The Current Role of Three-Dimensional Printing in Plastic Surgery

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Summary: Since the advent of three-dimensional printing in the 1980s, it has become possible to produce physical objects from digital files and create three-dimensional objects by adding one layer at a time following a predetermined pattern. Because of the continued development of inexpensive and easy-to-use three-dimensional printers and bioprinting, this technique has gained more momentum over time, especially in the field of medicine. This article reviews the current and possible future application of three-dimensional printing technology within the field of plastic and reconstructive surgery. (*Plast. Reconstr. Surg.* 137: 1045, 2016.)

With the advent of three-dimensional printing by Charles W. Hull in the early 1980s, it became possible to produce physical objects from digital files.[1] This technique is now one of many three-dimensional printing modalities referred to as additive manufacturing. Additive manufacturing, or three-dimensional printing, is a fast-growing manufacturing technique where three-dimensional objects are created by adding material one layer at a time in a predetermined pattern.[2–7]

Initially, additive manufacturing was focused primarily on producing product prototypes for the automotive and aerospace industries, but it has recently become readily available and inexpensive enough to be used by the general public.[2,4,7] Currently, the cost of a three-dimensional printer for domestic use ranges from $300 to $2500.[8,9] Because of its ability to produce customized geometrically complex objects in small quantities, often with cost savings because of reduced material use or potential operating room/hospital time savings, additive manufacturing has also led to patient-specific applications in medicine.

Medical additive manufacturing is defined as "the manufacture of dimensionally accurate physical models of human anatomy derived from medical image data using a variety of additive manufacturing technologies."[10] In the past decade, medical additive manufacturing has been applied to a range of medical specialties.[2–4,6,8,9,11–13] Also, various

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