Commentary
Samarium-cobalt magnets

Abe M. Blechman

I recently attended a large international interdisciplinary Congress that dealt with the biological and medical effects of electricity and magnetism. While attempting to determine what the appropriate doses of these modalities should be for the various growing applications in medicine, it was concluded that physical standards alone were inadequate, and ulitmately, it was the biologic response that determined the dose-response criteria. Therefore, the dose-response would vary, depending on the applied physical modality and its target result.

The authors of "Force generation by orthodontic samarium-cobalt magnets" are using a dose-response relationship that is characteristic of certain conventional orthodontic force devices. Familiarity with the clinical results of certain samarium-cobalt permanent magnets (appropriate energy products, pole face area, geometry, etc.) would have demonstrated that a different dose-response was quite effective and biologically safe. One reason for this difference is the apparent synergistic, simultaneous combination of force and beneficial bioeffect of the applied magnetic field, which other conventional, and purely mechancial force devices, obviously lack.

Since these magnets distalize molars at a rate of 1 mm to 2 mm per month, and monthly reactivation is suggested, it is indeed uncommon for the magnets to consistently operate beyond 2 mm. If a patient fails to appear for a monthly appointment, the remaining magnetic force is adequate to retain the distalized position. One suggested method of anchorage control involves leaving a small air gap (approximately 0.50 mm to 1 mm) between the repelling magnets when reactivating them. For this approach, monthly reactivations continue with negligible effect on the rate of distalization. In fact, more frequent reactivation will strain anchorage. An article, to be published in the near future, will illustrate this procedure.

The samarium cobalt magnets were designed specifically for molar distalization in the posterior segment. This application requires static repelling magnets - not attracting or time-varying magnets. Using these magnets in any other fashion would indeed generate a different dose-response, with unpredictable consequences.

Justification for using these magnets can only be determined by the individual orthodontist. Clinical experience demonstrates some advantages: 1) rapid distalization without dependence on patient compliance; 2) predictable, controllable results; 3) almost no mobility or discomfort during movement; 4) bodily movement primarily, with minimal rotation; and 5) no reported adverse effects such as root resorption or alveolar bone loss.

A full discussion of the magnetic bioeffects is inappropriate here, but will be the subject of a future paper. Furthermore, the advantages mentioned above can be attributed to the magnetic bioeffect and force combination.