

FIRST REAL TIME-BIOLUMICORDER TO MEASURE LONG-TERM GENE EXPRESSION IN FREELY MOVING RODENTS.



Problem – Challenge

Virtually all mammalian physiological function regularly fluctuate during the day. This fluctuation is orchestrated by a central clock located in the brain and local oscillators named clock genes, which are present in all organs. Clock genes are transiently expressed during the day, conferring circadian rhythms within individual cells throughout the organisms. The disruptions of circadian rhythms contribute to numerous pathologies including metabolic and cardiovascular disorders, cancer and aging, which have lead many research laboratories to investigate the mechanism of clock genes expression.

The circadian rhythms are usually studied by detection of bioluminescence emitted by luciferase, a reporter gene fused to clock genes. However, due to the lack of appropriate in vivo bioluminescence recording technologies, studies on circadian rhythms have been mainly restricted to in vitro experiments using mammalian cell lines.

Solution

The Real Time Biolumicorder has been developed to monitor and analyze rhythmic clock gene expression in live. The machine was designed to record the bioluminescence emitted by a target cell population that has been genetically engineered to express a luciferase reporter gene in organs of freely moving mice over many consecutive days. The RT-Biolumicorder consists of a cylindrical cage equipped with a PMT, a feeding machine, a water flask and a photon-reflecting walls. The RT-Biolumicorder has proven to be a useful tool to study circadian rhythms but will also find wide and fruitful applications in other areas of biomedical research such as revealing the kinetics of signaling by hormones, cytokines, metabolites and medical drugs.

The University of Geneva has patented the machine and granted an exclusive license to LESA-Technology SA to manufacture and sell The RT-Biolumicorder

The measurement of bioluminescence in real time allows tracking the expression of clock genes in mouse liver.

