HEARTWARE - A NOVEL MINIATURIZED PASSIVE MAGLEV CENTRIFUGAL VAD

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A long term mechanical assist device must have the following attributes to be successful in a large patient population: capability of full ventricular support; small size and optimized fit; hemocompatibility; highly reliable, wearless design; high power efficiency. Heartware has developed a miniaturized passively magnetically suspended centrifugal VAD, which has a displaced volume of 50 cc and weighs 145 grams. The pump has a short integrated inflow cannula and an axial height less than one inch. The size of the device coupled with the perpendicular relationship of outflow to the inflow allows for intrapericardial pump placement and fast implantation. The short axial height is achieved through a proprietary design that integrates the motor into a wide-bladed impeller. Wearless pump design is achieved via a combination of passive radial magnetic bearings, which also provide axial preload, and shrouded axial hydrodynamic thrust bearings. Enhanced reliability is achieved via the simplicity of the impeller suspension system, as well as by redundant stators and a fatigue resistant driveline. The pump can provide 2 to 12 litershin of flow at 2500 rpm. Through the novel motor and impeller integration, the pump is highly power efficient requiring only 4.5 Watts to deliver 5 l/min flow against 100 mmHg. The Heartware VAD promises to be an easily implantable, highly reliable, long term, mechanical ventricular assist device suitable for a large patient population.

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