

A TOTALLY IMPLANTABLE ARTIFICIAL HEART BY USING PRECESSIONAL DISPLACEMENT PUMPS

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Precessional displacement pump (PDP) is a small size continuous flow displacement-type blood pump with a new principle. A total artificial heart (TAH) was designed by using two PDPs and one motor. Each PDP has an oneway bearing with which a precessional movement in a PDP is restricted only to one direction. Two PDPs can be switched by the change of the rotational direction of the motor, and the blood is ejected from left and right PDPs alternately (Fig.1). Then, the pulsatile flow can be obtained. In this system, each PDP requires one artificial valve at the outlet port to prevent the regurgitation of the blood flow when it is stopped.

Under these design, the prototype model of the PDP for the left artificial heart (PDP 22-LAH) was constructed and its performance was examined (Fig.2). As the maximum continuous output of the PDP22-LAH was 20 L/min with 120 mmHg of afterload, PDP was considered to be a practical blood pump with which a pulsatile TAH could be realized.

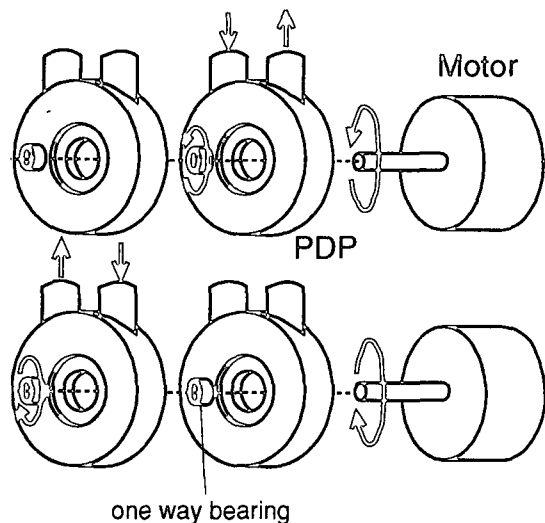


Fig.1 Drive method

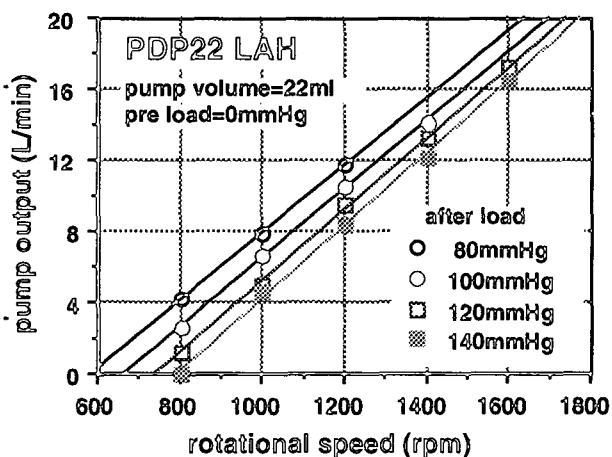


Fig.2 Pump output of PDP22-LAH