Information for Medical Practitioners

maintrac Cancer cells in the blood
The Maintrac analysis method quantifies the circulating epithelial tumour cells (CETC) in the blood. CETCs determine the risk of haematogenous distant metastases and consequently, the course of the disease. Therefore, it is crucial to check the results during systemic treatment to monitor the response of these cells.

Particularly in the adjuvant phase of treatment, when success is within reach and the residual tumour burden consists of only a few single cells, results must be meticulously monitored since every live tumour cell in the blood is significant.

Simple and effective, the method employs a standard EDTA tube for the collection of blood or body fluids. The quantification of CETCs is practically free of loss, and the method is highly reproducible. Meeting the requirements of standard ISO 15189, the successful method has been repeatedly audited and accredited across Europe; it has been validated numerous times and published in top-tier journals around the world.

Chemotherapy agents do not target all cancer cells in the same way. The tumour releases cells into the patient’s bloodstream, which in turn increase the likelihood of metastasis with cell proliferation. On account of this, the practice of identifying, quantifying and characterising a patient’s tumour cells is highly relevant when determining the treatment.

Maintrac monitors the response of tumour cells to various therapeutic interventions in accordance with a highly significant correlation between the dynamics of the cell count and the metastatic growth of the disease.

Maintrac cells and tumour markers

Maintrac gives a specific and representative record of vital cells with the characteristics of circulating tumour cells in the blood. Tumour markers, on the other hand, reflect the disintegration of cancer cells throughout the body.

Three benefits for the patient

1. Individual monitoring of results of adjuvant chemotherapy

Patients, whose circulating epithelial cells in the blood are completely eliminated or substantially reduced, rarely suffer a relapse.

2. Individual use of hormone blockade:

As long as there is no increase of cell count in the blood and perhaps, even a gradual reduction, relapses are rare. The proliferation of circulating tumour cells depends on the number of hormone receptors they have.

Hormone receptor blockers – Tamoxifen being one example - prevent cell growth. However, it should be noted that the blocking ability of some drugs such as HER2/neu function with time.

3. Individual and targeted treatment where metastases are present

If treatments are considered which have shown statistically comparable results, we recommend those medications that have the maximum effect on the individual patient’s cancer cells.
Methodology

Using the latest technology, the Maintrac method engages microscopic analysis to track cancer cells that survive in the blood.

The new dimension allows Maintrac to count and characterise these cells remotely, meaning that disruption and loss are no longer an issue. In 96% of cases, cancer cells express the cell surface marker EpCAM. In the case of sarcoma cells, 91% can be detected using antibodies against an additional antigen.

EpCAM initiates cell-cell contact and stimulates cell growth. Maintrac monitors the life and proliferation as well as the death and disintegration of each individual cell and its quantitative evaluation, even in the presence of chemotherapy agents (chemosensitivity).

Maintrac can monitor and target the microscopic sub-cellular, molecular and nanoscale levels; gene variants are made visible with the Maintrac Fluorescence in situ Hybridisation (FISH) technique. By using a highly automated process, even cells with a small number of EpCAM molecules can be captured in a reproducible manner. This allows the presentation of Epithelial Mesenchymal Transition (EMT) that most likely plays a critical role in the process of metastasis.

All the while, the usual cancer stem assays are routinely carried out.

Reproducibility

Patients who present with increasing cell numbers when undergoing treatment have a higher risk of recurrence (red Kaplan Meier curve). Here, the Maintrac analysis enables the clinically relevant course of cell proliferation to be documented in order to optimise the treatment of patients with increased cell proliferation.

Clinical relevance

There is a high variation in strength of the EpCAM expression present on the cells. With Maintrac, even cells with a very low EpCAM expression can be captured since they are the cells that are potentially crucial in the process of metastasis.

Just as successful is the reproducibility of the cell count results that have been recognised for more than six years by DAkkS, the German Accreditation Centre GmbH.
Every live tumour cell in the blood is significant.

Adjuvant chemotherapy is an attempt to kill any tumour cells remaining in the body after surgical resection of a malignant tumour.

Malignant tumours release epithelial tumour cells into the patient’s bloodstream that in turn may form metastases in other essential organs.

With Maintrac, it is easy to prove the effectiveness of the individually assigned chemotherapy agent used against the circulating tumour cells in your patient’s blood.

A drop in cancer cells means the treatment is working. More than one blood sample is taken: comparisons of CETC numbers - at the beginning and during the treatment (depending on the type of treatment) - are made in order to determine whether the treatment has resulted in a reduction of cancer cells.

During such treatments, the behaviour of CETCs in your patient’s blood can still be monitored. This allows a rapid response to change. By testing CETCs for particular properties (Maintrac characterisation) the treatment can be optimised for each patient.

Sensitivity to medications

Each patient is unique, each tumour distinct.

The drug sensitivity of tumour cells is different for each medication. Accordingly, the degree of administered medications’ efficacy can vary. Using a simple blood test, the Maintrac chemosensitivity test can determine which therapeutic agent has the highest probability of being effective for each of your patients. CETCs in the blood are individually tested.
**Which drug has the best efficacy?**

With Maintrac sensitivity, up to six commonly used cytostatic drugs or other medications (small-molecule agents or alternative medications) can be tested against circulating tumour cells in the blood. In most cases the medication with the highest efficacy will be selected for treatment.

Where treatment needs to be adjusted, Maintrac should be used to periodically check whether the new medication is still effective.

The assay can be used to test for properties of the cell surface, intracellular markers, switching individual genes on/off, as well as testing for genetic variance of single or multiple circulating tumour cells.

**maintrac characterisation**

**Treatment-relevant properties of tumour cells**

**What are the properties of circulating tumour cells?**

There are a number of treatments that are only advisable where the tumour cells have the relevant target structures. To date, such tests have been carried out on primary tumours. When difficulties arise it is because the primary tumour is frequently composed of multiple cells at varying stages of maturity and it is often unclear which of these cells are able to form metastases. Additionally, primary tumours or biopsy material from the primary tumour may no longer be available after surgical resection of the tumour.

With Maintrac, it is now possible to characterise Circulating Epithelial Tumour cells (CETCs) and identify the most suitable treatment.

**Which treatments are subject to the properties of the CETCs?**

Examples include the blockade of various hormone receptors from oestrogen to progesterone, EGFR and HER2/neu, as well as androgen receptors, small-molecule agents or even alternative therapies with appropriate medications.

When determining whether these methods will be effective for your patient, there are special tests available that quantify circulating tumour cells. The percentage of growing or sleeper cells can also be determined. This is particularly important, since rapidly growing cancer cells are treated with different agents compared to slow-growing or sleeper cells.

In regards to Adenocarcinoma of Unknown Primary Origin (ACUP) and nodular masses, Maintrac helps identify the origin of these cells by using the characterisation of the circulating tumour cells.
Paradigm shift

Targeted treatment

In addition to the guidelines, the targeted treatment of individual patients who are matched with their most effective drug, is central to an optimal, personalised treatment.

The relevant and sound results of the Maintrac chemotherapy sensitivity assay allow for an informed decision when selecting a drug for cancer treatment.

Genetic tumour profiles

By focusing on the genetic profile of individual live tumour cells in the patient's blood, new forms of treatment become possible. Approaches that have so far eluded patients - due to their complexity - are now in reach with the Maintrac method.

Psycho-oncology benefits

Cancer patients not only have to cope with their illness, but also suffer the uncertainty of whether the treatment is effective and whether, at the end of their treatment, they have really conquered the cancer. All cancer patients live with the fear that their cancer will reoccur or spread.

With diagnostic imaging, tumours as small as one centimetre can be detected. Yet, a tumour the size of one millimetre emits up to 100,000 cancer cells per day into the blood. With Maintrac it is possible to detect changes in cell numbers from approximately 50,000 cells in the entire blood stream and, as such, can be used for long-term monitoring and be regarded as a “follow-up screening test”. A patient’s fear of unnoticed reoccurrence of the tumours can be alleviated with their awareness of the dynamics of their cell numbers. This psycho-oncology benefit also allows them a better quality of life.

Quantification of the re-growth of previously sensitive subpopulations is also possible, as well as the monitoring drug-refractory subpopulations.

Single Cell Picking - the single cell analysis

Expect precision

Cells from solid tumours carried out into the blood may be heterogeneous.

Of course, not all of these cells will form a metastasis. With Maintrac and EpCAM, the human epithelial antigen, circulating tumour cells in the blood can be detected, marked and quantitatively proven.

The SINGLE CELL PICKING method is used for the isolation and molecular genetic analysis of individual pure circulating tumour cells. In other words, it allows genetic research to be carried out in order to test an individual's suitability for treatment. Some of these cells can be propagated and then used for immunisation. These cells may also be cryopreserved for further research.
Long-term monitoring
Ease of use

Advantages of single cell analysis

- Determination of the tumour cell expression status before and during treatment (transcriptomics)
- Detection of mutations and genomic changes (genomics)
- Determination of heterogeneity of washed out populations before and during the treatment
- Analysis of the effect of cytotoxic drugs and, where appropriate, precise identification of metastases-enabling cells

Benefits for the patient

This analysis is increasingly and successfully used with targeted and personalised treatment approaches.

Ordering a test

**Genostics Australia Pty Ltd** is the exclusive distributor of Maintrac Tests for Australia and New Zealand.

To inquire about tests and services please contact Genostics Australia Pty Ltd on +61 1300 282 482 or email info@genostics.com.au

To proceed with a test we first require receipt of a completed Test Request Form, inclusive of payment details. Please contact our Head Office for a copy of this form.

... for Maintrac cell counting

Quantitative determination of circulating tumour cells for treatment follow-up and monitoring

**Material required:**
15ml EDTA blood (tubes labelled with patient’s name, date of birth, date of collection)

... for Maintrac cell counting and analysis

**Material required:**
15ml EDTA blood (tubes labelled with patient’s name, date of birth, date of collection)

... for individual sensitivity testing (in addition to Maintrac cell counting and analysis)

**Material required:**
Please submit one daily treatment dose of the medication, agents after consultation with Genostics.

(15ml EDTA blood is sufficient for the testing of up to 7 agents)

Shipping of samples

**If the patient is currently undergoing chemotherapy:**

Please collect blood samples before the next cycle of chemotherapy or two weeks after chemotherapy.

**Transport:** via FedEx.

All logistics information is included in the supplied collection kit.

**Results**

Normally within 1-2 weeks via email.

Genostics
Individual diagnosis & therapies
based on molecular medicine

For further information and enquiries, contact Genostics Australia Pty Ltd.

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Dr. Pachmann Laboratory and Practice provides outpatients and inpatients of all health insurers with diagnostic services and treatment. The laboratory specialises in blood stasis disorders, particularly thrombocytopenia, von Willebrand disease, thrombosis and pulmonary embolism and their individual prophylaxis. The lab also hosts the quarterly meeting of the Bavarian Quality Circle for Thrombosis and Pulmonary Embolism. Like all other blood tests at the lab, the determination of tumour cells in the blood for the monitoring of results in adjuvant chemotherapy, for hormone therapy and personalised treatment optimisation once metastases have occurred are carried to the highest standard. The lab also competently handles any issues relating to transfusion immunology. The practice is barrier-free and child-friendly.

SIMFO Spezielle Immunologie Forschung + Entwicklung GmbH Bayreuth is a medical-biological research facility, offering professional research management and methodology development, coupled with highly specialised expertise in oncology, haemostasiology and transfusion medicine. We are committed to developing the most current, state-of-the-art procedures for you through ongoing continuing education, structured knowledge transfer and a successful culture of innovation.