**Claims**

1. A peritoneal dialysis filter device, which comprises:

a housing comprising:

a first compartment having a first port, and a second port;

a second compartment, having a third port, an inlet port and an outlet port;

a switching means or apparatus fluidly connected to the first and third ports and that is configured to be connected to a subject's peritoneum;

a head-space cavity portion that fluidly connects the first compartment to the second compartment;

a first hollow fibre membrane formed from hollow hydrophilic fibres within the first compartment of the housing, where each of the fibres have an inner surface and an outer surface and where the inner surface of the hollow hydrophilic fibres are aligned co-axially with respect to the alignment of the first port and the outer surface of the hollow fibres is aligned perpendicularly with respect to the alignment of the second port; and

a second hollow fibre membrane formed from hollow hydrophobic fibres within the second compartment of the housing, where each of the fibres have an inner surface and an outer surface, where the inner surface of the hollow hydrophobic fibres are aligned co-axially with respect to the alignment of the third port and the outer surface of the hollow fibres is aligned perpendicularly with respect to the alignment of the inlet and/or outlet ports, such that, when in use:

a dialysate from a subject enters the first compartment of the filter device through the first port and exits the first compartment of the filter device *via* the second port in an outflow direction; and

a regenerated dialysate from a sorbent system enters the first compartment of the filter device through the second port, passes through the head-space cavity into the second compartment, where the hollow hydrophobic fibres degasses the regenerated dialysate before it exits through the third port, with the removed gas exiting the system *via* the outlet port.

2. The peritoneal dialysis filter device according to Claim 1, wherein the device further comprises a post-filtration system, which comprises:

(a) a fluid pathway situated between the third port of the housing and the switching means or apparatus, which fluid pathway comprises a post-filtration sorbent compartment, where the post-filtration sorbent compartment comprises a sorbent that is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms; and/or

(b) a post-filtration sorbent placed within the head-space cavity portion, where said sorbent is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms.

3. A peritoneal dialysis filter device, which comprises:

a housing comprising:

a first compartment having a first port, and a second port;

a second compartment, having a third port, a fourth port, an inlet port and an outlet port;

a switching means or apparatus fluidly connected to the first and third ports and that is configured to be connected to a subject's peritoneum;

a head-space cavity portion that fluidly connects the first compartment to the second compartment;

a first hollow fibre membrane formed from hollow hydrophilic fibres within the first compartment of the housing, where each of the fibres have an inner surface and an outer surface and where the inner surface of the hollow hydrophilic fibres are aligned co-axially with respect to the alignment of the first port and the outer surface of the hollow fibres is aligned perpendicularly with respect to the alignment of the second port; and

a second hollow fibre membrane formed from hollow hydrophobic fibres within the second compartment of the housing, where each of the fibres have an inner surface and an outer surface, where the inner surface of the hollow hydrophobic fibres are aligned co-axially with respect to the alignment of the third and fourth ports and the outer surface of the hollow fibres is aligned perpendicularly with respect to the alignment of the inlet and/or outlet ports, such that, when in use:

a regenerated dialysate from a sorbent device enters the second compartment of the filter device through the fourth port and exits through the third port.

4. The peritoneal dialysis filter device according to Claim 3, wherein the device further comprises a post-filtration system, which:

(a) comprises a fluid pathway situated between the third port of the housing and the switching means or apparatus, which fluid pathway comprises a post-filtration sorbent compartment, where the post-filtration sorbent compartment comprises a sorbent that is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms; and/or

(b) further comprises a post-filtration sorbent placed within the head-space cavity portion, where said sorbent is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms.

5. A peritoneal dialysis system, comprising,

a filter device; and

a sorbent device,

wherein

the filter device is arranged to receive and filter the entirety of dialysate from a subject and to provide the filtered dialysate to the sorbent device when operated in an outflow direction; and

the filter device is arranged to receive at least part of a regenerated dialysate from the sorbent device when operated in an inflow direction,

wherein the filter device comprises:

a housing comprising:

a first compartment having a first port, and a second port;

a second compartment, having a third port, an inlet port and an outlet port;

a switching means or apparatus fluidly connected to the first and third ports and that is configured to be connected to a subject's peritoneum; and

a head-space cavity portion that fluidly connects the first compartment to the second compartment;

a first hollow fibre membrane formed from hollow hydrophilic fibres within the first compartment of the housing, where each of the fibres have an inner surface and an outer surface and where the inner surface of the hollow hydrophilic fibres are aligned co-axially with respect to the alignment of the first port and the outer surface of the hollow fibres is aligned perpendicularly with respect to the alignment of the second port; and

a second hollow fibre membrane formed from hollow hydrophobic fibres within the second compartment of the housing, where each of the fibres have an inner surface and an outer surface, where the inner surface of the hollow hydrophobic fibres are aligned co-axially with respect to the alignment of the third port and the outer surface of the hollow fibres is aligned perpendicularly with respect to the alignment of the inlet and/or outlet ports,

where the hollow hydrophilic fibres comprise a porous wall matrix;

such that, when in use:

a dialysate from a subject enters the first compartment of the filter device through the first port and exits the first compartment of the filter device *via* the second port in an outflow direction; and

a regenerated dialysate from the sorbent device enters the first compartment of the filter device through the second port, passes through the head-space cavity into the second compartment, where the hollow hydrophobic fibres degasses the regenerated dialysate before it exits through the third port, with the removed gas exiting the system *via* the outlet port.

6. The peritoneal dialysis system according to Claim 5, wherein the filter device further comprises a post-filtration system, which comprises:

(a) a fluid pathway situated between the third port of the housing and the switching means or apparatus, which fluid pathway comprises a post-filtration sorbent compartment, where the post-filtration sorbent compartment comprises a post-filtration sorbent that is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms; and/or

(b) further comprises a post-filtration sorbent placed within the head-space cavity portion, where said sorbent is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms.

7. The peritoneal dialysis system according to Claim 5 or Claim 6, wherein the system further comprises a bypass means or apparatus, which comprises:

(a) a bypass fluid pathway connected to the sorbent device and arranged to return a regenerated dialysate to the subject without passing through any part of the filter device; and

a switching means or apparatus that selects between sending a regenerated dialysate to the filter device or to the bypass fluid pathway; or

(b) a bypass fluid pathway connected to the sorbent device and arranged to return a regenerated dialysate to the subject which passes through the second compartment of the filter device, which comprises a fourth port, such that the dialysate enters the second compartment through the fourth port and exits through the third port; and

a switching means or apparatus that selects between sending a regenerated dialysate to the second port or fourth port of filter device.

8. A peritoneal dialysis system, comprising,

a filter device; and

a sorbent device,

wherein

the filter device is arranged to receive and filter the entirety of dialysate from a subject and to provide the filtered dialysate to the sorbent device when operated in an outflow direction; and

the filter device is arranged to receive at least part of a regenerated dialysate from the sorbent device when operated in an inflow direction,

wherein the filter device comprises:

a housing comprising:

a first compartment having a first port, and a second port;

a second compartment, having a third port, a fourth port, an inlet port and an outlet port;

a switching means or apparatus fluidly connected to the first and third ports and that is configured to be connected to a subject's peritoneum;

a head-space cavity portion that fluidly connects the first compartment to the second compartment;

a first hollow fibre membrane formed from hollow hydrophilic fibres within the first compartment of the housing, where each of the fibres have an inner surface and an outer surface and where the inner surface of the hollow hydrophilic fibres are aligned co-axially with respect to the alignment of the first port and the outer surface of the hollow fibres is aligned perpendicularly with respect to the alignment of the second port; and

a second hollow fibre membrane formed from hollow hydrophobic fibres within the second compartment of the housing, where each of the fibres have an inner surface and an outer surface, where the inner surface of the hollow hydrophobic fibres are aligned co-axially with respect to the alignment of the third and fourth ports and the outer surface of the hollow fibres is aligned perpendicularly with respect to the alignment of the inlet and/or outlet ports, such that, when in use:

a regenerated dialysate from the sorbent device enters the second compartment of the filter device through the fourth port and exits through the third port.

9. The peritoneal dialysis system according to Claim 8, wherein:

(i) the filter device further comprises a post-filtration system, which:

(a) comprises a fluid pathway situated between the third port of the housing and the switching means or apparatus, which fluid pathway comprises a post-filtration sorbent compartment, where the post-filtration sorbent compartment comprises a post-filtration sorbent that is suitable for removing one or more of water-soluble uremic

toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms; and/or

(b) comprises a post-filtration sorbent placed within the head-space cavity portion, where said sorbent is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms; and/or

(ii) the system further comprises a bypass means or apparatus, which comprises:

(ab) a bypass fluid pathway connected to the sorbent device and arranged to return a regenerated dialysate to the subject without passing through any part of the filter device; and

a switching means or apparatus that selects between sending a regenerated dialysate to the filter device or to the bypass fluid pathway; or

(bb) a bypass fluid pathway connected to the sorbent device and arranged to return a regenerated dialysate to the subject which passes through the second compartment of the filter device, such that the dialysate enters the second compartment through the fourth port and exits through the third port; and

a switching means or apparatus that selects between sending a regenerated dialysate to the second port or fourth port of filter device.

10. The peritoneal dialysis system according to any one of Claims 5 to 7 and 8 to 9, wherein the system further comprises a bypass means or apparatus, which comprises:

a bypass fluid pathway connected to the sorbent device and arranged to return a regenerated dialysate to the subject without passing through the filter device; and

a switching means or apparatus that selects between sending a regenerated dialysate to the filter device or to the bypass fluid pathway.

11. A kit of parts comprising:

(i) a peritoneal dialysis filter device according to Claim 1; and

(ii) a post-filtration system, which comprises:

(a) a fluid pathway situated between the third port of the housing and the switching means or apparatus, which fluid pathway comprises a post-filtration sorbent compartment, where the post-filtration sorbent compartment comprises a sorbent that is suitable for removing one or more of water-soluble uremic toxins, protein-bound

uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms; and/or

(b) a post-filtration sorbent placed within the head-space cavity portion, where said sorbent is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms.

12. A kit of parts comprising:

(i) a peritoneal dialysis filter device according to Claim 3; and

(ii) a post-filtration system, which:

(a) comprises a fluid pathway situated between the third port of the housing and the switching means or apparatus, which fluid pathway comprises a post-filtration sorbent compartment, where the post-filtration sorbent compartment comprises a sorbent that is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms; and/or

(b) further comprises a post-filtration sorbent placed within the head-space cavity portion, where said sorbent is suitable for removing one or more of water-soluble uremic toxins, protein-bound uremic toxins, low-molecular weight proteins, endotoxins, exotoxins, inflammatory mediators and microorganisms.