

3rd International Congress on Early Onset Scoliosis
And Growing Spine - Istanbul
Paper # 20

In vivo distraction force and length
measurements of growing rods –
Which factors have an influence
on the ability to lengthen?

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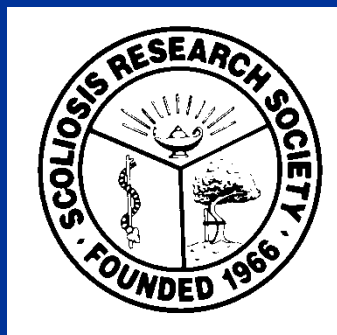
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Paper 20: In vivo distraction force...

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Stewart Tucker No disclosures
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**3rd ICEOS
Authors Disclosure
Information**

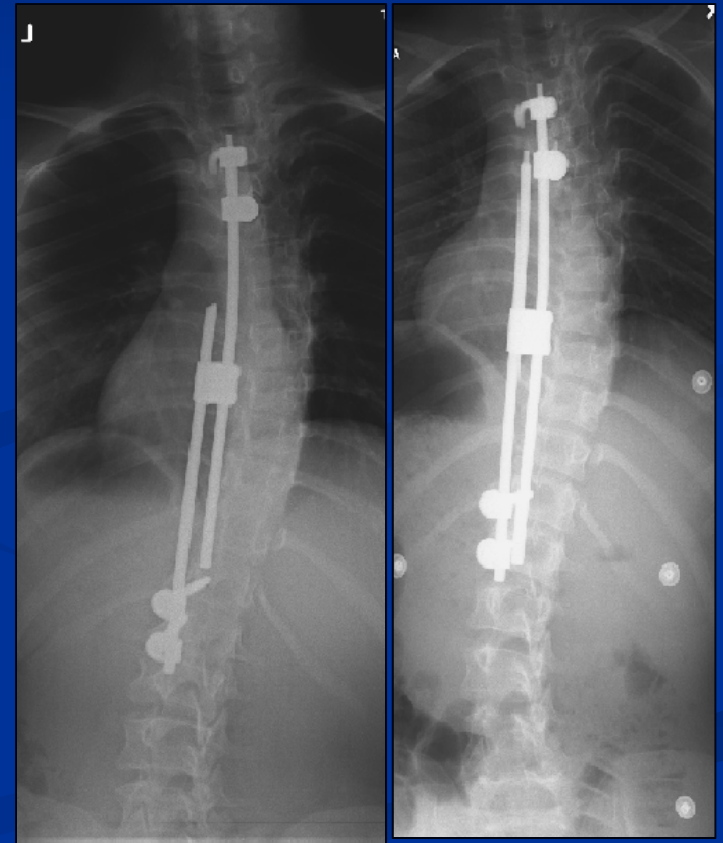
- a. Grants/Research Support
- b. Consultant
- c. Stock/Shareholder
- d. Speakers' Bureau
- e. Other Financial Support

Background – Growing Rods

- Goal: achieve deformity correction while maintaining spinal growth.
- Gradual stiffening or spontaneous fusion of the spine can interfere with the ability to lengthen
- Increased forces required to lengthen
- Decreased length achieved
- Spontaneous fusion already evident at the time of conversion to definitive arthrodesis

Purpose

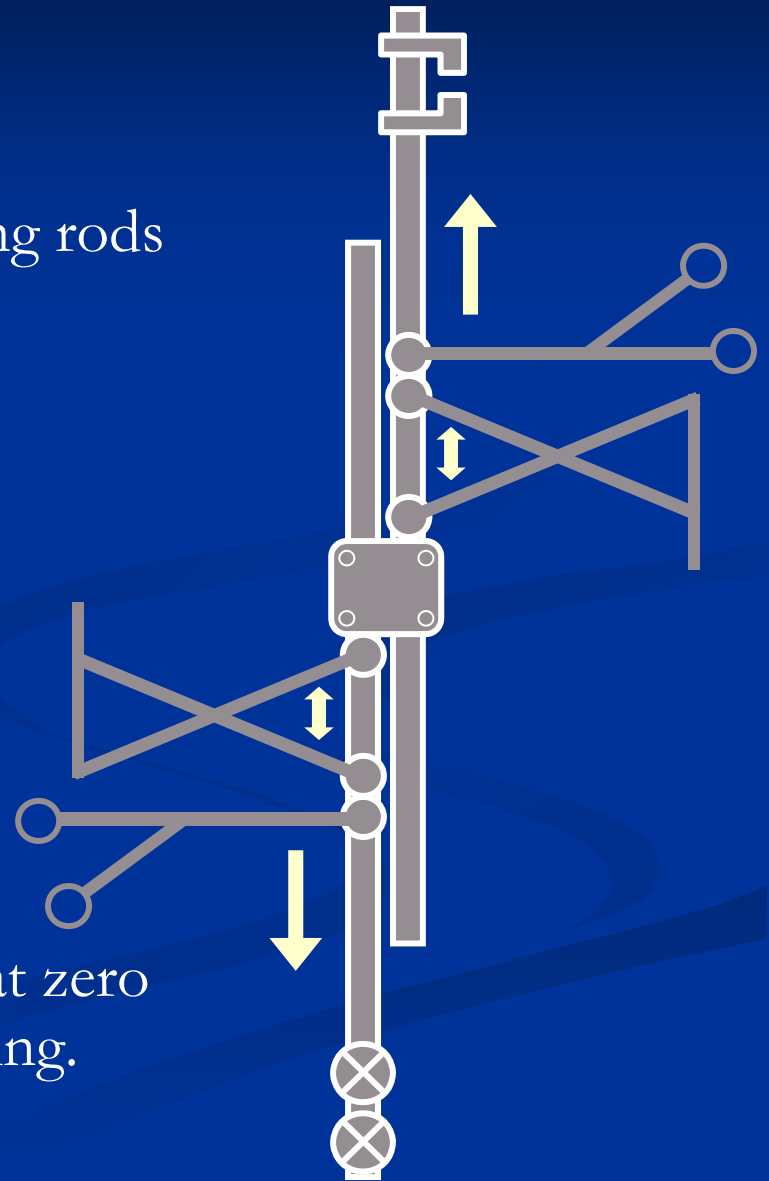
Measure the forces and amount of distraction over time in a consecutive series of patients with growing rods.



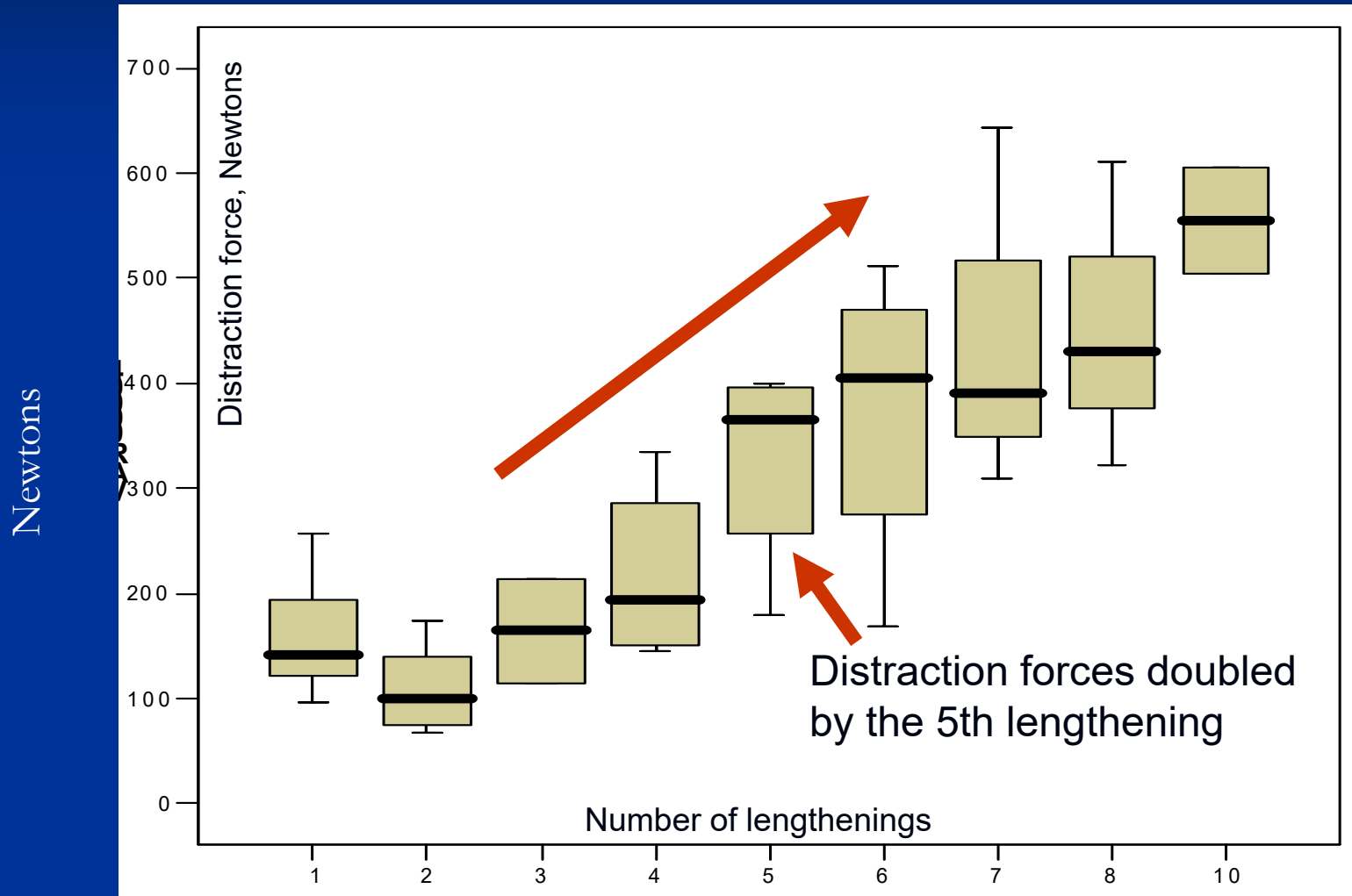
Patients & Methods

- 60 measurements
- 26 patients with single submusc growing rods
- Average age 7.8 yrs
- Average preop cobb 71°
- with apical fusion 72° (27 kg)
- without apical fusion 69° (22 kg)

- Dedicated pair of distraction calipers
- Resting load prior to any extension was recorded
- Output from the transducer recorded at zero load status and at every 1mm lengthening.



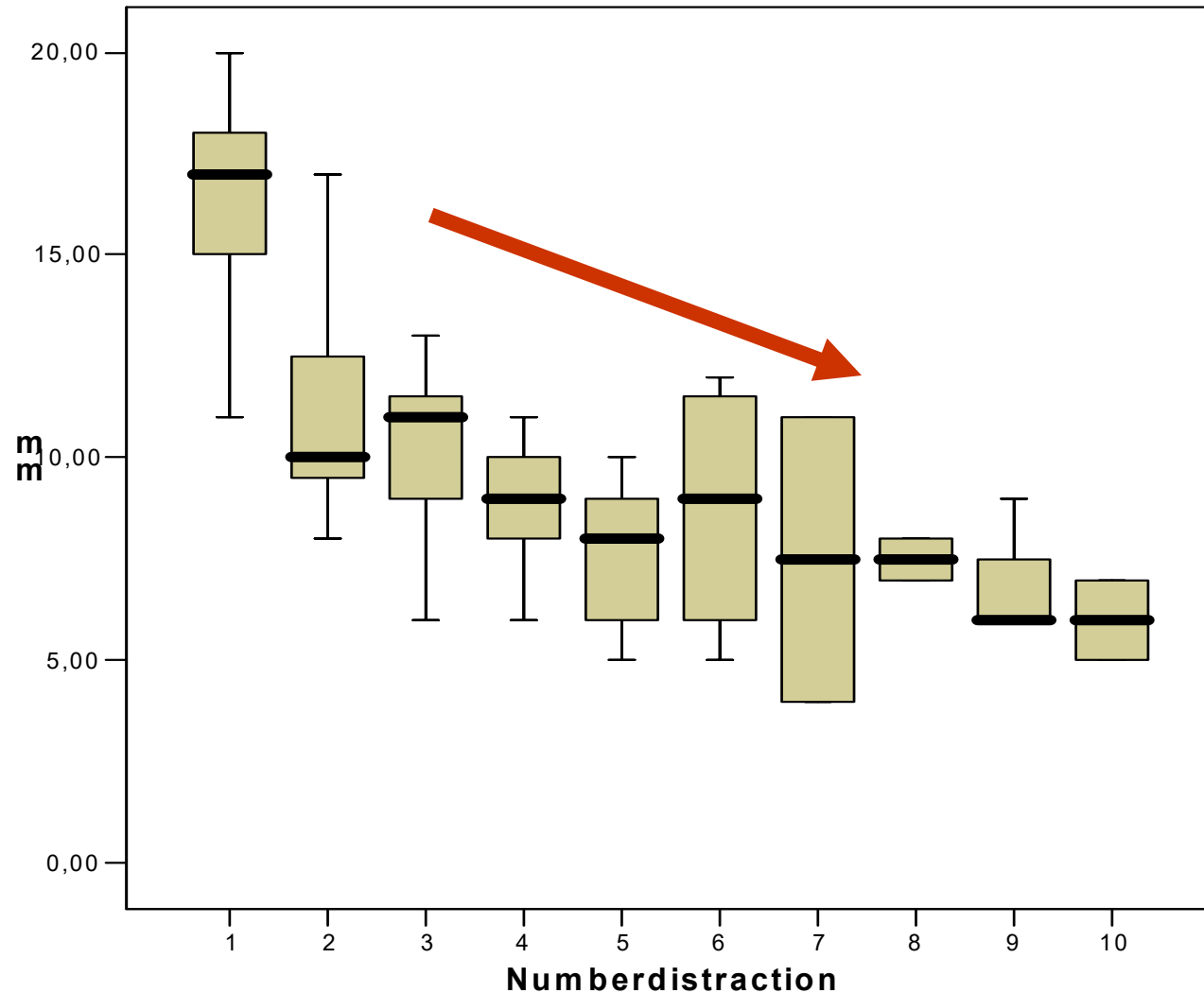
Force increased with each lengthening



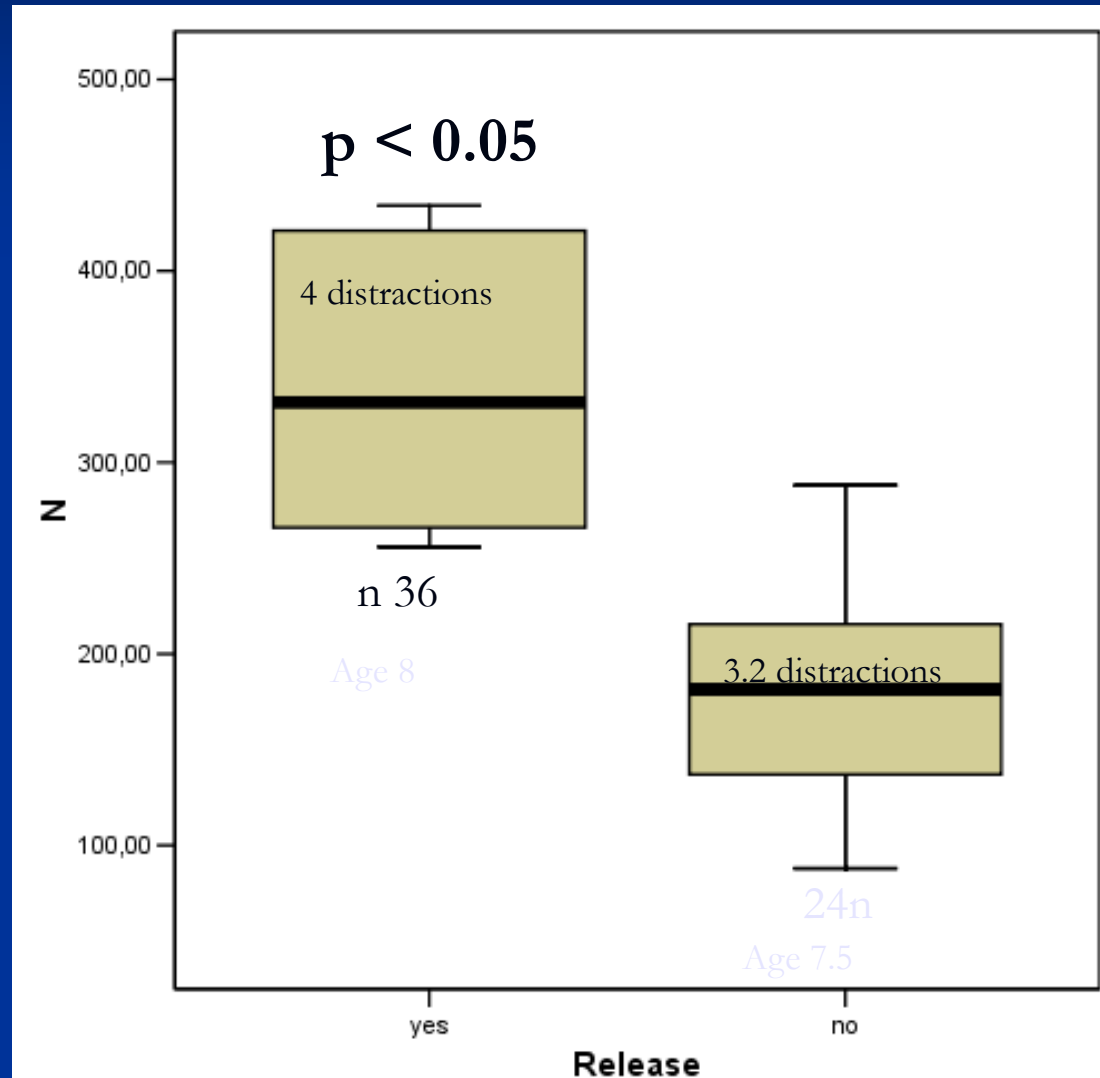
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Number of lengthenings

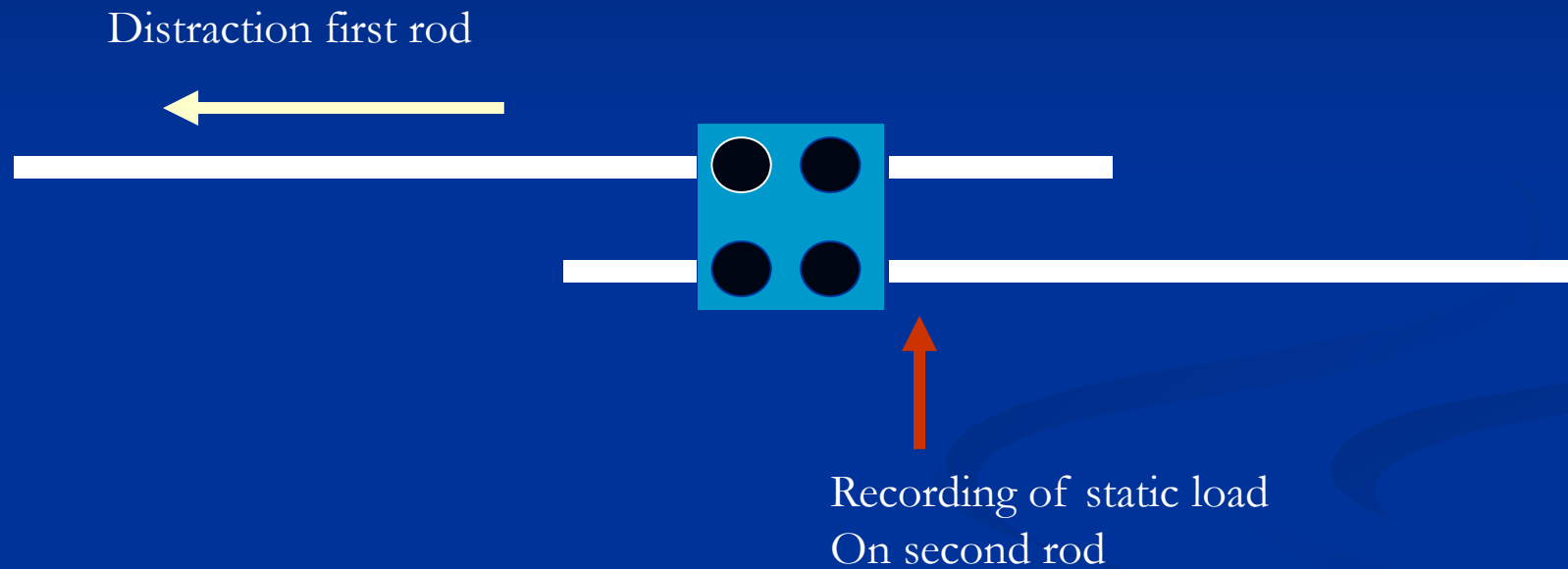
Length (mm) achieved over time decreased after the 5th lengthening



Apical fusion increased average distraction force by 42%



Do we have to lengthen both rods?



Average distraction force first rod 355N

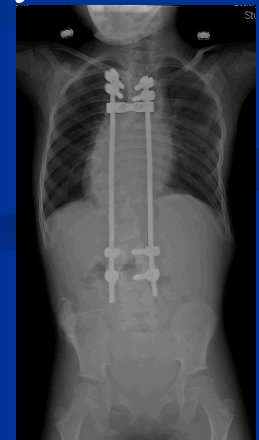
Average static load on second rod 190N

Discussion

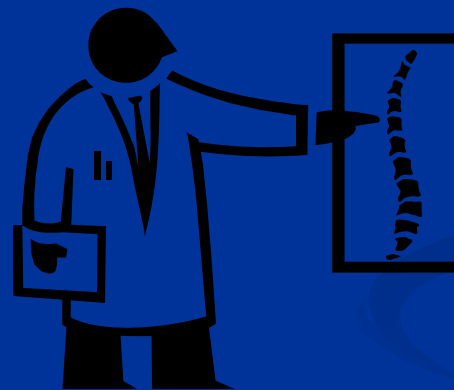
- In this consecutive series of single submuscular growing rods...
- Distraction forces increase significantly after repeated lengthening
- Length achieved diminished after the 5th length.
- The high distraction forces in apical fusion pts may explain the higher incidence of instrumentation failure reported in the literature
- Recommend routine surgical release of the side connector or lengthening of both rods for a optimum distraction

Significance

- This is the first study to quantify the significant increase in distraction forces in growing rod constructs with subsequent lengthening
- Instrumentation design must accommodate these forces to minimize failure
- Routine change to larger diameter rods may be indicated during treatment
- Subsequent study of dual rod forces are underway



Thank you



Nemours

Alfred I. duPont
Hospital for Children

Nemours
Children's Clinic

