Haemodialysis Machines

BTM
Blood Temperature Monitor

Fresenius Medical Care
Physiological Dialysis

Notwithstanding the continual technical optimisation of the dialysis systems, dialysis-induced hypotension still remains today one of the most frequent complications, whose causes are of multifactorial origin. Treatment parameters such as dialysate temperature, ultrafiltration rate and composition of the dialysis fluid influence directly the physiological parameters such as body temperature, blood volume and blood composition of the patient.

In order to keep these critical physiological parameters within safe limits during the treatment, they must be measured and individually controlled. This is the aim of a physiologically oriented dialysis.

With the dialysis system 4008 from Fresenius Medical Care and the optional modules from the “Physiological Dialysis” concept, Doctors are able also to specify treatment targets instead of only machine-related parameter settings.

Within the modules, the integrated closed control loops handle the measuring and processing of patient-specific parameters. Based on the measured data and the use of control algorithms the machine settings are automatically adapted to the patient’s individual requirements.

BTM 4008 module and graphical presentation of the BTM data (optional for the 4008 haemodialysis machines generation)
Blood Temperature Management

The Blood Temperature Monitor BTM 4008, the module for the regulation of the thermal energy balance is a component from our overall concept of “Physiological Dialysis”.

Numerous studies have confirmed that a controlled negative thermal balance in patients with instable circulation has a positive effect upon their intradialytic vascular stability. Using the control function, non-physiological, up to now unnoticed changes in the body temperature leading to cardiovascular reactions can be avoided during the treatment.

In addition to the non-invasive measuring function the BTM 4008 permits - within physiologically tight limits:

- the regulation and stabilisation of the intradialytic body temperature of the patient, as well as
- the regulation of the intradialytic extracorporeal thermal energy balance

For regulation of the body temperature the BTM 4008 determines the arterial and venous fistula temperature by means of a temperature-compensated sensor and taking into account the current recirculation value, calculates the body core temperature. Utilising the targeted control of the dialysate temperature the venous temperature is initially set at the prescribed body temperature course (for example ±0 °C/h) and continuously monitored. In this way, the processor-controlled regulation permits a quick reaction to unwanted body temperature changes for the stabilisation of the circulatory system within physiological limits.
Furthermore, the BTM 4008 features a quick, precise, non-invasive measuring of the recirculation. During the treatment, independent from the temperature regulation, the automated measurement based on the thermodilution procedure can be activated at any time by the pressing of a key.

The BTM 4008 initiates a brief temperature change in the dialysis fluid circuit which is transferred to the blood in the dialyser. Using the venous temperature sensor in the measuring block of the BTM 4008, the temperature peak is registered, time recorded and subsequently compared with the registered course of temperature in the arterial temperature sensor.

The ratio between the two temperatures integrals is calculated and the resulting recirculation percentage is displayed.

Within a few minutes, a first estimate of the fistula function and the efficacy of the running treatment is provided.