5. Rodriguez S. The real reason everyone calls billion-dollar startups 'unicorns.' *International Business Times*. Available at: <http://www.ibtimes.com/real-reason-everyone-calls-billion-dollar-startups-unicorns-2079596>. Accessed March 3, 2017.
6. Ioannidis JP. Stealth research and Theranos: reflections and update 1 year later. *JAMA*. 2016;316:389-90.
7. Plebani M. Evaluating and using innovative technologies: a lesson from Theranos? *Clin Chem Lab Med*. 2015;53:961-2.

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NO FREE LUNCH: EVEN WITH A DIET HEAVY ON PEARS

Reply to the Editor:

We appreciate the comments on our work¹ and also the work of Treasure and colleagues² in using patient-specific 3-dimensional printing to aid the manufacture of the Personalized External Aortic Root Support (PEARS). Their work is an excellent example of the application, integration, and manipulation of advanced imaging technologies to develop new paradigms of surgical care.

As investigators who are also exploring ways to apply 3-dimensional printing technologies to clinical medicine,¹ we believe that the work of Treasure and colleagues² is a definitive first step toward the holy grail of additive manufacturing in cardiovascular medicine: the printing of patient-specific replacement parts, especially heart valves. Dr DeBakey's wife long ago proved to us that endothelial biochemical functionality does not need to be replicated when she successfully created prosthetic grafts with Dacron polyester fabric; with the 3-dimensional printer now standing in for the sewing machine, it seems that the next big challenge is to identify an inert, durable, and nonthrombogenic printing material. That this material will then be used to create patient-specific replacement parts seems inevitable when viewed within the context of our world's logarithmic technologic progress.

To a clinical heart surgeon (J.L.H.), PEARS is an interesting new twist on the old surgical trick of vascular wrapping. Albert Einstein, who underwent cellophane wrapping of an aortic aneurysm, would certainly be proud.

J.L.H.'s wife has performed paid work as consultant for Medtronic. B.R. has nothing to disclose with regard to commercial support.

Or would he? Fifty years ago, PEARS might have seemed like a cure for Marfan aortopathy, but in today's world of routine valve-sparing root replacement, the bar for PEARS is much higher. PEARS may easily find a niche for older patients as a lower-risk surgical intervention for prophylaxis of acute aortic syndromes. For young patients, however, the jury will be deliberating for some time before delivering this verdict. Not only does PEARS have to prove long-term protection against adverse aortic outcomes, but the hazard of reoperation after PEARS will need to be tracked. As a congenital surgeon, my mind immediately wanders to the "next operation" and a cohort of young patients with aortopathy who will, in time, have cardiac surgical indications for conditions such as mitral valve prolapse, coronary artery disease, infectious endocarditis, and pericardial disease. The difficulty and danger encountered in reoperating in a PEARS chest (think fashioning and sewing coronary buttons) could be considerable. Free lunch remains elusive.

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References

1. Hermesen JL, Burke TM, Seslar SP, Owens DS, Ripley BA, Mokadam NA, et al. Scan, plan, print, practice, perform: development and use of a patient-specific 3-dimensional printed model in adult cardiac surgery. *J Thorac Cardiovasc Surg*. 2017;153:132-40.
2. Treasure T, Austin C, Pepper J. Plan, scan, model, print, manufacture, and implant personalized external aortic root support (PEARS). *J Thorac Cardiovasc Surg*. 2017;154:78.

<http://dx.doi.org/10.1016/j.jtcvs.2017.03.078>