TECHNICAL OVERVIEW

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Regulation of Vascular Grafts

REFERENCE: Britain, R. G., **"Regulation of Vascular Grafts,"** *Vascular Graft Update: Safety and Performance, ASTM STP 898,* Helen E. Kambic, Adrian Kantrowitz, and Pei Sung, Eds., American Society for Testing and Materials, Philadelphia, 1986, pp. 5–7.

KEY WORDS: vascular grafts, prostheses, Food and Drug Administration, standardization

Generally speaking, replacement of diseased, injured, or malfunctioning segments of the cardiovascular system with vascular prostheses is now a common and successful surgical procedure. Instances of device failure, functional impairment, or undesirable responses by the recipient patient do occur, however, the continuing challenge is to develop a vascular graft combining good patency, durability, strength, blood/surface compatibility, porosity, elasticity, and other characteristics. The authors in this book are involved in meeting this challenge.

I am afraid, however, that I personally face a far greater challenge that is, in a brief overview, I must explain how vascular grafts are regulated by the Food and Drug Administration (FDA). I should also explain what initiatives can be expected from the FDA, and how they may affect everyone involved in this area.

The FDA's involvement in assuring the safety and effectiveness of vascular grafts predates the 1976 Medical Device Amendments to the Federal Food, Drug, and Cosmetic Act. Before 1976, vascular grafts of animal, including human, origin were regulated as "new drugs" by the FDA, and the clinical testing and marketing of these vascular grafts were subject to Agency review and approval. Upon enactment of the Medical Device Amendments, these products then fell within the expanded definition of a medical device. The law provided, however, that vascular grafts of animal origin would remain subject to premarket approval unless data are developed to support a petition reclassifying these devices into the

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standards regulatory category. Because no such petition has been approved, these vascular grafts continue to be regulated in the category of devices subject to premarket approval, known as Class III devices, and new versions of these vascular grafts must undergo an extensive Agency review, including the review of clinical test data, to ensure that they are safe and effective before marketing.

Vascular grafts made of woven or knitted synthetic materials, such as Dacron® or Teflon®, have a different regulatory history from their animal-origin counterparts and, as a result, are controlled somewhat differently by the FDA. These vascular grafts have always been considered medical devices by the FDA, and they therefore became subject to the general regulatory scheme established by the Medical Device Amendments. In particular, the law required the FDA to classify these devices into one of three regulatory classes based on the level of control necessary to assure safety and effectiveness.

In attempting to determine which regulatory class would be appropriate for these vascular grafts, that is, whether to classify them into Class I, the general controls category, Class II, the performance standards category, or Class III, the premarket approval category. The FDA and a panel of outside experts formed by the FDA were confronted with an interesting situation. General opinion and practice among vascular surgeons indicated that prosthetic vascular replacements with an internal diameter of 6 mm or greater had proven generally satisfactory for use as arterial grafts, and, although these vascular grafts are life-sustaining implants, it appeared that a performance standard could be developed to provide a reasonable assurance of their safety and effectiveness. On the other hand, prosthetic vascular grafts of less than 6-mm diameter appeared to be less satisfactory than the alternatives of endarterectomy and autogenous vein grafting, and the reasons for this poorer performance were not fully known. The panel of experts and FDA believed that sufficient scientific and medical data did *not* exist to establish adequate standards for these smaller vascular grafts. Thus, the classification panel recommended, and the FDA concurred, that vascular grafts of 6-mm or greater diameter, typically constructed of woven or knitted material such as Dacron® or Teflon®, be classified in Class II, the performance standards category, while similarly constructed vascular grafts of less than 6-mm diameter be classified in Class III and be made subject to premarket approval. These classifications become final in March of 1980.

As an aside, it is interesting to note some of the names appearing in the references cited by the FDA as the basis for its vascular graft classification regulations — names such as Sauvage and Szilagyi. I am quite pleased that these gentlemen are among the distinguished authors who are in this book.

Now that the FDA has classified these devices, the task remains of making them subject to the regulatory controls called for by their classifications. In the case of vascular grafts of less than 6-mm diameter, the FDA must propose and finalize a regulation requiring the submission of premarket approval applications for all marketed versions of this device. We, at the FDA, are developing such regulations for Class III devices at a rate consistent with our priorities and limited resources. While I think you can expect, during the next few years, the issuance

of regulations calling for premarket approval of several Class III cardiovascular devices, such as heart valves and pacemakers, it is unlikely during this period that we will begin development of a similar regulation for Class III vascular grafts. I believe, nonetheless, that efforts by ASTM and other organizations and individuals to promote the development of information which will be necessary for premarket approval are extremely beneficial and timely.

Perhaps even more timely, from the FDA's perspective, are efforts to facilitate the development of a standard for Class II vascular grafts; that is, vascular grafts of 6 mm and greater diameter. Of the more than 1000 generic types of devices that have been proposed for final classification in Class II, eleven are currently the subject of formal standards development proceedings. Vascular grafts of 6-mm and greater diameter are one of these eleven devices.

The FDA began formal standards development proceedings for this device in July 1983 with the publication of a notice in the *Federal Register*, providing an opportunity to request reclassification of the device. No reclassification requests were received, so we are now working on the next step required by law: the publication of a notice soliciting offers to develop a standard. Once this notice is published, interested parties will have 60 days to provide a response.

Other authors will be providing more information later in the book about the FDA's standards development process. For now, I would just like to emphasize my hope that this book will contribute to the development of information instrumental in assuring the safety and effectiveness of vascular grafts. In particular, I hope that it will contribute to the standards development process, and will foster further efforts to develop and disseminate information. I am confident that I will not be disappointed.