlying addictive substance effects.

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Research Summary

Addiction to various substances (e.g., drugs, alcohol, and tobacco) and behaviors (e.g., internet and gambling) is a serious public health problem. The use of illegal drugs has been increasing in Japan in recent years. Thus, preventing and solving problems that are related to addiction are important.
Some addictive drugs are also widely used as analgesics and for the treatment of developmental disorders. Some molecules that are involved in the actions of addictive drugs may be shared between analgesia and developmental disorders.
The goals of our project are the following:
(1) Developing novel treatments for addiction and prevention. We study action mechanisms of opioids, dopamine, and hallucinogens such as phencyclidine to reveal the onset of addiction using several mouse models and behavioral pharmacological study. In parallel with the basic research, we also develop and verify a scale to addiction severity.
(2) Improving personalized pain treatment. Sensitivity of opioid analgesics is associated with polymorphisms of several genes. Based on the genome information, we develop personalized pain treatment.
(3) Developing novel treatments for developmental disorders. We mainly focus on autism and attention deficit hyperactivity disorder (ADHD). In our project, tuberous sclerosis complex 1 and 2 hetero knockout mouse and dopamine transporter knockout mouse are mainly used as models of autism and ADHD, respectively. We are finding novel treatments for autism.
Attaining these goals will make significant contributions to society. We seek to accomplish these goals by studying the actions of addictive drugs using molecular biological, behavioral pharmacological, human genomic, and clinical approaches.

Selected Publications

Fujita M, et al. (2020) “Increase in excitability of hippocampal neurons during novelty-induced hyperlocomotion in dopamine-deficient mice.” ***Mol. Brain.*** 13: 126.

Kotajima-Murakami H, et al. (2018) “Effects of rapamycin on social interaction deficits and gene expression in mice exposed to valproic acid in utero.” ***Mol. Brain*** 12:3

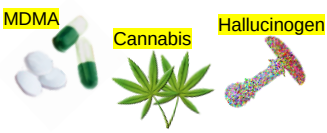
Sugaya N, et al. (2018) “A randomized controlled study of the effect of ifenprodil on alcohol use in patients with alcohol dependence.” ***Neuropsychopharmacology Rep.*** 38(1):9-17.

Ide S and Ikeda K. (2018) “Mechanisms of the antidepressant effects of ketamine enantiomers and their metabolites. ” ***Biol. Psychiatry.*** 84:551-552.

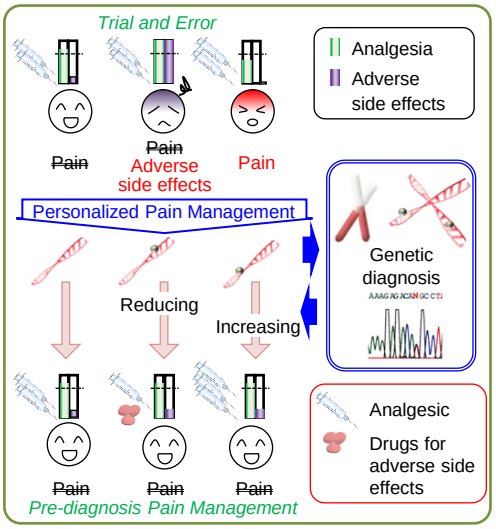
Nishizawa D, et al. (2014) “Genome-wide association study identifies a potent locus associated with human opioid sensitivity.” ***Mol. Psychiatry.*** 19: 55-62.

Sato A, et al. (2012) “Rapamycin reverses impaired social interaction in mouse models of tuberous sclerosis complex” ***Nat. Commun.*** 3: 1292.

Three main project targets.



Various addictive drugs.



Scheme of personalized pain treatment strategy.

Laboratory HP: http://www.igakuken.or.jp/abuse/