Claims

1. A monitoring device (1) for monitoring the fluid balance of an animal or human body, the device comprising:
   - a body weight sensor (2) for continuously or periodically weighing the body,
   - a fluid delivery device (3) for providing a controllable supply of fluid to the body,
   - a urine output sensor (4) for determining the urine output of the body, and
   - a processor (5),

   wherein said processor (5) is adapted for:
   - determining the total amount of fluid intake and total fluid outtake of the body, taking a signal provided by the body weight sensor (2) and a signal provided by the urine output sensor (4) into account;
   - determining a fluid outtake due to perspiration and respiration by taking a signal provided by the body weight sensor (2), a signal provided by the urine output sensor (4) and a determined fluid intake into account; and
   - providing a control signal to the fluid delivery device (3) to regulate a volume, flow velocity or flow rate of the fluid delivered to the body, so as to maintain a predetermined fluid balance in the body,

     wherein other routes of fluid loss, except urination, perspiration and respiration, are assumed to be negligible.
2. The device of claim 1, further comprising a fluid retention detector (6) for detecting edema in at least a part of the body, wherein the processor (5) is adapted for detecting a condition of edema based on a signal from the fluid retention detector (6).
3. The device according to claim 1 or claim 2, wherein the body weight sensor (2) comprises at least one load cell, integrated in or operably connected to a support structure for supporting the body in use of the device.
4. The device according to any of the previous claims, comprising an alarm (7) to alert an operator, wherein said processor (5) is adapted to activate the alarm when the condition of edema is detected.
5. The device according to any of the previous claims, wherein said processor (5) is adapted to control the fluid delivery device (3) so as to block the delivery of fluid to the body when the condition of edema is detected.
6. The device according to any of claims 2-5, wherein the fluid retention detector (6) comprises a range detector for determining a distance from at least a point of reference to a plurality of points on the surface of the body, said range detector forming a three-dimensional imaging system, wherein said processor (5) is adapted for determining a volume of the body based on data provided by the range detector.
7. The device according to claim 6, wherein said range detector comprises at least two cameras, and wherein said processor (5) is adapted for determining an image depth in images obtained by the cameras, for generating a three-dimensional contour model of the body based on the determined image depth and for determining a volume of the body based on the three-dimensional contour model as indicative of edema. .
8. The device according to claim 6 or claim 7, wherein said range detector comprises at least one laser light source for illuminating the body, a sensor for measuring the reflected light, and a scanning system for scanning the laser light beam(s) emitted by the at least one laser light source over at least a part of the surface of the body while measuring the reflected light for a plurality of scanned points, wherein the processor (5) is adapted for collecting point cloud data of the body based on measured reflected light for the plurality of scanned points, for generating a three-dimensional contour model of the body based on the point cloud data and for determining a volume of the body based on the three-dimensional contour model as indicative of edema.

9. The device according to any of claims 2-8, wherein the fluid retention detector (6) comprises an element (61) for enclosing a part of the body and a sensor module (63), which is integrated in or operably attached to the element (61) and adapted for generating a signal indicative of a circumference of the body part.
10. The device according to claim 9, wherein said sensor module (63) comprises a capacitive, inductive or resistive strain sensor, and/or a linear variable differential transformer.
11. The device according to any of claims 2-10, wherein the fluid retention detector (6) comprises multiple parts for being positioned around different body parts and for generating separate signals indicative of swelling of each of the different body parts.
12. The device according to any of the previous claims, wherein the fluid delivery device (3) comprises an intravenous pump.
13. The device according to any of the previous claims, wherein said urine output sensor (4) comprises an optical sensing chamber, an ultrasonic transceiver, a measuring head, and/or a weighing system.
14. A hyperthermia treatment system comprising a monitoring device (1) in accordance with any of the previous claims.