

Spinal Curvature Measuring Device

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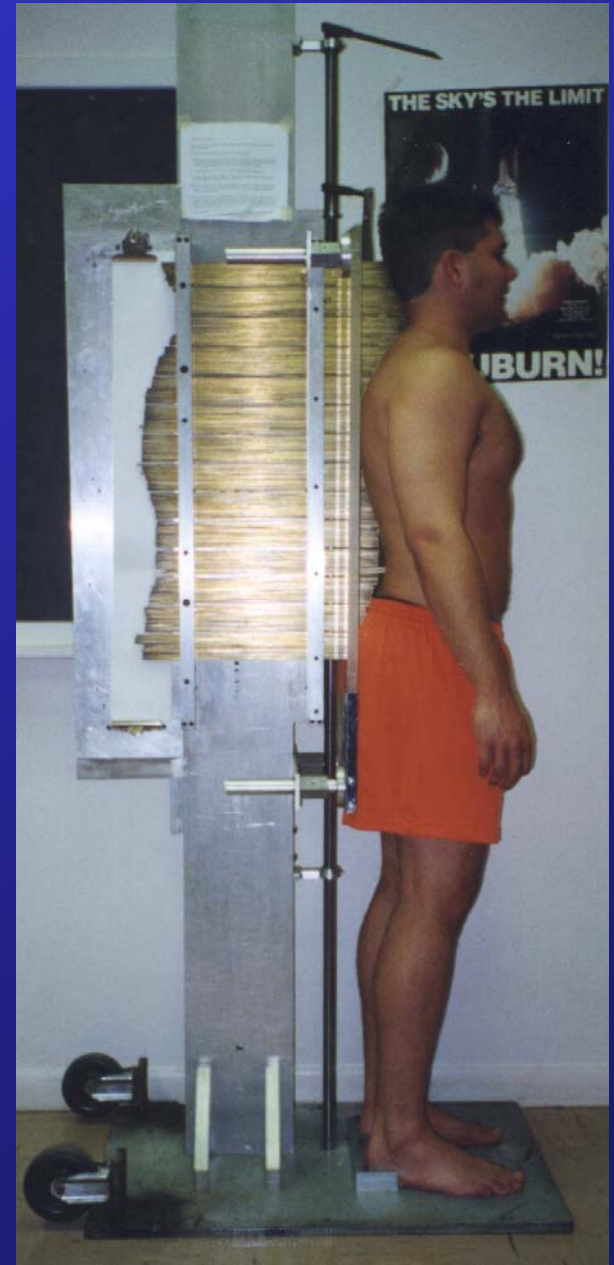
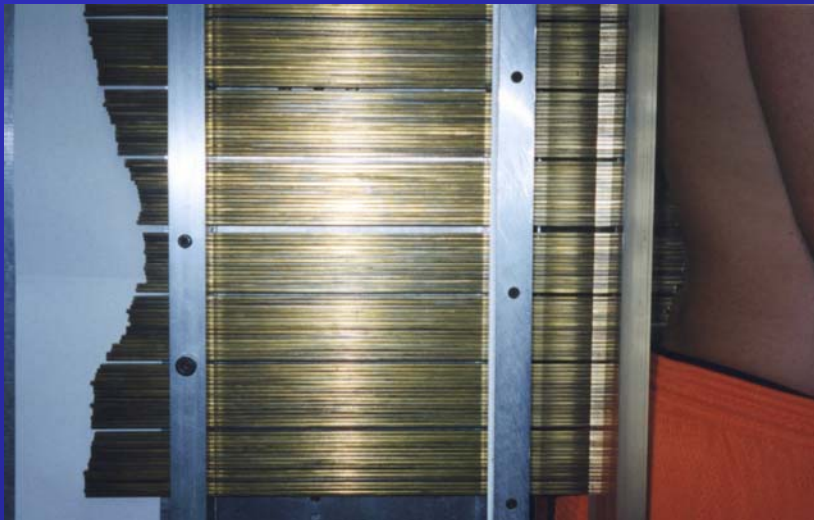
May 15, 2006

Overview

- Introduction
- SCMD Apparatus
- Variables measured with the SCMD
- Previous studies
- Significance of the SCMD studies
- Future directions/research

SCMD Apparatus

- Simple
- Captures surface curvature spine



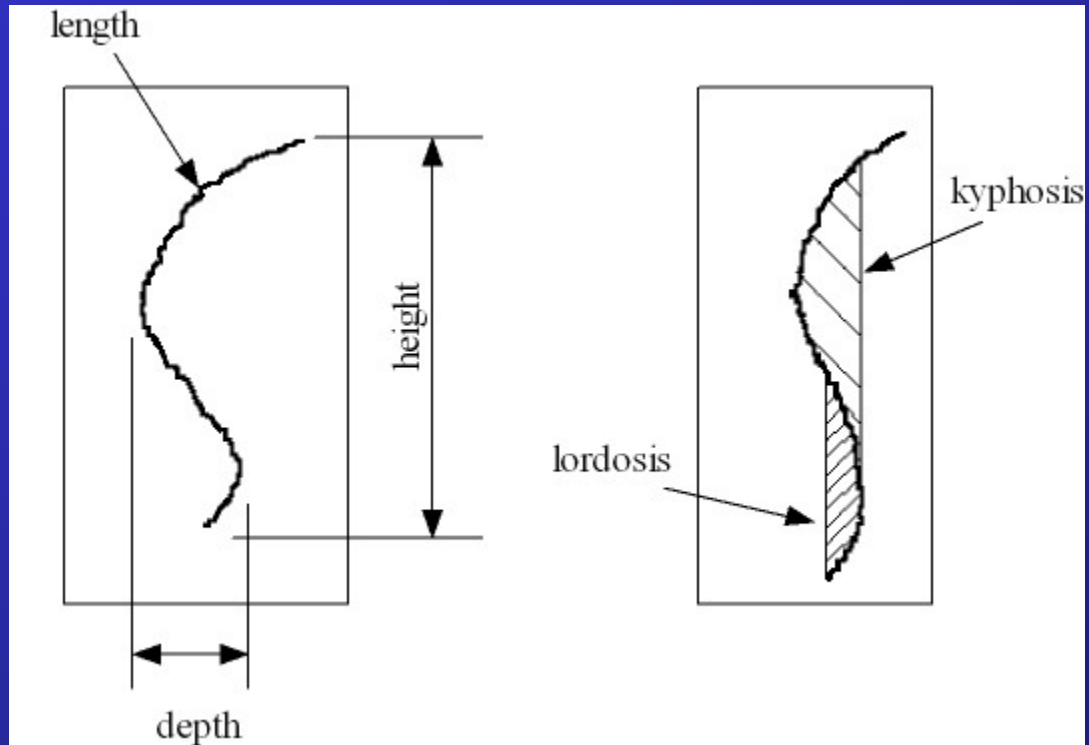
SCMD

- Hardware element
 - Small brass rods (equal length)
 - Curvature drawn at the end of the rods from C7 to S1
 - Fiberglass reference plane
 - Footguides
- Software element
 - Curve is digitized, and the results used in Excel or statistical packages



SCMD Measurements

- Height
- Length
- Depth
- Lordosis
- Kyphosis
- *Combinations of Kyphosis and Lordosis*



Studies

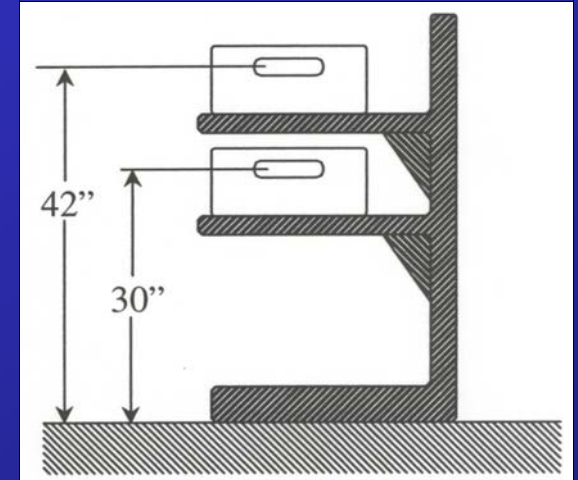
- Whiteley (1991)
 - Spinal creep in a simulated aircraft
- Box (1993)
 - Effects of anti-fatigue floor matting on males
- Walker (1994)
 - Effects of back-belts during material handling
- Joseph (1996)
 - Effects of inclination with the SCMD

Studies

- Evers (1998)
 - Workload and recovery techniques in males
- Skidmore (2000)
 - Effect of backbelts on females during material handling
- Davis (2001)
 - Effect of backbelts on males during material handling
- Payton (2001)
 - Lifting regimens and recovery patterns in females

Most recent experiment

- Spinal research in females
 - Careful duplication of Evers' methodology to allow comparisons
- Six female subjects
 - Eight test runs each
 - 2 Levels of Load (15 and 25 lbs)
 - 2 Levels of Duration (2 and 4 hours)
 - 2 Levels of Recovery Technique
 - Standing and Reclining
- Fixed factors
 - Height of Lift (12 inches)
 - Lift frequency (random 2/min)



Comparing SCMD outcomes

- Existing literature
 - Loading creates a loss in height
 - Loading results in more curvature
- SCMD results
 - Loading creates a loss in spinal height
 - Loading results in more curvature
 - Loading causes spinal length to decrease
 - Loading increases both kyphosis and lordosis

Future research

- Expand current experimental design to study effect of rotation on lifting for both genders
- Older subjects (increasingly mature workforce)
- Add EMG studies in parallel with MH studies
- Investigate as screen tool for physical therapy protocol following back injury (e.g. Childs et.al. 2004, Jarvik et.al. 2002, and www.npr.org)
- Validation of the NIOSH lifting guides

Questions?

