Commentary: Pediatric cardiac stem cells: Another holy grail?

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I welcome the review article on the use of stem cell therapy in pediatric patients provided by Sano and colleagues² in this issue of the *Journal*. Wikipedia defines the Holy Grail as a vessel “with miraculous powers that provides happiness and eternal youth.... an elusive object or goal that is sought after for its great significance.”³ Certainly, that describes the potential power of cardiac stem cells. The opinion piece provided by Sano and colleagues² is a superb review of where this field started and where it is going now. Dr Sano is one of the leading investigators in this field and has been working with stem cells in pediatric patients for many years. This is a very young field, as evidenced by the fact that the oldest reference in the article² is from 2003, and essentially all the other references are from the last 5 years.

The review article of Sano and colleagues² is a focused effort to summarize the recent advances in cardiac stem cell therapy in pediatric patients. One of the primary objectives of stem cell therapy is to increase healthy myocardium, particularly in patients with hypoplastic left heart syndrome and in other patients with single-ventricle morphology with right ventricular dominance. Sano and colleagues² take us through the phase I TICAP (Transcoronary Infusion of Cardiac Progenitor Cells in Patients with Single Ventricle Physiology) and the phase II PERSEUS (Cardiac Progenitor Cell Infusion to Treat Univentricular Heart Disease) trials from Japan. These clinical trials evaluated the safety and feasibility of transcoronary infusion of autologous stem cells. The positive results from TICAP and PERSEUS were a clinical launch for trials of cardiac

Chalice of the Infanta Dona Urraca, León, Spain. Reprinted with permission.¹ ©M Torres Sevilla and JM Ortega del Rio.

Central Message

A review of cardiac stem cell therapy efforts in pediatric patients shows that further investigation is needed to define timing, dosing, and cell types to help children with complex congenital heart disease.

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regeneration therapy. The authors then summarize the current APOLLON (Cardiac Stem/Progenitor Cell Infusion in Univentricular Physiology), Mayo Clinic, Duke, and EL-PIS (Allogeneic hMSC Injection in Patients with Hypoplastic Left Heart Syndrome—University of Maryland) cardiac stem cell trials. It is to be hoped that further investigation will define the ideal timing, dosing, and stem cell types to help children with complex heart disease. Stem cell therapy is indeed an elusive goal, but we seek it because of its great significance for these challenging patients.

References

1. Torres Sevilla M, Ortega del Rio JM. *Kings of the Grail: tracing the historic journey of the cup of Christ from Jerusalem to modern-day Spain*. New York: Harry N. Abrams; 2015:256.
2. Sano S, Ishigami S, Sano T. New era of heart failure therapy in pediatrics: cardiac stem cell therapy on the start line. *J Thorac Cardiovasc Surg*. 2019;158:845-9.
3. Wikipedia. Holy Grail. Available at: https://en.wikipedia.org/wiki/Holy_Grail. Accessed May 21, 2019.