products injected for soft tissue augmentation. J Am Acad Dermatol 1989:21:992-8.

39. Pollack SV. Silicone, Fibrel, and collagen implantation for facial lines and wrinkles. J Dermatol Surg Oncol 1990:16:957-61.

40. Elson ML. Dermal filler materials. Dermatol Clin 1993;11:361-7.

41. Spiro M, Rosen T. Injectable soft tissue substitutes. Clin Plast Surg 1993:20:181-8.

42. Cooperman L, Michaeli D. The immunogenicity of injectable collagen. I. A 1-year prospective study. J Am Acad Dermatol 1984;10:638-46.

43. Cooperman L, Michaeli D. The immunogenicity of injectable collagen. II. A retrospective review of seventy-two tested and treated patients. J Am Acad Dermatol 1984:10:647-51.

44. DeLustro F, Condell RA, Nguyen MA, et al. A comparative study of the biologic and immunologic response to medical devices derived from dermal collagen. Biomed Mater Res 1986;20:109-20.

45. Millikan L, and the Multicenter Study Group. Long-term safety and efficacy with Fibrel in the treatment of cutaneous scars: results of a multicenter study. J Dermatol Surg Oncol 1989:15:837-42.

46. Millikan L, Banks K, Purkait B, et al. A 5-year safety and efficacy evaluation with Fibrel in the correction of cutaneous scars following one or two treatments. J Dermatol Surg Oncol 1991:17:223-9.

Commentary
Several recent reports underscore the absence of any ideal material for permanent implantation in the human body. A broad variety of substances, often used in large volumes, characteristically produce inflammation, granulomas, and scar tissue, immediate or delayed, which is often retractive to all but the most valiant treatments. When large volumes of material are employed radical surgery becomes necessary to eliminate gross disfigurement.

More sophisticated, analytical techniques might pinpoint the presence of specific compounds but the relationship of a specific compound with the degree of inflammation elicited would be impossible to determine. The human body does not tolerate implants particularly in large volumes. Although breast implants and artificial hips are at opposite ends of the therapeutic spectrum both share a large variety of the same problems that afflict all permanent implants. No one is certain why these reactions occur, however, bacterial infections probably play a major role. Breast implants are permitted in the United States only in the absence of any infectious process. The use of liquid silicone even in small quantities in the presence of overt clinical infections is contraindicated in all authoritative publications. The fate of implanted biomaterials has been conceptualized as "a race for the surface between macromolecules, bacteria and tissue cells." Evolution has programmed tissue cells to reject foreign bodies but bacteria have developed methods of colonizing inanimate substrata as a survival strategy. The net result is the inability of permanent implanted synthetic materials to integrate themselves into host biological systems. Gore-Tex (expanded polytetrafluoroethylene) seems promising, however, in a few years the true story will be known and until then it is worth remembering that no foreign material is perfect and all have the potential for complications large and small.

DAVID M. DUFFY, MD
Torrance, California

References
1. Rapaport MJ, et al. Injectable silicone: cause of facial nodules, cellulitis, ulcerations and migration. Aesth Plast Surg 1996:20:267-76.

2. Mastrucerio DN, Pesqueira MJ. Severe granulomatous reaction and facial ulceration occurring after subcutaneous silicone injection. J Am Acad Dermatol 1996:34:849-52.

3. FDA Medical Bulletin. 1992:22(2).

4. Orentreich DS, Orentreich NO. Injectable Fluid Silicone: Principles of Dermatologic Surgery. New York: Marcel Dekker, Inc., 1989:1349-95.

5. American Academy of Derm. Soft Tissue Augmentation Task Force on Liquid Injectable Silicone. December, 1993.

6. Cristina AG. Biomaterial-centered infection: microbial adhesion versus tissue integration. Science 1995:237:1588-95.
Copyright of Dermatologic Surgery is the property of B.C. Decker Inc.. The copyright in an individual article may be maintained by the author in certain cases. Content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.