The molecular mediators of the ribbon-like Golgi architecture in animal cells

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Abstract

The Golgi apparatus is involved in several cellular processes, the most studied of which is exocytosis. The stack, a pile of membranous cisternae, is the functional unit of Golgi apparatus. Across eukaryotic species, the number of stacks ranges from one to several copies per cell. When present in multiple copies, stacks can remain separate or link to each other into a tri-dimensional "ribbon-like" network, thus called after Camillo Golgi's original definition. While the current consensus is that the ribbon-like organization of the Golgi is restricted to vertebrate cells, recent work from our lab has shown that it is in fact present across several animal groups indicating its ancient origin during metazoan evolution. Although the functions of the ribbon-like Golgi are currently unknown, they must be important as disruption of this Golgi organization is often observed in human pathologies, ranging from viral infections to neurodegenerative diseases and cancer. Understanding the biological processes mediated by the ribbon-like Golgi may therefore also clarify the consequences of its impairment in the context of disease. Identifying the molecular determinants of the ribbon-like Golgi clearly represents an important step in defining its functions. This PhD project aims at identifying the core proteins involved in the formation and maintenance of the ribbon-like Golgi organization in animals by adopting two lines of action: testing a hypothesis and using an unbiased approach. The project will test the hypothesis that Golgi stack linking, and ribbon-like formation, appeared due to the newly evolved interaction of pre-existing Golgi-localized molecular tethers. It will also probe the changes in the Golgi-associated proteome during ribbon formation in the sea urchin embryo, with the aim of identifying its molecular effectors.