Dear Editor,

I would like to highlight a few key aspects of Ohno and colleagues[1] excellent paper published in this issue of *Journal of Oral Implantology* (*JOI*) and thank the authors from Kanagawa Dental College for their collaboration and outstanding work. The article focuses on using OsteoGen crystals coated with a biomimetic nano-crystalline fluorapatite surface technology to promote osteoblast cell differentiation, migration, and proliferation, which are expected to accelerate bone growth; a finding supported by our own and a related researcher's histologic findings.[2] The paper established increased physiologic bioactivity for bone mineralization due to the unique fluorapatite nano-crystalline surface coating. Increased levels of the osteogenic differentiation marker, alkaline phosphatase (ALP), demonstrated this physiologic bioactivity.

Osteoblast cell recruitment is also true, but to a lesser degree, with the original nonfluoridated OsteoGen crystals and clusters.[3–5] Ohno and colleagues'[1] paper (Figure 2a, the control noncoated crystals) confirms that OsteoGen is chemotactic with ~6 to 7 osteoblast cells in the field of microscopic view. This control is compared to the experiment (Ohno et al[1], Figure 2b) having fluorapatite coated crystals showing ~18 to 21 osteoblast cells, or an improvement of 300% to accelerate osteoblast cell recruitment and proliferation for the purpose of laying down new bone formation.

I would like to thank *JOI* for the opportunity to clarify some misconceptions regarding the differences between nonresorbing dense filler granules classified as ceramics (eg, hydroxylapatite [HA], tricalcium phosphate [TCP], bovine, coralline, glass, and plastics) and nonceramic synthetic bioactive resorbable HA crystals. Physicochemically ceramic grafts are distinctively different from OsteoGen grafts.

OsteoGen nonceramic crystals are not sintered like ceramics. By avoiding high temperatures associated with ceramics, the material does not lose its natural state [$Ca_5(PO_4)_3(OH)$] and retains physicochemical properties similar to human trabecular bone.[3,4,6] Similarities exist between nonceramic OsteoGen crystals and human bone mineral as the two have the same formulation and crystallographic structure for HA, as defined by the International Center for Diffraction Data. Ceramic granules [$CA_{10}(PO_4)_6(OH)_2$], including bovine ceramics, dehydroxylate under high heat sintering and convert to oxyapatite [$Ca_{10}(PO_4)_6O_2$], losing their hydroxyl and calcium carbonate groups.[7,8] Ceramic HA is not truly an HA and these ceramic granules are dissimilar to OsteoGen crystals or biological bone, as evidenced by infrared spectroscopy and X-ray diffraction.[4] Nonresorbable dense and monolithic particulates are mostly removed by macrophages and giant cells through fragmentation. This could result in passage of these particles to the regional lymph nodes, lungs, and spleen for further processing, and therefore, interfering with the normal function of these organs and possibly compromise the immune system.[9,10]

Artzi and colleagues' clinical study[9] reports that "OsteoGen is physiochemically and crystallographically equivalent to human bone," and the "three-dimensional configuration of OsteoGen (crystal clusters) provides more space between particles when compared to ceramics. These spaces facilitate cellular and tissue proliferation into the grafted material, thus enhancing osseointegration." Reference is made to the Sinus Consensus Conference[11] where Artzi et al[5] clarifies that "what is important is the implant success rate over time (3 to 5 years)." Fifteen papers have reported on the safety, effectiveness, and over 5 year cumulative 98% success rate of OsteoGen.[12]

In conclusion, as Ohno et al[1] have demonstrated: nonceramic OsteoGen crystals coated with a biomimetic nano-crystalline fluorapatite surface technology promote osteoblast cell differentiation, migration, and proliferation, which is expected to accelerate bone formation. This reaffirms the work of previous investigators.[2] Beyond these benefits, the microfine nano-crystalline fluorapatite coating, both loosely and firmly bound on the nonceramic OsteoGen crystal surface provides a time-release mechanism of having a bioactive barrier resulting in the creation of a bacteriostatic state. This bacterio-

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static state may aid in the control and elimination of pathogens that proliferate and destroy bone. Elimination of these pathogens may in turn reduce the incidence of periodontitis and implantitis.[2]

Maurice Valen,
President, Director of R&D Impladent Ltd

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