

**EXECUTIVE SUMMARY [NON-CONFIDENTIAL, NON-TECHNICAL ABSTRACT FOR PUBLIC INFORMATION OR PROGRAM PROMOTION]:** State 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.

The process by which cells transmit, receive and interpret deterministic signals is a fundamental biological problem of particular relevance during the embryogenesis of multicellular organisms. Some of these signaling molecules (e.g. Hedgehog, (Hh) and Wingless (Wg)) play critical roles in the establishment of pattern during embryogenesis and their aberrant activation has been implicated in a variety of human congenital malformation and cancers. It has become increasingly clear that our static and imprecise characterization of how these morphogenetic proteins move and activate signaling cascades in cells needs to be revised if we are to understand how they function. The specific aims of this proposal is to determine the in vivo spatial and temporal distribution of the Hedgehog and Wingless receptors visualized by means of a fluorescent tag expressed in the model organism *Drosophila melanogaster*. This fluorescent fusion receptor can then be analyzed through the use of advanced imaging techniques. The availability of genetic, molecular, and cellular methodologies make *Drosophila* an exceptional model system to tackle this problem. Data from this study will further our understanding at a fundamental level of how these types of receptors function that can aid in possible future therapeutic treatments.