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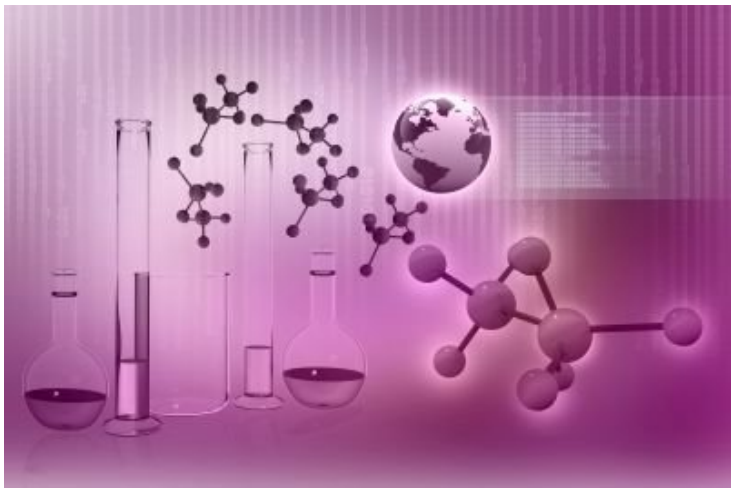

Tokyo:Ã?Â A joint collaboration between the researchers at Massachusetts Institute of Technology (MIT) and the Center for iPS Cell Research and Application (CiRA), Kyoto University, has led to the invention of RNA-based gene circuits that control cellular output.

Because these circuits are entirely RNA-based, the researchers believe that they should be safer for use in humans when compared with their DNA-based counterparts. Therefore, the researchers have RNA-based gene circuits would be available for a number of biomedical applications.

A common way to control cell function is through the use of drugs or other small compounds. However, drug actions are often imprecise and the subjects are posed to the risk of undesirable side effects. Researchers believe that a better tool would be synthetic gene circuits.

Unfortunately, although a number of such circuits already exist, none are suitable for biomedical applications and therefore cannot replace drugs. "All circuit designs rely exclusively or partially on DNA-based transcriptional regulation, and the required DNA poses a risk of cancer," said Ron Weiss, a synthetic biologist at the MIT who is seeking ways around this problem.

Accordingly, Weiss considered ways to remove the requirement for transcriptional regulation by making RNA-only circuits.

To push this work quickly, he partnered with Hirohide Saito, a bioengineer and professor at CiRA who specializes in RNA-based technologies. Saito explained what makes the RNA-only circuits envisaged by Weiss more challenging. "In the case of DNA, various transcriptional repressors and activators are known and used to construct circuits. In the case of RNA-only circuits, we need a set of RNA-binding proteins that effectively control gene expression in a post-transcriptional manner," said the Japanese researcher.