

PLENARY LECTURE, Thursday, June 30, 10:10

**Hiroki R. Ueda**

LABORATORY FOR SYSTEMS BIOLOGY AND FUNCTIONAL GENOMICS UNIT, CENTER FOR DEVELOPMENTAL BIOLOGY, RIKEN, 2-2-3 MINATOJIMA-MINAMIMACHI, CHUO-KU, KOBE, HYOGO 650-0047, JAPAN

e-mail: hiro@cdb.riken.jp

**System-level Understanding of Biological Timings**

The logic of biological networks is difficult to elucidate without (1) comprehensive identification of network structure, (2) prediction and validation based on quantitative measurement and perturbation of network behavior, and (3) design and implementation of artificial networks of identified structure and observed dynamics. Mammalian circadian clock system is such a complex and dynamic system consisting of complicatedly integrated regulatory loops and displaying the various dynamic behaviors including i) endogenous oscillation with about 24-hour period, ii) entrainment to the external environmental changes (temperature and light cycle), and iii) temperature compensation over the wide range of temperature. In this symposium, I will take a mammalian circadian clock as an example, and introduce the systems- and synthetic-biological approaches for understanding of biological timings.

REFERENCES

- [1] Ueda, H.R. et al, *Nature* 418, 534-539 (2002).
- [2] Ueda, H.R. et al, *Nat. Genet.* 37, 187-92 (2005).
- [3] Sato T. K. et al, *Nat Genet.* 38, 312-9 (2006).
- [4] Ukai H. et al, *Nat Cell Biol.* 9, 1327-34 (2007).
- [5] Ukai-Tadenuma M. et al, *Nat Cell Biol.* 10, 1154-63 (2008).
- [6] Minami Y. et al *PNAS* 106, 9890-5 (2009).
- [7] Isojima Y. et al, *PNAS* 106, 15744-49 (2009).
- [8] Masumoto KH. et al, *Curr Biol.*20(24):2199-206.(2010).
- [9] Ukai-Tadenuma M et al. *Cell* 144(2):268-81 (2011).