Title of Project : Creation and Promotion of the Will-Dynamics

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【Purpose of the Research Project】

To live a creative and active life, it is essential to have a high willpower: an ability to make an effort to overcome difficulties to achieve goals. The reward system, executive function controlled by the prefrontal cortex, etc. may be involved, but details of the neuroscientific mechanism of the willpower, a unique function of human, is unknown. This research area aims to reveal the mechanism of this mental function, and the impact of social/internal environment on willpower. Along with the research to identify the neural basis of willpower, interdisciplinary investigation will be performed by reserchers of neuroscience, psychiatry, internal medicine, educational psychology and sport science will closely cooperate each other to seek the methods to support the development of will-power through education and sport.

【Content of the Research Project】

This research area aims to perform multidimensional analyses of the molecular/neural basis of willpower and the condition caused by its impairment such as social withdrawal (hikikomori), apathy and modern depression, from the viewpoints of [1] neuroscientific understanding, [2]growth environment including education, society, exercise, diet and sleep, and [3]internal environment including endocrine system, metabolic abnormalities, intestinal bacterial flora, and presence of chronic inflammation. This research area also aims to help improving the people's willpower by feeding back the findings.

To scientifically understand the correlation between environment and willpower, specialists in educational psychology, psychosomatic medicine, etc. who can analyze the growth environment of young people including family, education and society in practice should perform multidimensional analyses in close cooperation with specialists in neuroscience, psychiatry, etc. who are familiar with the molecular/neural basis of mental growth and diseases caused by its impairment, and thereby characterize various aspects of the interface between human and environment.

It is likely that recent changes in growth environment in our society have had major impact on mental growth, no clear evidence has been available. In the field of neuroscience, investigations on reward system, a basis of willingness, have focused on the functions of dopamine neuron of the ventral tegmental area, ventral striatum, etc. However, sufficient feedback has not been provided to the actual human society. This area explores biological basis related with the development of willpower, paying attention to social environment and internal environment.

Figure. Diagram of WILLDYNAMICS

【Expected Research Achievements and Scientific Significance】

[1] Neural basis of will-power be revealed, and brain-function imaging techniques, etc. which allow real-time analyses of its kinetics *in vivo* will be established.
[2] Molecular neuropathology will be explored, revealing how the maturation of mind-body correlation and willpower are affected by the changes in metabolic environment and internal environment including intestinal bacterial flora associated with modernization of our life.
[3] The principle of activation will be explored for the mechanism of correlation between growth environment, internal environment and development of mental functions, which will reveal the therapeutic target, resulting in the establishment of basic technologies for drug discovery/ diagnosis to restore volition.
[4] Scientific evidence will be obtained, demonstrating that impaired development of the mental functions related with willpower can be improved with optimized exercise, sleep, diet, etc.
[5] Longitudinal researches on social environment at schools will identify the environmental factors that may influence willpower. As a result, useful interventional supportive methods to reduce the environmental loads will be proposed.

【Key Words】

willpower, motivation, intestinal flora, social withdrawal, apathy, depression, internal environment, social environment, biological clock, volition, sleep, sport science, educational psychology, developmental disorder

【Term of Project】 FY2016-2020

【Budget Allocation】 1,153,800 Thousand Yen

【Homepage Address and Other Contact Information】

http://willdynamics.com