

Semaphorins are signaling molecules that interact with plexin-type receptors, triggering complex intracellular cascades that regulate processes such as axonal growth, cell migration, immune responses, and cancer cell metastasis. This bachelor's thesis focuses on semaphorin-plexin signaling, specifically on the study of the structure of proteins that are key to this signaling system. In this study, emphasis is placed on the analysis of the structure of semaphorins and Plexins, their mutual interactions and the mechanisms by which they influence cellular processes. Part of the thesis is an overview of the current state of research in the field of structural biology of these proteins, including their crystallographic and cryo-EM studies, and a description of their functional domains, which are key to signaling pathways. Furthermore, the importance of these proteins is discussed in the context of the development of the nervous system, the regulation of the immune response. The aim of the work is to provide a comprehensive overview of the structure and functions of semaphores and Plexins and to contribute to a better understanding of their role in biological processes, which could lead to new therapeutic approaches in the field of oncology and neuroscience.