Homologous Histone Chaperones Human SET/TAF-Iβ and Plant NRP1: Similarly Inhibited by Cytochrome c in Cell Nucleus

SY05-02

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Genome integrity is constantly under attack by genotoxic agents. These can induce DNA damage leading to cell death if not properly repaired. While most studies on the DNA repair process have focused on yeast and mammals, in which histone chaperones have been revealed as key regulators making DNA accessible to repair machinery, knowledge of the exact role of histone chaperones in DNA damage response is far from complete, particularly in plants.
Our recent studies reveal that the closely-related histone chaperones, human SET/TAF-Iβ and plant NRP1, are similarly involved in nucleosome assembly following DNA breaks in humans and plants, respectively [1,2]. Furthermore, both histone chaperones were found to interact with cytochrome *c* in the cell nucleus upon DNA damage.
To provide structural insight into the complex formed by cytochrome *c* with each histone chaperone, nuclear magnetic resonance, isothermal titration calorimetry, surface plasmon resonance and molecular docking were used. Cytochrome *c* competitively hinders the binding of SET/TAF-Iβ and NRP1 to core histones, thus locking their histone-binding domains and inhibiting their nucleosome assembly activities [1,2]. The findings also indicate that the underlying molecular mechanism of nucleosome disassembly/reassembly needed for DNA repair is highly conserved throughout evolution.
[1] González-Arzola K., *et al.* (2015) *Proc. Natl. Acad. Sci. USA* 112 (32): 9908-9913.
[2] González-Arzola K., *et al.* (2017) *Nucleic Acids Res.* 45 (4): 2150-2165.