CLAIMS

1. A cell processing system comprising:

at least one cell suspension module;

at least one buffer module;

at least one flow-through magnetic separation/debeading module;

at least one non-magnetic output module;

at least one magnetic output module; and

at least one spinning membrane debeading module, wherein the at least one spinning membrane debeading module is located immediately downstream of the at least one flow-through magnetic separation/debeading module, and is configured to debead the output from the at least one flow-through magnetic separation/debeading module.

2. The cell processing system of Claim 1, further comprising at least one return loop returning upstream of the at least one flow-through magnetic separation/debeading module.

3. The cell processing system of Claim 1, comprising at least two flow-through magnetic separation/debeading modules in parallel or in series.

4. The cell processing system of Claim 1, further comprising at least one additional module.

5. The cell processing system of Claim 1, comprising at least two spinning membrane debeading modules in parallel or in series.

6. The cell processing system of Claim 4, wherein the at least one additional module comprises at least one physical separation module.

7. The cell processing system of Claim 6, wherein the at least one additional module comprises at least one magnetic column module.

8. The cell processing system of Claim 4, wherein the at least one additional module comprises one of the following: at least one media exchange module, at least one cell concentration module and at least one cell washing module.

9. The cell processing system of Claim 1, wherein the flow-through magnetic separation/debeading module comprises:

a chamber defined by walls and having an x-direction, a y-direction, and a z-direction;

an inlet and an outlet arranged on opposite ends of the chamber in the y-direction; and

at least two magnets adjacent or proximate a wall of the chamber and arranged to establish a zero gradient line within the chamber between the inlet and the outlet.

10. The cell processing system of Claim 1, wherein the at least one spinning membrane debeading module comprises:

a debeading chamber define partially by a cylindrical side-wall;

a porous spinning membrane having an interior and oriented co-axially with the cylindrical side-wall;

a sample inlet;

a waste output module connected to the interior of the spinning membrane; and

a cell output module connected to the debeading chamber.

11. The cell processing system of Claim 10, wherein the at least one spinning membrane debeading module further comprises at least one magnet adjacent or proximate to the cylindrical side-wall.

12. The cell processing system of Claim 9, wherein each flow-through magnetic separation/debeading module comprises at least two inlets and at least two outlets.

13. The cell processing system of Claim 9, wherein each flow-through magnetic separation/debeading module comprises at least three magnets adjacent or proximate a wall of the chamber and arranged to establish at least two zero gradient lines within the chamber between the inlet and the outlet; or wherein each flow-through magnetic separation/debeading module comprises at least four magnets arranged in two arrays on opposite sides of the chamber in the z-direction.

14. The cell processing system of Claim 13, wherein each flow-through magnetic separation/debeading module comprises at least four magnets arranged in two arrays on opposite side of the chamber in the z-direction and cross-oriented in the x-y plane from near one inlet to near one outlet on the opposite side of the chamber in the z-direction.

15. The cell processing system of Claim 9, further comprising:

sub-membrane injection ports adjacent a wall of the chamber also adjacent the at least two magnets; and

a membrane adjacent a sub-membrane.

16. The cell processing system of Claim 10, further comprising a reagent module.