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Commentary: The ideal prosthetic valve: The quest for the Holy Grail continues

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Aortic valve replacement is one of the most common surgical procedures in cardiac surgery. A wide range of different devices are currently available, and new models are constantly being released. In addition to this, the possibility of implanting them through different approaches (such as transcatheter therapies) has deepened the research in this field. However, stringent requirements are required before approval.¹

In the current issue of the *Journal*, Sadri and colleagues² evaluate the anatomical and hemodynamic modifications of the aortic valve INSPIRIS RESILIA (Edwards Lifesciences, Irvine, Calif) after long-term use, using accelerated wear tests. In their paper, the authors compared effective orifice areas and flow characteristics of three 21-mm and 23-mm INSPIRIS RESILIA valves with their respective values at zero cycle conditions. Their conclusions showed excellent durability after an equivalent of 25 years of in vitro wear, with hemodynamic data comparable with “control” valves.

The authors are to be commended for this remarkable work. However, some aspects may be worthy of proper discussion. The in vitro evaluations were performed under ideal hemodynamic conditions, as both the chambers and the liquid used do not reflect the effective shear stress on the valve. Therefore, a more authentic assessment is needed to better assess the durability of the valve in vivo. As acknowledged by the authors, the use of a fluid that does



The quest of the ideal prosthetic valve: A holy grail in cardiac surgery.

CENTRAL MESSAGE

New models of valve prostheses are constantly being released. A new bioprosthetic valve showed optimal hemodynamic data. However, these need to be confirmed in vivo.

not resemble blood represents a limit to ex vivo evaluations of thrombosis and calcifications, which are the main causes of prosthetic valve dysfunction. The lack of different study groups (a proper control group vs other commercial valves) could have strengthened the results. A comparison between RESILIA and other valves already in use could have provided essential information to surgeons in choosing the ideal valve for their patient (Figure 1). Thus, many of the results shown remain expectations and speculations about possible in vivo data.



FIGURE 1. The quest for the ideal valve prosthesis has deepened the research and still represents a Holy Grail.

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Nevertheless, the maintenance of optimal hemodynamics shown is undoubtedly surprising and promising. The process of selecting the best prosthetic valve requires multiple and complex evaluations. Durability is one of the main criteria for minimizing patient morbidity and reoperations.³ Novel durable patient-tailored prostheses could be delivered in a (possibly) near future. We should just wait and continue our quest.

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