All cells in the human body have the ability to make connections with other cells and attach to the surface, i.e. to **adhere**. The vast majority of cells, after detaching from the surface, die by way of programmed cell death, i.e. apoptosis. Only cells in the blood do not need to adhere to survive. Although some of them have this ability and under certain conditions use it to get through the wall of the blood vessel and pass through the tissue, for example, to remove bacteria or to neutralize cancer cells.

For cancer cells that migrate out of the primary tumor and move within the tissues to create a new, secondary tumor site, adhesion is extremely important, without it there is no **migration** and **invasion**, and therefore no **metastasis formation**. In our research, we focus on human melanoma cells because it is a tumor that is difficult to treat. Melanoma cells are very plastic, which means that they adapt quickly to changing conditions and medicaments used in therapy, including the latest generations of drugs. This means that early diagnosis is still the most important in the treatment of this tumor.

There are many proteins involved in the adhesion process. An important group are **integrins**, which are transmembrane proteins. This means that one end of the integrin is outside the cell, its center is immersed in the cytoplasmic membrane, while the other end of the protein is inside the cell. Integrins, when they connect with their partner in extracellular space, change their spatial structure, resulting in interaction with various proteins inside the cell. Subsequently this results in triggering various signal cascades. The transmitted signals then regulate many processes including cell movement or cell division. The structures responsible for adhering the cell to the substrate are focal adhesions (FAs). Their composition varies depending on the type of cell or the prevailing conditions around the cell.

One of the FA proteins is **integrin-linked kinase (ILK)**. It is a protein whose role in adhesion has been known for a long time. We are currently implementing another project whose goal is to determine the nature of the interactions between ILK, gelsolin and LamR. All of these proteins are involved in adhesion, but we have discovered that these proteins can form complexes together. We are now working to determine whether these proteins interact directly with each other and how this affects the adhesion, movement and division of melanoma cells. To this end, we have obtained, among others cells with a damaged gene encoding ILK protein. This means that melanoma cells do not produce ILK protein.

By examining these cells, they were found to produce ILK, which is secreted into the culture medium. What's more, intrigued by this discovery, we checked whether the ILK protein was found in the serum itself, in the presence of which the cells are grown in the laboratory. Yes, it is there. So far, no one has observed it. The goal of this project is to assess the role of secreted ILK protein in melanoma cells in adhesion, cell movement and proliferation rate.

In our study, the cell model will be human melanoma cells that produce and do not produce ILK. First, we want to remove the naturally occurring ILK from the serum. We will then produce ILK (recombinant ILK, rILK), which we will administer to cells at different doses under controlled conditions and test their ability to stick, move and divide. Using microscopic techniques, we will check how adhesive structures are formed and what they are made of. We will also determine the effect of rILK on major signaling pathways regulating movement and proliferation, and determine how ILK is secreted by cells.

As part of this Project, a PhD student will spend six months at the Department of Bioscience and Nutrition at the Karolinska Institutet (Sweden). In the laboratory headed by Professor Staffan Strömblad, this person will perform experiments that they cannot perform here because of the equipment base. The young scientist will have access to advanced microscopic techniques.

We believe that our research will contribute to deepening knowledge about the biology of human melanoma. In addition, it could be used to develop new therapies to treat this difficult cancer.