Look up, and you will find the way from the sky

Remote synchronization system loaded on the first quasi-zenith satellite "MICHIBIKI"

We have been developing a remote synchronization system for the onboard crystal oscillator (RESSOX) of the quasi-zenith satellite system (QZSS) since 2003. QZSS is a three-satellite navigation/positioning system conceived to improve the positioning performance (satellite availability and position accuracy) of the presently available global positioning system (GPS) in areas where high-rise buildings and mountains reduce the number of visible GPS satellites in Japan. The orbital planes of QZSS satellites are inclined (at 43 degrees) from the equatorial plane, although the semi-major axis is the same as the geostationary satellites. RESSOX is conceived as a very precise radio-controlled clock. The target of RESSOX is synchronization within 10 ns between the ground station time standard and the onboard QZSS crystal oscillators. We have achieved a synchronization error within 2 ns in the ground experiments.

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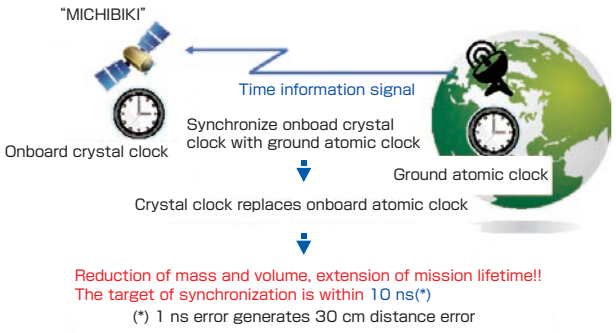

Outline of remote synchronization system

Tumor growth suppression activity by circadian clock molecule

Novel function of circadian clock gene, *Period2*

Some reports have indicated that the core clock gene, *Period2* (Per2) regulates the cell cycle, immune system and neural functions. To understand the effects of PER2 on tumor growth *in vivo*, stable transformants of murine sarcoma 180 (S-180) cell lines expressing different levels of PER2 were established. The growth of stable PER2 transformants *in vivo* was significantly and dose-dependently suppressed according to the amount of PER2 expressed, indicating that PER2 plays a role in the growth suppression of sarcoma cells. The anchorage-dependent and -independent growth *in vitro* and expression of the clock controlled cell-cycle related genes were not altered in the stable PER2 transformants. In contrast, susceptibility to murine natural killer (NK) cell cytolytic activity was enhanced in the PER2 transformants. Furthermore, the PER2 transformants suppressed cell motility and reduced fibronectin expression, but the expression of integrin receptors was not affected. These results suggest that sarcoma cells overexpressing PER2 suppress tumors *in vivo* by changing the nature of tumor cell adhesion.

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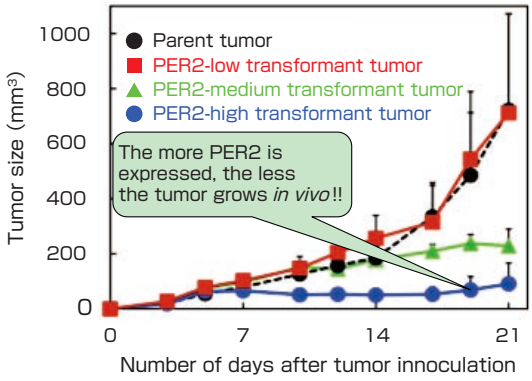

Tumor growth suppression *in vivo* of PER2 transformant tumor