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Liquid Biopsy of Cerebrospinal Fluid for Less Invasive and More Effective Characterisation of Brain Tumours



The identification of each tumour type along with its respective individual molecular makeup is critical in tackling cancer with greater precision. To date, the analysis of brain tumours has consisted of a biopsy, which poses a risk in itself and does not necessarily facilitate access to a representative part of the tumour. Recently, Joan Seoane's group proposed using cerebrospinal fluid for a liquid biopsy. This technique is much less invasive and allows detecting cancer mutations.

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In November 2015, Dr. Joan Seoane's group at the Vall d'Hebron Institute of Oncology (VHIO) published a study in *Nature Communications* proposing that cerebrospinal fluid could be used as a liquid biopsy for the early diagnosis, prognosis, therapeutic management and tracking of brain cancer.

The identification of each and every tumour type along with each respective, individual molecular makeup is critical in tackling cancer with greater precision. Moreover, the study of how the tumour complexity evolves with time is crucial for the correct treatment of cancer. To date, the analysis of brain tumours has consisted of a biopsy or surgical sampling. Such approaches suppose a risk per se and do not necessarily facilitate access to a representative part of the

tumour. A new technique, liquid biopsy, has been recently and successfully developed which detects a tumour's specific mutations by means of the analysis of circulating tumour cell-free DNA.

The liquid biopsy 'policing' of cancer is not only facilitating a more precise treatment selection for each individual patient, but could also help be steps ahead of cancer's next move. Compared to traditional tissue biopsy, it is a much less invasive technique, and represents a significant forward step towards better detecting cancer mutations, tracking the evolution of disease, as well as predicting response to therapy.

Liquid biopsy in plasma has already proven useful in several tumour types but not in brain tumours. However, Joan Seoane's group discovered that the cerebrospinal fluid is highly enriched in circulating tumour DNA and allows for the characterisation of brain tumours. The cerebrospinal fluid flows through the brain parenchyma and the spinal cord and can be sampled by a lumbar puncture (similar to an epidural puncture). The cerebrospinal fluid liquid biopsy opens a novel, pioneering line of research into biomarkers that enable monitoring the progress of the disease and ultimately help to evaluate the effect of treatment and drug effectiveness as the cancer progresses.

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