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THE EDITOR'S CORNER

How About Four-to-Six-Month Treatment?

The emphasis in improving orthodontic treatment has been largely on technology—new and better metals and more efficient bracket designs. Current developments in interactive brackets, as shown in this month's article by Dr. Voudouris, are yet another step in that direction. Orthodontists have become quite adept at correction of malocclusions through tooth movement, but there are limitations to technology. For example, it still takes 18 months or longer to treat an average case, and malocclusions are still corrected in basically the same way and by the same procedures that have been in use for a hundred years.

There has been speculation in this corner and elsewhere that a significant change in orthodontic treatment will be produced by breakthroughs in basic science and, particularly, in cell biology. A recent report described such a breakthrough. A team at the Johns Hopkins Medical Center succeeded in reproducing in the laboratory the biology of events that occur in the period following conception. Simultaneous work at several universities and private companies has produced similar results.

At least 20 protein molecules have been found to produce bone growth, and these molecules also seem to have the power to stimulate growth of other tissues. Many kinds of tissues—skin, bone, cartilage, teeth, and other organs—have been grown in the laboratory. The work on bone is now reported to be on the verge of making it possible to routinely grow new bone in the human body.

Advances in molecular biology made all this possible by isolating the proteins responsible for bone growth—bone morphogenic proteins—and the genes responsible for producing them. The body itself manufactures some of these proteins to set off healing in response to injury. In the same fashion, the proteins can be called on to stimulate the generation of tissue. Such a process, which has been successfully carried out on a variety of laboratory animals, seems to support the concept of morphogenetic fields. The proteins are not specific to

bone, cartilage, and so on. Rather, they seem able to induce primitive cells to differentiate in much the same manner as in the ontology of living organisms from insects to humans.

Treatment of bone and cartilage fractures will likely be among the first applications of this technology in human patients. At the Genetics Institute in Cambridge, Massachusetts, severe leg bone fractures have already been successfully treated. Creative Biomolecules in Hopkinton, Massachusetts, is due to report success with a test sample of 100 patients with shin fractures that did not heal well until treated with the bone morphogenetic proteins. Stabilization has been accomplished with nails and with external braces.

The demonstrated effectiveness of these proteins is passing from the anecdotal to the scientific. There appear to be no side effects. And while all this is certainly good news for football players, it also has interesting implications for the treatment of temporomandibular joints and serious genetic bone disorders. If artificial bone, cartilage, and tooth tissue can be grown in the mouth, there are also obvious ramifications in dentistry and orthodontics.

Two dental studies were reported at a recent meeting of the Genetics Institute. In one, 12 periodontal patients had areas of maxillary bone loss treated with implants of a bone morphogenetic protein in a bed of artificial collagen. Within four months, all 12 patients showed evidence of substantial new bone growth. Of equal significance to dentistry, in another experiment, cementum and periodontal ligament were grown in dogs.

Could orthodontists be close to techniques that would permit duplicating an ideal laboratory setup in the mouth, using morphogenetic proteins to promote healing of bone and periodontal fibers? There are still daunting obstacles, such as maintaining the vitality of the teeth, but an entirely different approach to orthodontic treatment—less technological and more biological—could be in the offing. Stay tuned.

ELG