A new 3-dimensional model for ovarian cancer based on amniotic membrane

Epithelial ovarian carcinoma (EOC) is the sixth most common malignancy in women and the leading cause of death from gynecological cancer in the world. One of the main differences between ovarian cancers and other neoplasm is burden of local extension. Hence the majority of mortality in ovarian cancer is due to extensive peritoneal disease, with a high rate of mortality and an overall survival rate ranging from 20% to 30% five years after surgery according to various studies. As for any metastatic process, the tumor cells have to go through the steps of detaching from the primary tumor, adhering to the peritoneal surface and then invading the peritoneum. Each of these steps might be critical in the development of a metastatic lesion. Therefore it is essential to understand the molecular background of peritoneal adhesion and invasion in order to define new therapeutic targets. It may be that classic 2-dimensional cultures do not represent an ideal model for the initiation of metastasis, and therefore studies using only 2-dimensional cell cultures might not replicate the reality of ovarian cancer physiology. The goal of our study was to define new 3-dimensional culture models that will mimic the peritoneal tissue. The constraints were; to use an easily accessible tissue, in relevant quantities, as close as possible to the peritoneum, with great manipulability. We demonstrated that we could keep the amniotic membrane in culture and mimic adhesion and the early invasion of ovarian cancer cell aggregates. We were then able to follow the invasive process within the membrane and determine different cell behavior. Developing reproducible 3-dimensional models of ovarian cancer aggregates and early adhesion and invasion will help us gain a more accurate understanding of the molecular mechanisms involved in the ovarian cancer metastatic process and define potential new therapeutic targets hindered by the use of classic 2-dimensional models.