Information on the Preparation of Dendritic Cells

DKZplus/DCs

Dear Sir/Madam,

this leaflet is here to provide you, as a medical specialist/therapist, with some background information on the formation, preparation and action of dendritic cells to guide you in the application of dendritic cell therapy.

How can a patient benefit from treatment with dendritic cells?

The effectiveness of treatment with dendritic cells has been proven for skin, kidney, pancreatic and prostate cancer. Dendritic cell treatment has also shown positive effects in cases of bowel cancer and ovarian cancer.

In the vast majority of cases, standard treatments such as operations, chemotherapy or radiotherapy have been offered and employed for decades. However, immunotherapy in conjunction with standard treatments, such as chemo- or radiotherapy, is also an excellent strategy, as it is now known that damaged tumour cells can be destroyed much more effectively than undamaged tumour cells by chemo- or radiotherapy.

Dendritic cell therapy is increasingly used when conventional treatments fail. This has shown that the immune system is often much more effective in patients with a low tumour burden than in patients with a high tumour burden. As a result, we recommend having the immune system's capacity to respond tested, using a special laboratory procedure, before dendritic cells are produced.

Whether with standard treatments, such as chemotherapy, operations or radiotherapy, or with immunotherapy with dendritic cells, the same principle applies: the earlier treatment is started, the better the chances of success.

How are dendritic cells produced?

1) After the medical specialist or therapist has taken 200ml of whole blood from the patient, the sampling kit is delivered directly to our laboratory in Germany. The blood is mixed with an anticoagulant in a special refrigerated container. Upon arrival in the laboratory – the zero hour – an immediate start is made on the isolation of dendritic progenitor cells.

2) The whole blood is separated by centrifuge into various fractions. This procedure separates the white blood cells from the red blood cells and the non-specific defence cells, the granulocytes. The fraction containing red blood cells and granulocytes is discarded. The fraction containing lymphocytes holds the cells which can be used to produce dendritic cells.

3) After several purification processes, the isolated cells are placed in a petri dish together with a nutrient solution. The cells gradually sink, and the dendritic progenitor cells adhere to the bottom of the dish. To initiate the maturing process, further special growth factors are added to the nutrient solution. The cells are continually monitored and kept at a constant temperature in an incubator during the growing phase.

4) Within 7 days, dendritic cells mature in the incubator. Their maturity is checked under the microscope. Dendritic cells have a very different shape to other cells, being surrounded by prominent thin, hair-like projections. Before the dendritic cells are harvested, a final check on cell maturity is made on the 7th day. This is carried out by examining a portion of the cells in a flow cytometer for particular surface characteristics, the presence, quantity and combination of which are typical for dendritic cells.

5) After this check, the cells are harvested and undergo several purification processes. The harvested cells for one dose – some 3 to 6 million – are picked up in two small syringes and delivered fresh to your practice by medical logistics on the 8th day. The injection should be given on the same day, subcutaneously in the left and right inguinal lymph nodes (hence the 2 syringes). The patient can leave the practice again after being monitored for a short time.

The principle of dendritic cells – from formation to therapy:

1) A special procedure enables the dendritic progenitor cells, which have the ability to mature to dendritic cells, to be separated from the patient's blood. This ability can be promoted by certain neurotransmitters to which the cells are exposed in the test tube. During the maturing process, the progenitor cells are exposed to fully mature, genetically-engineered tumour material based on the patient's own blood. The as-yet immature progenitor cells can absorb this material, even outside the body. After absorption, the cells then alter the tumour materials in such a way that they will be more easily-recognisable for other immune cells later on.

2) During this process, the progenitor cells mature to become fully 'trained' dendritic cells, which carry the characteristic features of the harmful structures of tumour cells on their surface, together with a specific marker.

3) The immune system is now able to detect these warning signals.

4) The fully-trained dendritic cells are now subcutaneously injected into the inguinal lymph node area. They then pass into the lymph nodes and activate the various types of killer cells (e.g. so-called cytotoxic T-lymphocytes), which can now kill off any abnormal cells.

5) These activated killer cells 'remember' the unfamiliar structural features of the tumour cells and move around the whole body, via the bloodstream, in search of cells in the body's various tissues which have exactly these features.

6) If the killer cells find relevant target cells – in this case, tumour cells – they attempt to destroy the target and release neurotransmitters to alert other defence cells.

7) As a result, the chance of the tumour being fought off effectively and long-term is increased by 40 times compared to all other known treatments.