

Study shows R-loops coordinate with SOX2 in regulating reprogramming to pluripotency

11 June 2020, by Liu Jia



Credit: CC0 Public Domain

R-loops are unique structures in the cell, composed of RNA–DNA hybrids and a displaced single-stranded DNA, that are commonly found around transcribed genes. However, R-loops are also dynamic and widespread entities that play unclear regulatory and epigenetic roles in the genome.

A recent study, published online in *Science Advances* and by the researchers at the Guangzhou Institutes of Biomedicine and Health (GIBH) of the Chinese Academy of Sciences, has shed light on the activity of R-loops in the [reprogramming](#) of somatic cells to induced [pluripotent stem cells](#) (iPSCs). They revealed that R-loops influence the reprogramming of somatic cells into iPSCs, and disrupting this activity leads to defects in the reprogramming of somatic [cells](#) to iPSCs.

R-loops may act as epigenetic markers by altering transcription factor binding, chromatin modifications, and DNA methylation. The researchers mapped the landscape of R-loops during OSKM (Oct4, Sox2, Klf4, and c-Myc, four [transcription factors](#) in the reprogramming cocktail) mediated somatic cell reprogramming and showed

a dynamic association between R-loop formation and dissolution and the process of somatic cell reprogramming.

"Our data indicate that R-loops cause sharp changes at both the early and late stages of reprogramming, but they have transient and subtle changes at the intermediate stage, which shows a similar pattern with chromatin opening, DNA methylation, and [gene expression](#) during reprogramming," said YAO Hongjie, an author of this study from GIBH.

YAO and his colleagues found that some R-loops formed in advance of gene expression, suggesting R-loops are poising genes ready for transcription. Their research revealed that the transcription factor Sox2 (but not any other Yamanaka factor in the reprogramming cocktail) was intimately involved in forming a complex with R-loops.

"It is not only a transcription factor that induces transcription but also an essential regulator that maintains the balance of R-loops, and further promotes reprogramming together with R-loop–resolving factors," said YAO.

More information: Yaoyi Li et al. R-loops coordinate with SOX2 in regulating reprogramming to pluripotency, *Science Advances* (2020). DOI: [10.1126/sciadv.aba0777](https://doi.org/10.1126/sciadv.aba0777)

Provided by Chinese Academy of Sciences

APA citation: Study shows R-loops coordinate with SOX2 in regulating reprogramming to pluripotency (2020, June 11) retrieved 4 June 2022 from <https://medicalxpress.com/news/2020-06-r-loops-sox2-reprogramming-pluripotency.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.