Strontium ranelate decreases the incidence of new caudal vertebral fractures in a growing mouse model with spontaneous fractures by improving bone microarchitecture

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Résumé en anglais	Summary Young mice over-expressing Runx2 fail to gain bone relative to wild type mice with growth and present spontaneous fractures. It allows, for the first time in rodents, direct assessment of anti-fracture efficacy of strontium ranelate which was able to decrease caudal vertebrae fracture incidence through an improvement of trabecular and cortical architecture. Introduction The aim was to investigate whether strontium ranelate was able to decrease fracture incidence in mice over-expressing Runx2, model of severe developmental osteopenia associated with spontaneous vertebral fractures. Methods Transgenic mice and their wild type littermates were treated by oral route with strontium ranelate or vehicle for 9 weeks. Caudal fracture incidence was assessed by repeated X-rays, resistance to compressive loading by biochemical tests, and bone microarchitecture by histomorphometry. Results Transgenic mice receiving strontium ranelate had significantly fewer new fractures occurring during the 9 weeks of the study (−60%, $p < 0.05$). In lumbar vertebrae, strontium ranelate improves resistance to compressive loading (higher ultimate force to failure, +120%, $p < 0.05$) and trabecular microarchitecture (higher bone volume and trabecular number, lower trabecular separation, +60%, +50%, −39%, $p < 0.05$) as well as cortical thickness (+17%, $p < 0.05$). In tibiae, marrow cavity cross-section area and equivalent diameter were lower (−39%, −21%, $p < 0.05$). The strontium level in plasma and bone was in the same range as the values measured in treated postmenopausal women. Conclusions This model allows, for the first time, direct assessment of anti-fracture efficacy of strontium ranelate treatment in rodents. In these transgenic mice, strontium ranelate was able to decrease caudal vertebral fracture incidence through an improvement of trabecular and cortical architecture.
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