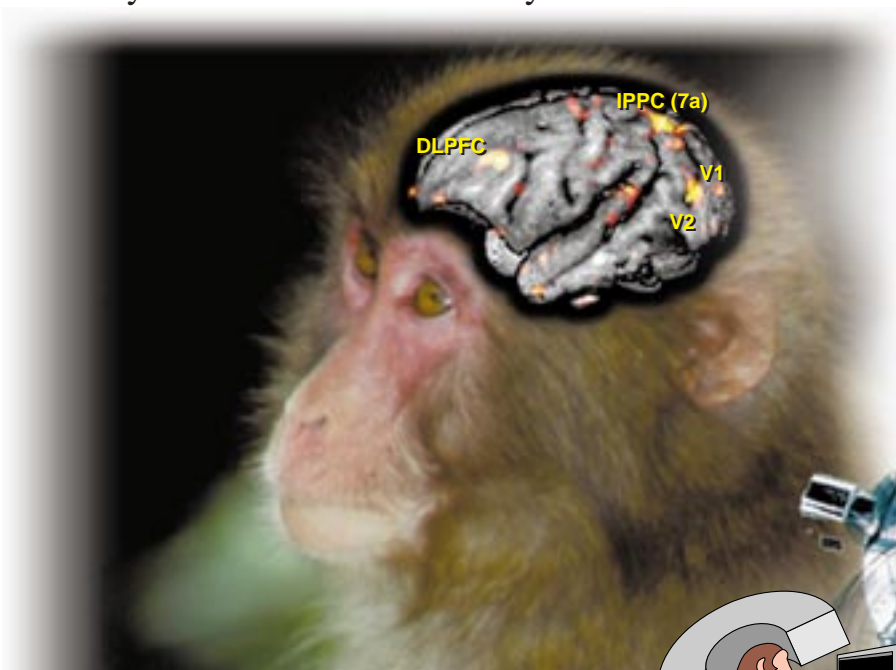


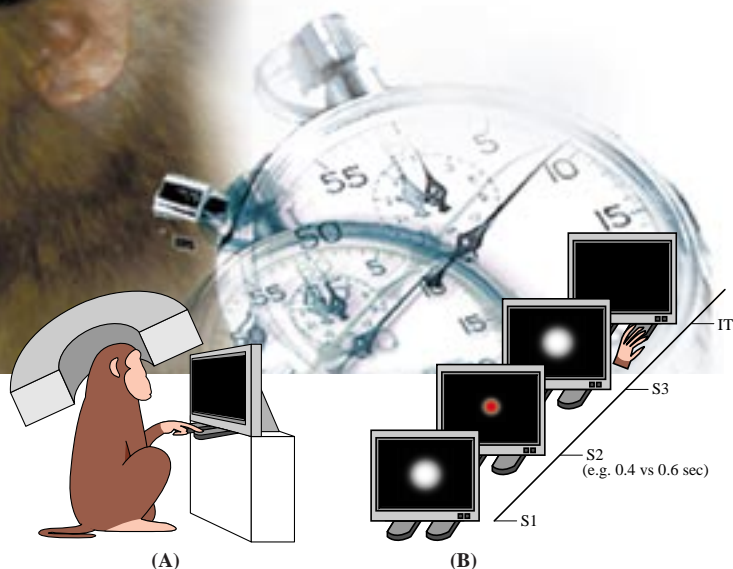
PET Research in Time Perception

Monkeys sense time the same way humans do.

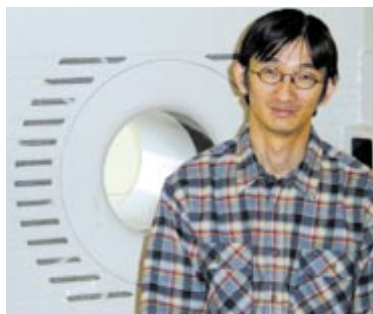


Brain areas responsible for time keeping. Changes in rCBF that covaried significantly with the durations of the target being perceived by subjects were found in the dorsolateral prefrontal cortex (DLPFC), the posterior part of the inferior parietal cortex (IPPC), basal ganglia and posterior cingulate cortex. The results indicate that a neural network composed of the posterior inferior parietal cortex to the DLPFC plays a crucial role in the temporal monitoring process in time perception.

The presence of an "internal clock" in the brain has been assumed to underlie information processing related to time. This clock plays a critical role in time keeping and time perception, which are closely associated with integrated functions in the brain. In an attempt to elucidate both the anatomy and the electrophysiological nature of neural mechanisms involved in the primitive stages of time perception, we performed a brain activation study with trained monkeys to measure regional cerebral blood flow (rCBF) as an index of neural activity using a PET system, which we developed previously for mapping the cortical functions of behavior in monkeys. In the present study, we succeeded in extracting the counting process in its pure form by performing a covariance analysis of rCBF with the duration of target perception during a time discrimination task.



Schema of the monkey PET system (A) and paired time discrimination task (B). Three colored (white, red) round spots, S1, S2 and S3, are presented sequentially at the center of the CRT display. S2 consists of the random presentation of one member of a temporal pair (T1 and T2, 0.4 and 0.6, 0.6 and 0.9, 0.8 and 1.2, and 1.0 and 1.5 sec). The monkey had to distinguish the duration of S2 by pressing one of two levers placed in front of it (T1 and T2 corresponded to the right and left levers, respectively) within the period of the S3 stimulus presentation. For example, if the pair consisted of 0.4 and 0.6 seconds, the monkey was required to determine whether a stimulus was 0.4 seconds (the shorter duration) or 0.6 seconds (the longer duration) by pressing the right or left lever, respectively.



Hirota Onoe

Hirota Onoe, Ph.D

Department of Psychology
Tokyo Metropolitan Institute for Neuroscience

This work was carried out in collaboration with Professor Yasuyoshi Watanabe of Osaka City Univ. Grad. Sch. Med., and the PET Center at Hamamatsu Photonics K.K.
Ref.: NeuroImage, Vo.13, p.37-45 (2001)

Photon is our business

HAMAMATSU PHOTONICS K.K.

325-6, Sunayama-cho, Hamamatsu City, 430-8587 Japan
Telephone: (81) 53-452-2141, Fax: (81) 53-456-7889
URL <http://www.hamamatsu.com>