Effect of Denosumab on the Growing Skeleton in Osteogenesis Imperfecta

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Children with increased bone fragility have been treated frequently with iv bisphosphonates based on experiences in children with osteogenesis imperfecta (OI) (1). In growing children, each infusion led to a region with reduced bone resorption known as “zebra lines” on radiographs and changes in metaphyseal shaping (2).

First short-term experiences about the use of the RANKL-antibody denosumab in children are available. Wang and colleagues recently reported radiological and histological changes after denosumab treatment in a boy with the rare condition, fibrous dysplasia, after amputation of both legs (3). Now we report two children with OI caused by mutations in COL1A1/A2 who received bisphosphonates for more than 4 years and switched to denosumab (1 mg/kg body weight every 12 wk) according to the regime published in other OI children (4). On the presented x-rays, the effect of denosumab is clearly visible (Figure 1). Zebra lines of the previous treatment are still visible, whereas the bone produced between the denosumab injections showed an increased density, demonstrating the long-lasting effect of denosumab (Figure 1, B–D). This gives evidence that longitudinal growth continues. Metaphyseal shaping including the metaphyseal index showed a trend toward the normal range but remained above +2 SD compared to healthy children (patient 1, baseline vs months 8, 0.65/0.63; patient 2, wk 3 vs week 9, 0.73/0.61) (5). Further long-term observations are needed to assess metaphyseal in-wasting processes under denosumab. In summary, these x-rays are the first demonstrating the effect of denosumab in OI supporting the promising reports about denosumab in growing children.

Acknowledgments

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Received July 31, 2014. Accepted August 18, 2014.
First Published Online August 22, 2014

Abbreviation: OI, osteogenesis imperfecta.

Figure 1. Radiographs of two children with classic OI treated with denosumab showing an increased metaphyseal density in the formed bone (square brackets) compared to the bisphosphonate induced “zebra lines” (arrows). Patient 1 received three injections between radiographs A and B; patient 2 received one dose before radiographs C and D.
This study was supported by a grant of the program “Forschungspool klinische Studien” 2012, medical faculty, University of Cologne and was performed in cooperation with the ZKS Köln (BMBF 01KN1106). Additionally the study was supported by the self support group “Care 4 Brittle Bones.”

Disclosure Summary: All authors have nothing to disclose.

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