stems and the circumferential peritruncal plexus, as well as the one between the circumferential peritruncal plexus and the epicardial vessels—allows for better understanding of the deviations of coronary patterns seen in anomalous aortic origin of a coronary artery² or in transposition of the great arteries.³ Overall, the authors fulfill their promise to lay out a unifying a novel pathway for coronary artery development.

See Article page 344.

Commentary: How does that happen, doc?

Ravi Vamsee, MBBS,^a and Robert D. B. Jaquiss, MD^b

It is likely that most congenital heart surgeons and pediatric cardiologists have a working knowledge of normal and abnormal cardiac development, with particular focus on “macroscopic” processes such as looping, spiraling, and septation. It is much less likely that practitioners are conversant with the “microscopic” processes involved in the development of the coronary arterial system. This is unfortunate, given the wide spectrum of abnormal coronary anatomy encountered in contemporary practice of pediatric cardiology and congenital heart surgery. Thus, the excellent review by Anderson and colleagues¹ of contemporary understanding of coronary artery development is most welcome.

Based predominantly on observations from human and murine histology, the authors describe what they term a “mosaic” of developmental processes and tissue origins. Readers will learn that formerly competing hypotheses of

Socially distanced and masked Ravi Vamsee, MBBS, and Robert D. B. Jaquiss, MD

CENTRAL MESSAGE

The understanding of coronary artery development has increased remarkably in the past century, but there remains much to learn.

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Disclosures: The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Aug 20, 2021; revisions received Aug 20, 2021; accepted for publication Aug 23, 2021; available ahead of print Aug 26, 2021.

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J Thorac Cardiovasc Surg 2022;164:351-2

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2021.08.050>

angiogenesis and vasculogenesis may in fact be complementary, with each explaining development in a different segment of the coronary arterial tree. The process of “reprogramming,” whereby venous endothelium is transformed into arterial endothelium, is also introduced. The varied origins of the component of the mature coronary arteries—endothelial stems from the aortic wall, a crown-like plexus of endothelial channels surrounding the developing aortic root, the protoepicardial origin of epicardial coronaries, and ventricular endocardium—are described. The authors then use these developmental concepts to explain a variety of malformations ranging from anomalous origin of the left coronary artery from the pulmonary artery to the bizarre coronary patterns that often accompany pulmonary atresia with intact

ventricular septum and the aortic atresia/mitral stenosis variant of hypoplastic left heart syndrome.

There has been remarkable progress in the understanding of coronary artery development in the past century.^{2,3} Advances have in many cases come from detailed examinations of histologic sections. The development of sophisticated genetic techniques has facilitated a more complete understanding of the varied lineages of the components of the mature coronary artery. However, there remain significant knowledge gaps and areas of active investigation, including how the various components of coronary primordia “find” each other to coalesce into a functional artery with normal origin and ramification. A very active area of study is how signaling from one cell influence the subsequent behavior of another, and well as the longstanding question of how biophysical considerations (flow and pressure) in a chamber or vessel

cause alterations in adjacent coronary anatomy.^{4,5} At a very practical level, Anderson and colleagues¹ give us confidence that we are ever closer to answering the age-old question of the parent of a child with an imperfect heart.

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