

**EXECUTIVE SUMMARY [NON-CONFIDENTIAL, NON-TECHNICAL ABSTRACT FOR PUBLIC INFORMATION OR PROGRAM PROMOTION]:** State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project relevant to California. Do not include proprietary or confidential information. This may be distributed before the funding decision has been finalized.

RNA pseudoknot is an interesting shape of RNA that is present as a part of messenger RNA in many medically important viruses. This RNA shape is important to the viability of viruses because it participates in the protein-making process of viruses. It seems that this RNA shape has interesting property in terms of its response to the external force, which might be important in its function in the protein-making process. The best way to study these mechanical properties is to grab one molecule at a time and stretch it until this shape is completely destroyed to see how much force is required to break this conformation. In this proposal, I propose to use a newly developed single molecule pulling machine, called "optical tweezers" to stretch this RNA shape one molecule at a time. This study will provide us with better understanding on how this RNA shape uses its mechanical properties in conducting its important function in the protein-making process, which can be important information in designing new drugs to prevent viral infection. In addition, in the long run, better understanding on the mechanical properties of this kind of interesting RNA shape will enable us to use various RNA shapes in building a molecular switch or machine that can be used in the development of very tiny electronic and medical devices which can be operated in such a tiny but sensitive environment like inside of a human body or integrated circuit of a computer.