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Most cases of small cell lung cancer are only diagnosed after the tumour has already formed metastases. Until now it has not been possible to investigate the reasons for this rapid metastasis, because of a lack of sufficient tumour material from patients. Now, the group of researchers led by Gerhard Hamilton, University Department of Surgery at Medical University of Vienna has succeeded in creating infinitely reproducing tissue cultures. The findings have been published in the leading journal *OncoImmunology*.

Every year around 4,000 people in Austria die of lung cancer, approximately 90% of whom have smoked heavily for many decades. This malignant disease is becoming increasingly prevalent among women in particular, so that now lung cancer has outstripped breast cancer as the most common cause of death from cancer in women. 15% of lung cancer patients have "small cell lung cancer" (SCLC), which in most cases has already formed metastases at the time of diagnosis so that the prognosis is correspondingly poor. The treatment consists of cytotoxic chemotherapy and irradiation. At this stage, an operation would not be effective and is therefore not performed.

Initially most patients respond very well to the combination treatment. However, within about a year tumors recur and these are resistant to further chemotherapy treatments so that the patient's chances of survival are drastically reduced. Until now it has not been possible to investigate why this cancer behaves so aggressively because, since only small biopsies are collected, there is not enough cell material available for biomolecular analysis. The only starting point was the knowledge that SCLC patients had a very high number of circulating tumor cells in their blood.

The group led by Gerhard Hamilton, in collaboration with Robert Zeillinger (Molecular Oncology Group, University Department of Obstetrics and Gynecology) and Maximilian Hochmair (Otto-Wagner Hospital), have now managed to establish a method for permanently cultivating the circulating tumour cells from patients with advanced small cell lung cancer. The researchers were able to use this method to develop four cell lines that are able to propagate indefinitely.

This enabled them to describe how the tumor cells managed to manipulate the body's immune system. Monocytes are developed into macrophages and then chemical messenger substances change their polarity so that, instead of fighting tumor cells, they create an

inflammatory micro-environment, which further stimulates the spread of cancer cells. There are also indications that chronic obstructive lung disease (COPD) was already present in the main patient risk group prior to the onset of lung cancer and this also favoured the formation of circulating tumor cells.

This completely new finding has now been published in the leading journal *OncoImmunology* and goes a long way towards explaining tumor metastasis, possibly with relevance for other malignancies as well. The next goal set by Hamilton's research group is to find out why the recurrent SCLC tumors are resistant to chemotherapy.

More information: Gerhard Hamilton et al. Small cell lung cancer: recruitment of macrophages by circulating tumor cells, *OncoImmunology* (2015). DOI: 10.1080/2162402X.2015.1093277

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