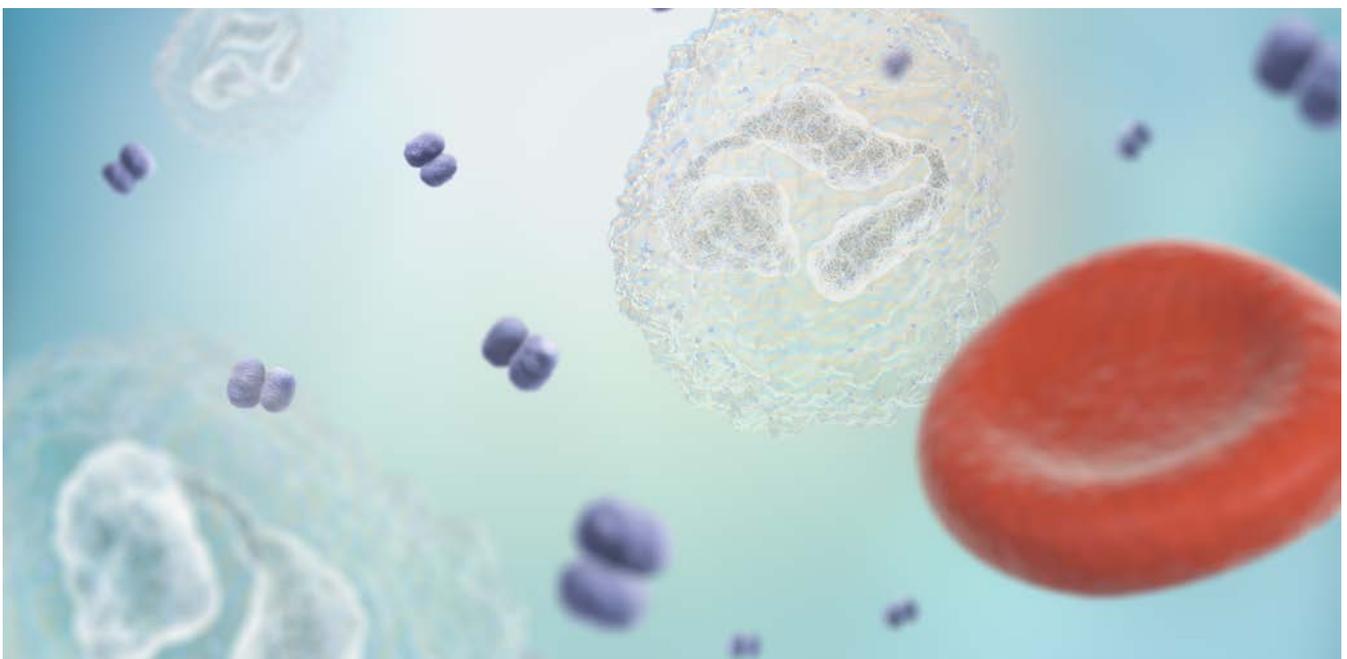


CASE REPORT

Leukaemias/malignancies

CSF analysis from a breast cancer patient



Leptomeningeal carcinomatosis (LC)

- LC is a rare and severe complication of cancer in which the disease spreads into the membranes (meninges) surrounding the brain and spinal cord.
- LC occurs in approx. 5% of people with cancer. Overall, current treatment offers poor outcome. If left untreated, median survival is 4 – 6 weeks; if treated, median survival is 3 – 6 months [1].
- Most common tumours to metastasise to the leptomeninges are adenocarcinomas, lung cancers, melanomas and breast cancers [2]. Because of the different relative frequencies, most patients with LC have breast cancer.
- Treatment goals include improvement or stabilisation of the patient’s neurologic status, prolongation of survival and palliation. Standard therapies include intra-cerebrospinal fluid (CSF) chemotherapy and involved field radiation for bulky disease [1].

Spreads into the membranes (meninges) surrounding the brain and spinal cord

LC

Occurs in ~5% of people with cancer

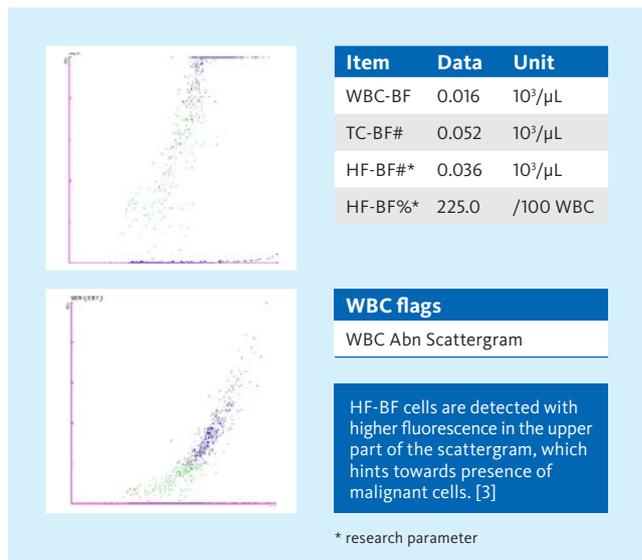
- improvement or stabilisation of the patient’s neurologic status
- prolongation of survival
- palliation

Adenocarcinomas, lung cancers, melanomas and breast cancers metastasise to the leptomeninges

Clinical outcomes

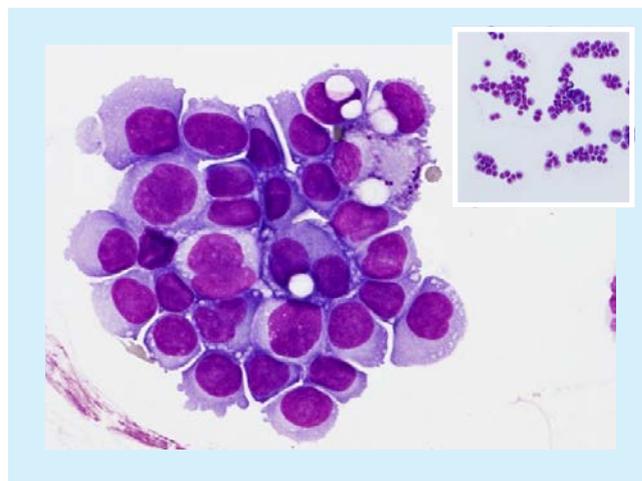
This patient case is about a female patient known to have breast cancer and hydrocephalus.

- The patient underwent adenocarcinoma resection.
- A craniotomy took place two weeks prior to the lumbar puncture.
- The white blood cell count (WBC-BF) and the total nucleated cell count (TC-BF) were elevated.
- Moreover, the analysis of the CSF in the Body Fluid mode of an XN-Series analyser revealed the presence of high fluorescence cells (HF-BF).
- Due to the presence of HF-BF the flag ‘WBC Abn Scattergram’ was triggered.
- A cytospin was prepared and the digital imaging analysis of the sample showed malignant epithelial tumour cells in the CSF.
- The patient was consequently diagnosed with leptomeningeal carcinomatosis.
- Karnofsky score < 60 (see table below)



Digital imaging analysis of the patient’s cytospin

The cytospin is rich in cells which are malignant epithelial tumour cells. They have polymorphic hyper-chromic nuclei and sometimes there are double-nuclei present. Some cells have vacuolated cytoplasm, sometimes with magenta bodies.



Karnofsky performance scale

- The Karnofsky performance scale (KPS) allows patients (≥ 16 years of age) to be classified according to their functional impairment.
- The functional status of a patient is assessed on an 11-point scale ranging from full well-being (100%) to death (0%), decreasing ten points at each level [4].

| General category | % | Specific criteria |
|---|-----|---|
| Able to carry on normal activity | 100 | Normal general status – No evidence of disease |
| No special care needed | 90 | Able to carry on normal activity – Minor sign of symptoms of disease |
| | 80 | Normal activity with effort, some signs or symptoms of disease |
| Unable to work | 70 | Able to care for self, unable to carry on normal activity or do work |
| Able to live at home and care for most personal needs | 60 | Requires occasional assistance from others, frequent medical care |
| Various amount of assistance needed | 50 | Requires considerable assistance from others, frequent medical care |
| Unable to care for self | 40 | Disabled, requires special care and assistance |
| Requires institutional or hospital care or equivalent | 30 | Severely disabled, hospitalisation indicated, death not imminent |
| Disease may be rapidly progressing | 20 | Very sick, hospitalisation necessary, active supportive treatment necessary |
| Terminal states | 10 | Moribund |
| | 0 | Dead |

References

[1] **Kwon JW et al. (2021):** Cerebrospinal Fluid Profiles and Their Changes after Intraventricular Chemotherapy as Prognostic or Predictive Markers for Patients with Leptomeningeal Carcinomatosis. *J Korean Neurosurg Soc.* Jul;64(4): 631–643.

[2] **Bruna J et al. (2009):** Leptomeningeal carcinomatosis. Prognostic implications of clinical and cerebrospinal fluid features. *Cancer Jan 15;115(2):* 381–389.

[3] **Labaere D et al. (2015):** Detection of malignant cells in serous body fluids by counting high-fluorescent cells on the Sysmex XN-2000 hematology analyzer. *Int J Lab Hematol;* 37(5): 7153722.

[4] **www.emedicine.medscape.com** assessed 31.08.2021.