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THE EDITOR'S CORNER

Star Trek Orthodontics

Like many people of my age group, I am an ardent fan of Star Trek. While I've enjoyed all four of the TV series to date (not counting the animated version), I was especially fond of the original show—the one with Capt. Kirk, Mr. Spock, Dr. McCoy, and (my favorite) the engineer Montgomery Scott. The action-adventure aspect of Star Trek was engaging, but what really held my attention were all the futuristic gadgets and gizmos that had apparently solved every mundane problem known to humanity. Spock would ask something like, "Computer: how far is it from Earth to the Crab Nebula?" The computer, in an alluring feminine voice, would immediately reply, "It is 6,523 light years." McCoy, the ship's physician, would "scan" each patient with a "tricorder" and come up with a diagnosis in short order. Of particular appeal to me was the "replicator", which could fabricate practically anything that would fit in the breadbox-size receiver, from food or coffee to repair parts. Pretty slick.

With each exhibit hall at the AAO annual session—and, it seems, with each issue of JCO—I become more convinced that the Star Trek future has arrived. To find the answer to Spock's hypothetical question, I simply Googled "Crab Nebula", waited a few seconds, and got the distance from Earth, albeit not in an alluring feminine voice—which would be entirely feasible with current technology. Considering the medical scanners on the market today and the software available to interpret them, the tricorder doesn't seem that farfetched. I have not been able to find any reference to an orthodontist on the Starship Enterprise, but if they had one, you can bet she would use an intraoral scanner similar to what we can now obtain.

In fact, these devices have become relatively commonplace in clinical orthodontics. Every orthodontic graduate program I've visited over the past few years has acquired intraoral scanners for use by its residents, and every program has at least secured access to cone-beam computed tomography. Data gathered by these devices, along with the now-ubiquitous digital photographs, can be "stitched" together to create an astonishingly realistic,

“peelable” digital model of a patient, in three-dimensional layers starting with full-color facial images and progressing to the musculature and to skeletal pictures capable of highly accurate cephalometric measurement. Given sufficient computer power, these images can even be portrayed as compelling videos.

In the January 2014 Editor's Corner, I mentioned that I have begun some collaborative research with one of my patients, a professor in the University of Southern California's Viterbi School of Engineering, on 3D printing in dentistry and, specifically, in orthodontics. His graduate students utilize 3D printers to experimentally manufacture a variety of objects with an accuracy previously achieved only by precision casting or computerized milling techniques. It doesn't take a giant leap of imagination to surmise that any plastic orthodontic appliances, from bite plates to study models to aligners to retainers, can be produced by laser-polymerization methods of 3D printing. Deposition metal printers, while still in their infancy, promise to achieve the long-awaited goal of fabricating completely customized fixed appliances, whether lingual or labial, in the orthodontic office. Three-dimensional printers are already finding wide applicability throughout industry and medicine. The replicators envisioned in Star Trek are here.

In the current issue of JCO, Drs. Christian Groth, Neal Kravitz, Perry Jones, John Graham, and Ronald Redmond present a detailed overview of 3D polymerized-resin printing in orthodontic

practice. If these names sound familiar, the same group of authors supplied the extensive review of intraoral scanners for our June 2014 issue. As they point out, although 3D printers—at least those with clinically acceptable levels of accuracy—are still cost-prohibitive, it won't be long until their prices come down enough for everyday office use.

So there you have it. We can get instantaneous access to virtually all the information in the universe through Google and other search engines. Intraoral and extraoral 3D scanners, coupled with various computer apps, give us the equivalent of Dr. McCoy's medical tricorder. Now 3D printers have taken on the role of Mr. Scott's replicator. What's next? Beam me up, Scotty. RGK

CORRECTION

In regard to their article on “The Tandem Archwire Concept with Self-Ligating Brackets” (April 2014), Drs. Anoop Sondhi and Anmol S. Kalha would like to acknowledge that the geometric analysis for the Tandem Archwire technique was originally done by Dr. Anshul Agarwal, a former postgraduate student, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India, and current director of Agarwal Dental Clinic, Jhansi, Uttar Pradesh, India; and Dr. Puneet Batra, Vice Principal, Professor, and Head, Institute of Dental Studies and Technologies. Their contribution to this work is gratefully recognized.