Anti-Human BLM

The BLM (Bloom syndrome protein) is a DNA helicase that plays an essential role in maintaining genomic stability and preserving the integrity of the genome. The primary protein function of BLM in DNA repair includes helicase activity, Homologous Recombination (HR), crossover formation suppression, resolution of DNA structures, and telomere maintenance. BLM is a component of the RecQ family of DNA helicases, enzymes that unwind DNA duplexes in an ATP-dependent manner. BLM possesses 3' to 5' DNA helicase activity, meaning it unwinds DNA in the direction from the 3' to the 5' end. This helicase activity allows BLM to unwind DNA structures during various DNA metabolic processes, including DNA replication, repair, and recombination. BLM plays a crucial role in promoting and regulating homologous recombination and repair of double-strand breaks (DSBs) and maintains genomic stability. BLM participates in the early steps of homologous recombination by unwinding DNA structures, such as displacement loops (D-loops) formed during strand invasion, and by processing recombination intermediates. Its helicase activity facilitates the resolution of recombination intermediates and promotes the efficient and accurate repair of DNA breaks through HR.

BLM functions to suppress the formation of crossover events during homologous recombination. Crossovers can lead to genomic rearrangements and loss of heterozygosity, which can contribute to genomic instability and cancer development. By promoting non-crossover outcomes and preventing excessive crossover formation, BLM helps to maintain genomic integrity. BLM is involved in the resolution of various DNA structures, including Holliday junctions, which are intermediates in homologous recombination and other DNA repair processes. BLM's helicase activity promotes the branch migration and resolution of Holliday junctions, ensuring proper DNA repair and preventing the accumulation of DNA damage. BLM is also involved in telomere maintenance, helping to resolve telomeric DNA structures and preventing the formation of aberrant DNA structures that can lead to telomere dysfunction and genomic instability.

BLM is essential for maintaining genomic stability and stopping the assemblage of mutations that can lead to cancer and other genetic disorders. Dysregulation or mutations in the BLM gene are associated with Bloom syndrome, a rare genetic disorder characterized by genomic instability, increased cancer susceptibility, and premature aging.

References:

[1] https://pubmed.ncbi.nlm.nih.gov/23543275/
[2] https://pubmed.ncbi.nlm.nih.gov/28912125/
[3] https://pubmed.ncbi.nlm.nih.gov/25084169/