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A team of chemists and biologists at the Institute of Transformative Bio-Molecules (ITbM), Nagoya University, Japan, have succeeded in finding new molecules that change the circadian rhythm in mammals by applying synthetic chemistry methods, which makes use of highly selective metal catalysts.

Most living organisms have a biological clock with an approximately 24-hour circadian rhythm, which regulates important body functions such as sleep/wake cycles, hormone secretion, and metabolism. Disruption of the circadian rhythm by genetic mutations and environmental factors, such as jet lag, may lead to sleep disorders, as well as lifestyle diseases such as obesity, cancer and mental disorders.

The circadian rhythm is also related to seasonal reproduction, where animals use their biological clock to sense the time of spring and start their reproductive activity.

Through the interdisciplinary collaboration between synthetic chemists, chronobiologists and theoretical chemists, researchers at ITbM have discovered the first circadian period-shortening molecule targeting the clock protein, CRY.

The study, published online in *Angewandte Chemie International Edition*, shows the power of synthetic chemistry to rapidly synthesize and tune the activity of circadian rhythm-changing molecules. Critical sites on the molecules for bioactivity have been uncovered and both period-lengthening/-shortening molecules have been utilized to investigate the regulation of the clock protein in the body's timekeeping mechanism.

The outcome of this study is expected to be useful for developing further efficient molecules that can control the circadian rhythm in mammals, which may overcome various circadian-related diseases and control reproductive activity in animals to provide solutions for food production.