ASSESSMENT OF SKELETAL BONE AGE WITH KNEE RADIOGRAPHS
Xin Tang MD, Yubo Lu MD, Jan Fritz MD, R Jay Lee MD
The Johns Hopkins Hospital, Baltimore, MD

OBJECTIVES
To compare a method for determining skeletal bone age from knee radiographs to the hand-wrist method.

METHODS
We retrospectively reviewed the records on all patients 6 to 19 years old from January 2004 to January 2014 with both hand and knee radiographs taken within 30 days of one another. Patients with fractures, chronic systemic diseases, and genetic syndromes were excluded. We analyzed radiographs based on a previously described knee scale and our abbreviated version of the knee scale. Hand films of females 10 to 16 and males 12 to 16 years old were analyzed with the Short Hand Method. Multivariate linear regression was used for statistical analysis, along with Akaike information criterion to analyze the scales.

RESULTS
The study group consisted of 503 patients. Both the original and abbreviated knee scale bone ages, correlated with the chronologic age of the patient, with adjusted R² values of 0.88 and 0.87. The knee scales’ predicted bone ages were consistently 1 year behind that of the hand scale.

DISCUSSION
Looking for specific radiographic landmarks on knee radiographs can be used to estimate skeletal bone age. Earlier radiographic formulas have similarly shown these landmarks can be used helpful for estimating maturity. However certain landmarks may be difficult to categorize, including development of the tibial spine and fibular styloid. We found that an abbreviated system provides consistent estimates, and like prior studies, estimate of knee bone age lags behind that of hand bone age. When planning a surgical procedure around the knee, instead of Tanner stag knee radiographs alone can be used to determine bone age.

CONCLUSIONS
Knee radiographs can be used to estimate skeletal bone age, though the estimated age lags behind the age estimated by hand bone age.

Contact Information:
Rushyuan Jay Lee MD
Department of Orthopaedic Surgery
The Johns Hopkins Hospital
1800 Orleans Street, Baltimore, MD 21287, USA
Email: rlee74@jhu.edu