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TRACKING TRENDS & PERFORMANCE IN BASIC RESEARCH

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2008 : October 2008 - Fast Breaking Papers : Satoshi Ikemoto

FAST BREAKING PAPERS - 2008

October 2008



Satoshi Ikemoto talks with *ScienceWatch.com* and answers a few questions about this month's Fast Breaking Paper in the field of Neuroscience & Behavior.



Article Title: Dopamine reward circuitry: Two projection systems from the ventral midbrain to the nucleus accumbens-olfactory tubercle complex

Authors: Ikemoto, S

Journal: BRAIN RES REV

Volume: 56

Issue: 1

Page: 27-78

Year: NOV 2007

* NIDA, Behav Neurosci Branch, NIH, US Dept HHS, 5500 Nathan Shock Dr, Baltimore, MD 21224 USA.

(addresses have been truncated)

SW: Why do you think your paper is highly cited?

Neuroscientists are fascinated by dopamine and how it mediates reward-related functions. This paper presents anatomical and functional refinements of the way we understand a dopaminergic projection system that has been implicated in reward. These refinements in our anatomical understanding of the rat brain complement a newly proposed way to understand the anatomical interaction between the midbrain and the striatum in the non-human primate brain.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

The paper synthesizes recent findings concerning chemical trigger zones for reward and their connectivity, in order to argue for a new way of understanding the functional organization of the rat brain. It also offers new hypotheses for the relationship between dopamine's functions and projection of dopamine neurons.

SW: Would you summarize the significance of your paper in layman's terms?

Dopamine is over-simplistically described as a pleasure molecule, particularly by the media; in reality, it is involved in a wide range of functions, from motivation to memory to motor control. My paper argues that dopamine's role in psycho-behavioral function depends on the brain site at which it is acting. I also suggested that some dopamine neurons are involved in non-sensory pleasure: emotional arousal, which may be characterized as anticipatory or emotional pleasure.

SW: How did you become involved in this research, and were there any problems along the way?

Twenty years ago, I started my graduate work at Bowling Green State University with Jaak Panksepp, who coined the term "affective neuroscience" and who profoundly influenced how I think about the brain's emotional systems and the functions of dopamine. I later began to work with Roy Wise, Chief of the Behavioral Neuroscience Research Branch at the National Institute on Drug Abuse (NIDA), and who continues to influence my perspective on dopamine function and who encouraged me to pursue the lines of research leading to this paper.

As for problems, I think it is difficult for all scientists to keep up with the vast and ever-increasing body of new knowledge—more is published on dopamine every day. Also, it is always a struggle for me to clearly put my thoughts into writing.

SW: Where do you see your research leading in the future?

Voluntary behavior is mediated by the basal ganglia, including the striatal complex and midbrain dopamine neurons. Each of this system's regions appears to be involved in a different aspect of voluntary behavior. I'm interested in investigating exactly what each of these regions mediates and how the different regions interact to mediate adaptive behavior.

SW: Do you foresee any social or political implications for your research?

Neuroscientific research shows that, in a nutshell, even the most intimate emotional experience is mediated by brain chemistry and function. Thus, we may soon learn to control our inner experiences with interventions like drugs and deep brain stimulation. This potentially raises both possibilities as well as posing certain ethical problems. We shall have to struggle to understand just to what extent it may be socially and politically acceptable to artificially alter our minds.

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Keywords: dopamine, anatomical interaction between the midbrain and the striatum, non-human primate brain, dopamine's functions, projection of dopamine neurons, dopamine's role in psycho-behavioral function, jaak panksepp, affective neuroscience, roy wise, drugs and deep brain stimulation.

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"Neuroscientific research shows that, in a nutshell, even the most intimate emotional experience is mediated by brain chemistry and function."