



## Invited Plenary Abstract

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### **Growth related origins of bone disease**

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Growth is important process to attain healthy adult bone. Throughout childhood, bone mineral acquisition and longitudinal bone growth take place. Although the bone mass increases through childhood, from the first half of adolescent to the middle, increasing most comes out and when postpuberty comes, the increase speed decreases. According to the longitudinal study, in a girl, the increase speed in the bone mass reaches a peak at the age of 11 to 14, and this corresponds about two years after the peak of the increase in height. Then, 16 years old or about two years after menarche, the increase speed in the amount of bone mineral shows a fall remarkably, and will become zero mostly at the age of around 18. Since adolescent in a boy delayed for about two to three years, the peak of the increase in the amount of bone mineral becomes around 16 years old.

Bone mineral density and bone strength cannot catch up with the longitudinal growth. Thus early through middle puberty can be considered to be a relative bone fragile term. The bone metabolism of a cortical bone increases, the porosity of a cortical bone increases at this stage, and a bone becomes fragile. In a male, a junior high school term corresponds at this stage, and the incidence of fracture is high. Junior high school student's fracture frequency is increasing in Japan in recent years. The annual incidence of the fracture in junior high school students increased about 2 times for 20 years. One of the causes of this increment is decrease in exercises during schoolchild period and decreased basic physical strength. A sport opportunity increases abruptly at junior high school term, and it increases the opportunity of the trauma leading to fracture.

The problem of nutrition is also important. In Japan, the intakes of calcium are an average of 550 mg/day remarkably low. We should be careful of the nutritional problem with the intake of vitamin D during adolescent.

Glucocorticoid induced osteoporosis (GIO) is the major form of the childhood osteoporosis. Other than the decreased bone mass and increased bone fragilities, glucocorticoid induced growth failure should be taken into account for the management of GIO. The actual condition in Japan of the GIO during childhood will be also discussed.