

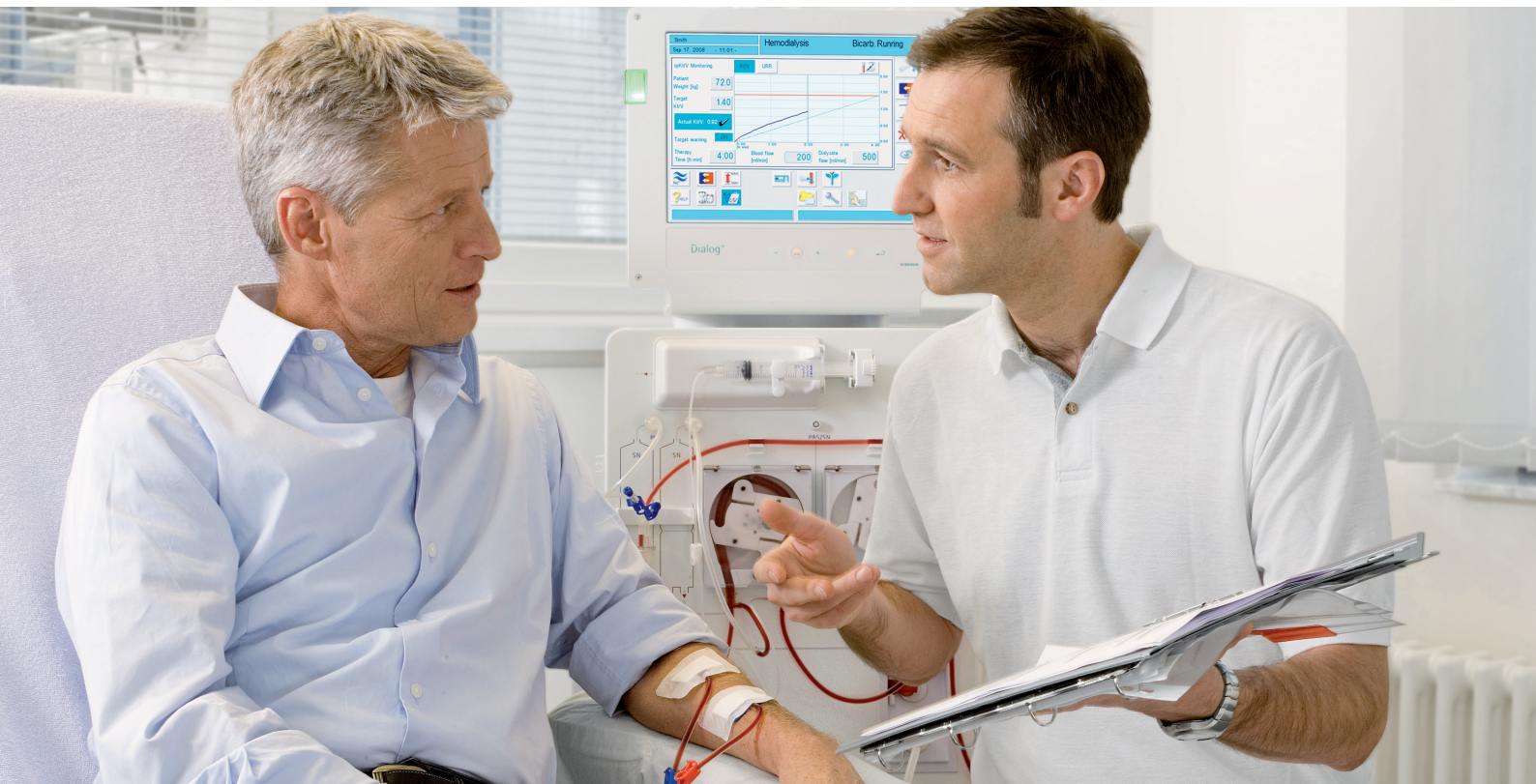
Adimea

Creating dimensions in monitoring dialysis dose



Haemodialysis

Real-time monitoring of the dialysis dose for optimising the treatment quality



Continual research and development:

Medical innovations over the past few decades and continual further development today ensure extremely efficient and high-performance dialysis treatment, which allows patients to lead extensively normal lives despite restrictions. At the same time, the remit is always to fulfil the new requirements of health care policy, as demands on the quality standards of dialysis are constantly growing.

B. Braun has set itself the aim of fulfilling these growing requirements with continual research and development of efficiency, quality and ergonomics for all its products and services and to optimise these for the benefit of patients in a future-oriented manner.

Focus on the patient:

One of B. Braun's aims is to provide doctors and nursing staff with the best-possible support for giving patients the optimum dialysis dose. The basis for this is continual precise measurement and display of the dialysis effectiveness during treatment. B. Braun has developed the Adimea real-time monitoring process.

Adimea measures dialysis efficiency by determining the reduction in molar concentration of urinary excreted substances in the spent dialysate. Hence, Adimea provides an accurate measurement process for reliable and continual control of the dialysis dose (Kt/V) throughout the entire treatment.

Treatment parameters can be adjusted by doctors and nursing staff for the benefit of patients even during treatment. This allows the equipment to optimally support the execution of the treatment objectives.

Advanced dialysis technology

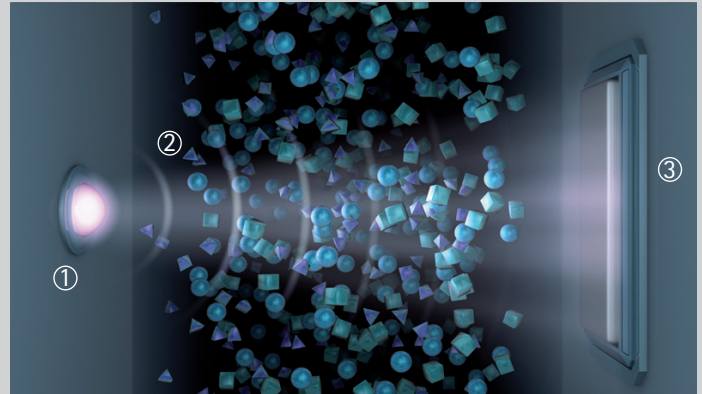
The innovative Adimea system utilizes the principles of spectroscopy for determining the reduction in the molar concentration of urinary excreted substances in the dialysate drain. A light source ① transmits ultraviolet (UV) light ② through the dialysate. The particles contained in the dialysate, which were removed from the plasma during dialysis, absorb the light. This absorption is measured by a sensor ③.

The pioneering technology enables measurement **in the spent dialysate**. Because it continuously analyzes change in the molar concentration, Adimea is directly connected to the patient. On the basis of this characteristic, Adimea is a highly reliable and accurate instrument for an online determination of the current Kt/V value during treatment.

Adimea is convincing not only in terms of its technology, but also with regards to its simple and clear operation:

The application merely requires the entry of one patient-specific parameter – the patient's weight before dialysis.

This means there is no time-consuming determination and entry of the urea distribution volume (V).



Various treatment indices – from the simple urea reduction rate through spKt/V , or alternatively, eKt/V are available for continual real-time control.

During therapy, the system generates, at the request of the user, a warning message in the event that the planned target value is not reached. This enables the user to carry out target-oriented adjustments to the treatment parameters – at any time during the ongoing dialysis.

Precise, innovative real-time measurement method

Precise, innovative determination of the reduction of urinary excreted substances in the spent dialysate using UV technology

Real-time monitoring during the entire treatment period via continual effectiveness measurement

Easy and flexible operation

No determination of V – merely requires the pre-dialysis weight

Configurable and clear display of URR, spKt/V , eKt/V as well as result prognosis

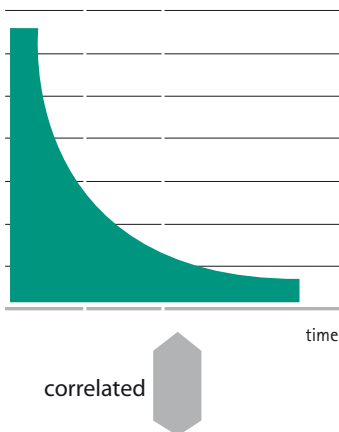
Changes to treatment parameters possible at any time

Progressive UV measurement

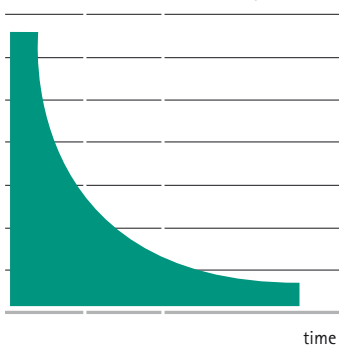
It has been proven¹, that the UV absorption measurements can be used for determining the dialysis dose as there is a very close linear correlation between the measured UV absorption signal and the urea in the dialysate. For this reason, the measurement values recorded by Adimea can be used as replacement parameters for the urea.

The progress of the measured substance reduction provides a true overview of the administered dialysis dose. Depending on the effectiveness of the dialysis, the concentration of urinary excreted substances, and hence also the UV light absorption, reduces over the course of the treatment. The continual measurements result in a patient-specific curve which almost precisely corresponds to the reduction in urea.

UV absorption in the dialysate



Urea concentration in the plasma



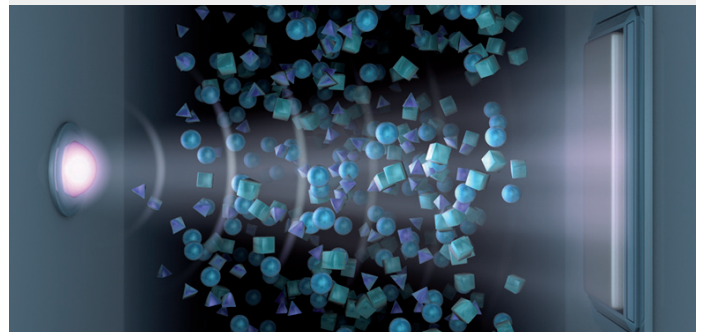
Adimea processes this acquired information to determine, and clearly display, the Kt/V during treatment. (see treatment progress graphs)

¹Uhlin F, Fridolin I, Linberg L-G, Magnusson M, Dialysis dose (Kt/V) and clearance variation-sensitivity using measurement of ultraviolet-absorbance (online), blood urea, dialysate urea and ionic dialysance. Nephrol Dial Transplant (2006) 21: 2225-2231

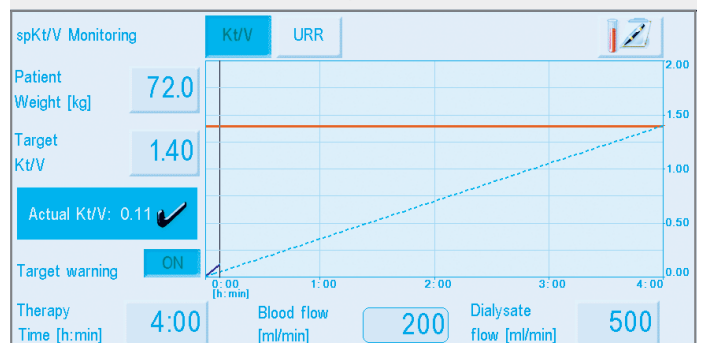
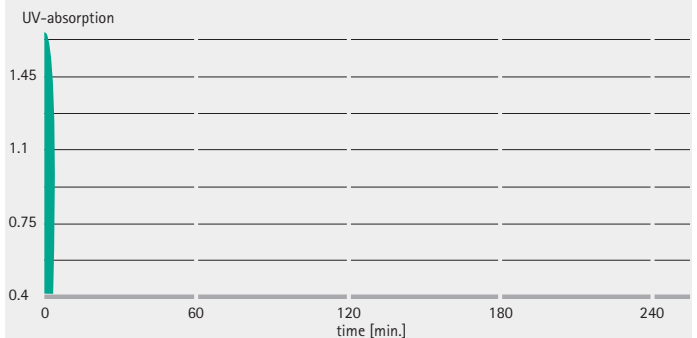
Beginning of treatment

High molar concentration in the dialysate ...

The urinary excreted substances in the dialysate absorb amajority of UV light on their way from the diode to the sensor.



... entails high UV absorption



The absorption signal provides information on the dialysis effectiveness

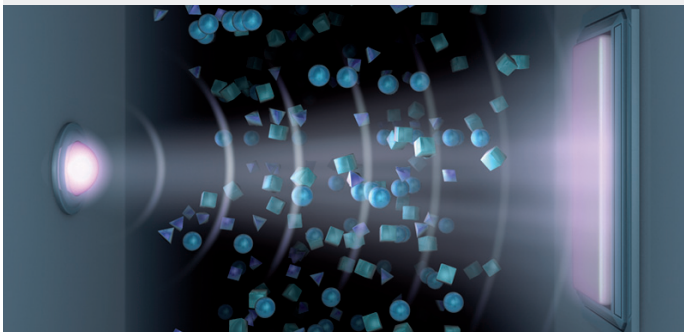
The user can see all parameters from the outset

- Selected treatment index (spKt/V example)
- Kt/V and URR
- Actual values achieved
- Overview of and access to: Treatment time / blood flow / dialysate flow.

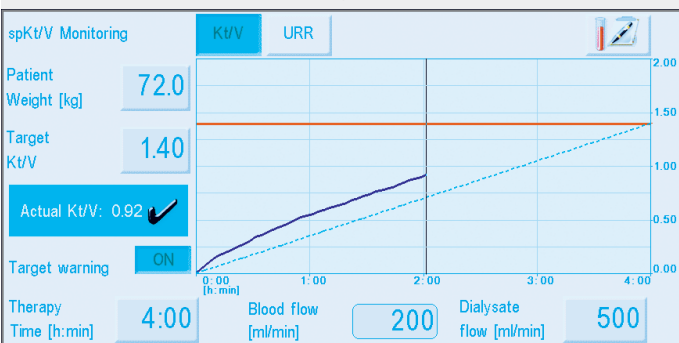
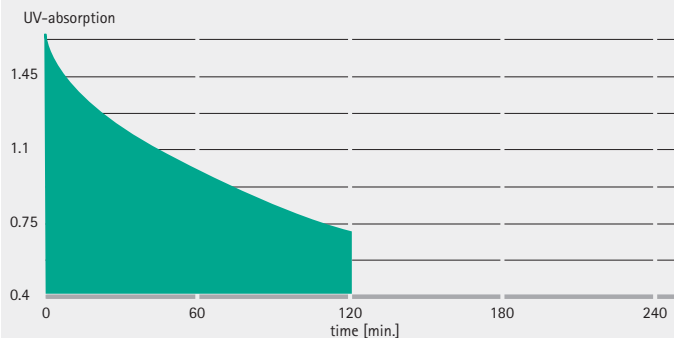
Middle of the treatment

The molar concentration decreases ...

After 120 minutes of dialysis, the volume of urinary excreted substances is considerably reduced.



... and less UV light is absorbed



Dialysis progress becomes apparent quickly and easily

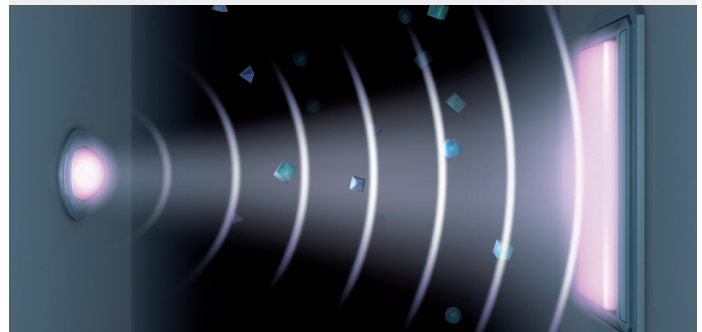
The graphic display of the treatment progress enables optimum user support at all times.

Trends in the treatment progress can be identified in good time by displaying the real time value curve (blue) / the target value curve (red) and an optical orientation line (dashed green). A target value warning, that can be optionally activated, additionally supports the user.

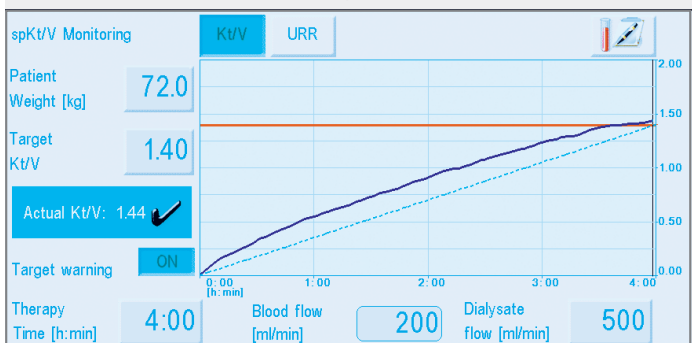
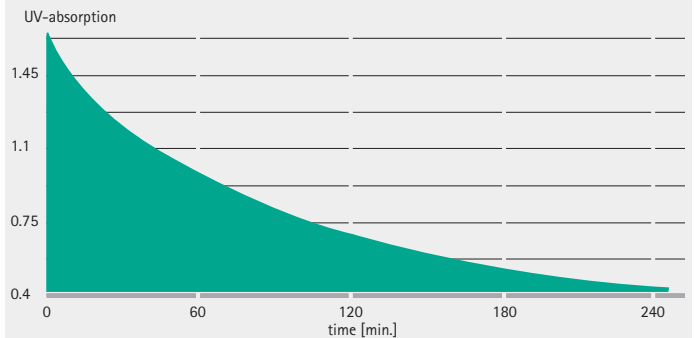
End of the treatment

The few remaining molecules ...

The low number of molecules still remaining in the dialysate drain barely absorb the UV light.



... hardly absorb any UV light any longer



Easy to understand display of the actual dialysis efficiency

At the end of the treatment, the user instantly sees whether the intended treatment objectives have been achieved. The relevant treatment data are available to be saved on the Patient Therapy Card and in Nexadia®.

Innovative technology – precise results

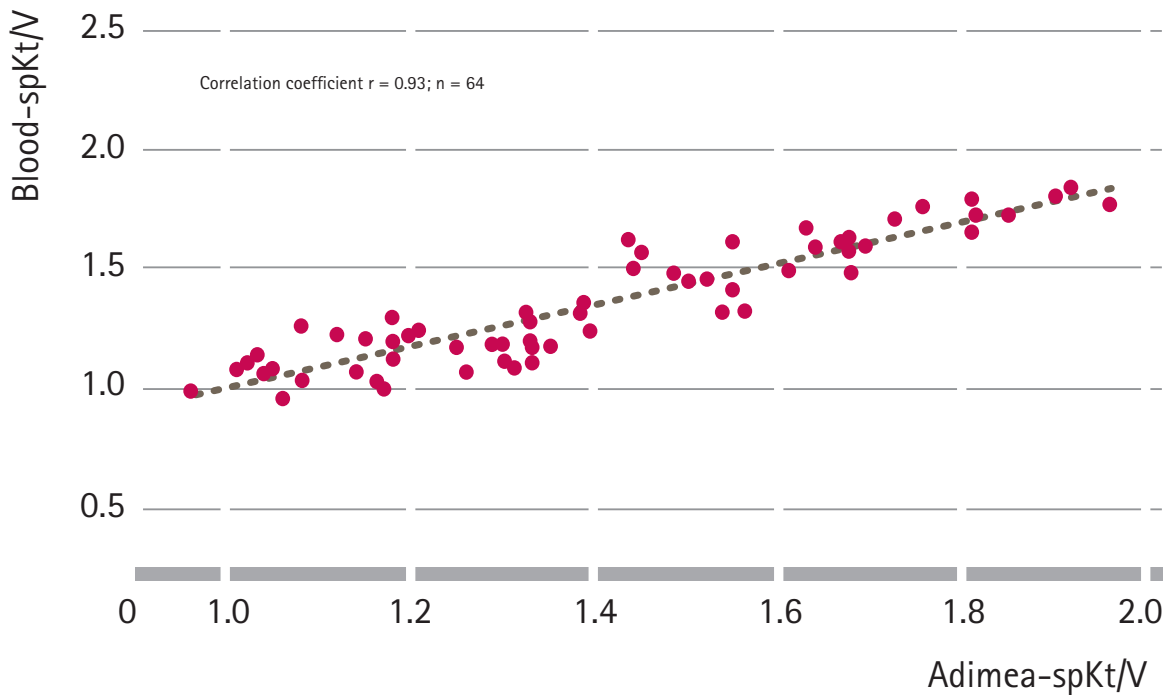


Fig. 1, scatter plot: Correlation between blood spKt/V and Adimea spKt/V

Clinical trials² reveal a very close correlation between the laboratory-determined blood spKt/V and the spKt/V determined by Adimea.

During a total of 64 treatments, blood was serially taken for urea testing so as to acquire an as accurate as possible determination of the spKt/V from the blood. The spKt/V value determined by Adimea was recorded at the same time.

The comparison of the data reveals, with $r = 0.93$ – an excellent correlation between the blood Kt/V and the Adimea Kt/V and hence a high degree of accuracy for the method. The measurement error recorded in these trials for the overall determination of the Kt/V is merely 7 %.

Adimea – the technical innovation in Kt/V monitoring

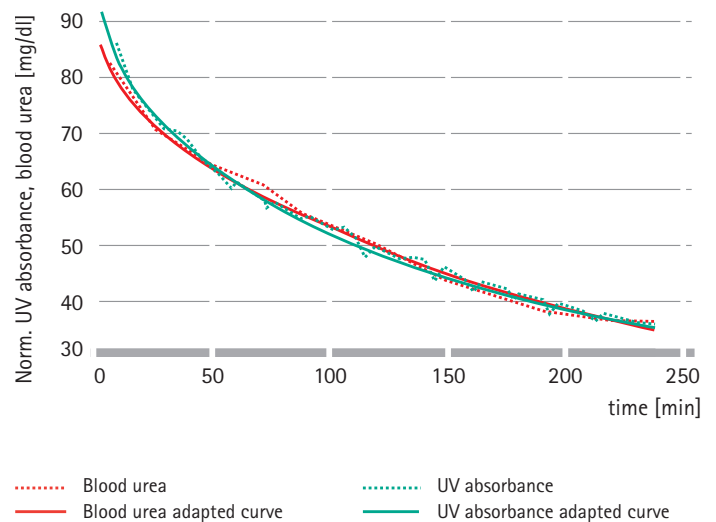


Fig. 2: This sample display for the UV absorption signal's treatment progress and the serum urea values at 20-minute measurement intervals reveals the excellent correlation.

² Werner, Günthner et al., [B. Braun Avitum AG, Melsungen], 2009.

Synergies provided by the integrated system



Systematic treatment quality, for that little extra quality of life

At B. Braun, we always define our performance aims ourselves: not only to fulfil the quality standards, but to exceed them. This also includes optimising the treatment efficiency of our products and services both for patients and for administering users.

State-of-the-art as the benchmark in our continual challenge to benefit patients.

Quality, efficiency and ergonomics are the cornerstones of our systematic approach. With this, we have taken on the economic challenges facing the health system and constantly focus on the quality and efficiency of our efforts – with the objective of sustainably optimising the quality of life for patients requiring dialysis.

Dialog⁺, Adimea and the data management system Nexadia[®]: perfect harmony

Perfect results require perfect team work: with our treatment system, Dialog⁺, we offer – on conjunction with Adimea and the Nexadia[®] data management system – the perfect treatment environment for patients requiring dialysis.

The combination of innovative, intelligent hardware and software solution guarantees an outstanding treatment standard, the optimisation of the treatment parameters during ongoing treatment as well as proof of treatment success.

For example, the Nexadia[®] data management system provides automatic pre-setting of the dialysis machine by means of a patient-specific chip card. Nexadia[®] transfers the parameters required by Adimea, such as patient weight and desired Kt/V, directly to the dialysis machine at the beginning of the treatment.

On the basis of this autonomous presetting, Adimea can automatically start the Kt/V monitoring. In addition to storing lots of patient and treatment data, Nexadia[®] also records the Kt/V value determined by Adimea following the conclusion of the treatment for further utilisation.

