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Histone Post-Translation Modifications Influence Chromatin Mechanical Stability

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Histone proteins organize the human genome into chromatin fibers while their post-translation modification (PTM) regulates genome replication, expression and repair. The mechanistic connections between histone PTMs and biological functions remain enigmatic. We find with a combination of magnetic tweezers mechanical measurements and biochemical studies that a number of histone PTMs influence the DNA mismatch repair process by mechanically destabilizing chromatin. The location of the PTM within the chromatin structure appears to determine the mechanism by which it alters the mechanical stability. These findings have direct implications for understanding the repair of the human genome.