ABSTRACT FOR THE GENERAL PUBLIC

Cancer is the second most frightening cause of death globally, or 1 in 6 deaths according to cancer statistics in 2018. Only in US, 1,898,160 new cancer cases and 608,570 cancer deaths are reported in 2021. There are more than 166,000 cancer deaths in the UK every year, that's more than 450 every day (2016-2018). Ovarian cancer is amongst the major causes of death in women all around the world. According to cancer research UK, there are around 7,500 new ovarian cancer cases every year, that's 21 every day. In the US, ovarian cancer is the fifth most common cause of cancer death in women. The symptoms of ovarian cancer can be very vague like feeling full quickly, loss of appetite, pain in the tummy (abdomen) or lower part of the abdomen that doesn't go away, bloating or an increase in the size of your abdomen, needing to wee more often, particularly when the disease is in its early stages. Because of these less serious symptoms, women are often ignoring the possibility of ovarian cancer which results in the diagnosis of ovarian cancer in a severe condition such as stage III/IV. At this stage, cancer will spread to other organs like the lungs and the survival rate is only 35 %. Currently, there is a lack of a proper diagnostic method for the early detection of ovarian cancer.

The early detection of this condition can be possible with the aid of a suitable biosensor that enables the sensitive detection of cancer biomarkers. The project aims to develop an electrochemical biosensor for the sensitive detection of ovarian cancer biomarker CA 125 which helps the early diagnosis of ovarian cancer. We are planning to use a graphene-based sensor decorated with gold nanodendritic structure, since graphene and gold nanoparticles are excellent materials for electrochemical sensing because of the conducting nature and large surface area. The surface of the sensor will be modified with anti-CA 125 antibodies to enhance the interaction of target CA 125 at the time of sensing. From the electrochemical signal obtained for the interaction of CA 125 with the sensor, its concentration will be calculated. Then the sensor will be used for the direct detection of CA 125 in the blood serum sample of an ovarian cancer patient and finally, the work will be extended to architect disposable sensors which assist in the easy detection of elevated levels of CA 125 in blood.