Japanese scientists explore pluripotency

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Japanese scientists have discovered how pluripotency -- the ability of stem cells to differentiate into other cell types -- is regulated.

Understanding how stem cells maintain pluripotent has involved the characterization of a multitude of transcription factors -- the proteins that determine whether a specific gene is expressed or not.

Pluripotency in embryonic stem cells was thought to be controlled primarily by the transcription factors Oct3/4 and Sox2, as these proteins were believed to activate Oct-Sox enhancers, which are regulatory regions that determine expression of pluripotent stem cell-specific genes.

Shinji Masui and colleagues at the International Medical Center of Japan used mutant mice lacking the Sox2 gene to show although Sox2 is needed for stem cell pluripotency, it is not required for the enhancers to function and, in fact, governs the expression of Oct3/4.

They also demonstrated the regulation is indirect, as Sox2 controls the expression of a number of transcription factors that in turn regulate Oct3/4 expression.

The researchers said their findings represent another small step toward a complete understanding of stem cell biology.

The research appears in the June issue of *Nature Cell Biology*.