

E0044

Spliceosomes Are As Essential to Life as Breathing: U1A, a Component of Spliceosomes. Jessica Jacob, Danielle Mattson, Rebecca Easter, Bai Yang, Megan Kaiser, and Shari Gajria, West Allis Central High School SMART Team, West Allis, WI 53726, Mentor: Dr. Mark McNally, Medical College of Wisconsin, Milwaukee, WI 53226-0509.

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U1A is a protein component of the RNA spliceosome, the cellular machinery that removes introns from RNA strands. DNA for the U1A protein is transcribed into the RNA. In order to reach the ribosome (which constructs the protein) it must acquire a 5'-guanine cap and a 3'-polyadenine tail. These additions prevent the U1A from being degraded, or unraveled within the cytoplasm.

The U1A protein self-regulates by preventing the polyadenine tail from attaching to the mRNA. The U1A protein recognizes a specific sequence within its RNA called the polyadenylation inhibition element, or PIE. Two U1A proteins bind to the PIE and then bind to the poly-A polymerase, otherwise known as PAP (an enzyme that adds the poly-adenine tail onto the end of the U1A). When the two U1A bind to PAP, its function is inhibited. This restricts PAP from forming the polyadenine tails. This process stops the U1A protein from being made, but only takes place when there are more U1A proteins than needed in the nucleus. The surplus is necessary because there must be enough U1A present for two of them to bind to the PAP, and therefore inhibit it.