# Deciphering the cellular reading system of DNA methylation

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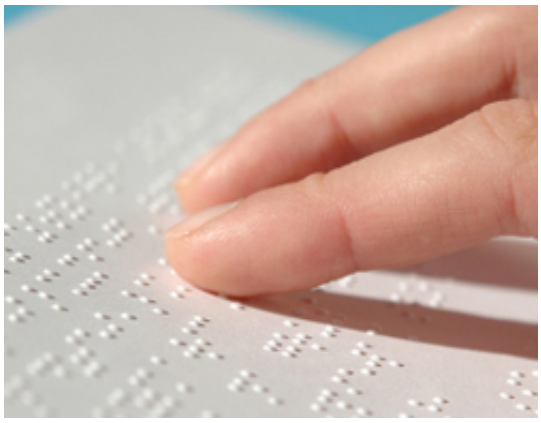

Braille reading. Credit: Roman Milert / Fotolia.com.

(Medical Xpress)—Scientists from the FMI identify how a family of proteins reads the methylation marks on the DNA so critical for cell development. These MBD proteins bind directly to methylation marks and inactivate the respective stretches of DNA. The findings are important because they provide the means to better understand how this epigenetic mark influences cell fates.

Dirk Schübeler and his team at the Friedrich Miescher Institute for Biomedical Research have now been able to show how proteins that bind methylated DNA recognize and interpret this well-known epigenetic modification in our genome. These findings have been published in the last issue of *Cell*.

Using a novel approach, they could show how a specialized group of proteins called MBD proteins directly binds to methylation marks on the DNA through their methyl-CpG-binding domain. More methyl knobs on the DNA lead to more MBD protein binding, but reduced activity of genes. MBD proteins continuously read the marks on the DNA and follow them as they change, for example, when a stem cell becomes a neuron.

"We are excited about these findings since they allow us to better understand how methylation marks on DNA are interpreted," said Schübeler. "They show how DNA methylation, which changes during different developmental programs, disease or upon environmental stimuli, is read by the cell."

The scientists could further show that MBD proteins, besides interpreting DNA methylation, have additional functions that can be attributed to different protein domains and their interactions with other transcriptional regulators.

While several MBD proteins can read DNA methylation, one of them is of particular biomedical interest because mutations in this MBD protein cause a neurological disorder known as Rett syndrome. "Rett syndrome is caused by diverse mutations of the MBD protein MeCP2," said Tuncay Baubec, a scientist in Dirk Schübeler's group who is the main contributor to this study. "Our novel approach allows us now to study how such mutations cause the disease and how changes in DNA methylation and MBD protein interactions influence genome regulation."

**More information:** Baubec, T. et al. (2013) Methylation-dependent and -independent genomic targeting principles of the MBD protein family, *Cell*, 153, 480-492. www.sciencedirect.com/science/ … ii/S0092867413003334

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