# Utilizing Inversion/Rotation on Bone

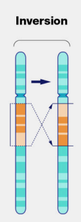
## Inversion and Rotation: Definitions and Mechanisms for Bone Growth

Inversion refers to the act of positioning the  body in an upside-down or semi-inverted state, typically achieved through inversion tables, hanging upside down, or certain yoga poses. This creates traction and decompression forces on the spine and joints, countering the effects of gravity.
Rotation involves circular or angular motion of body parts, such as the arms, legs, or spine. Rotational forces create torsional stress, which can stimulate bone remodeling and increase the elasticity of surrounding tissues.

Both mechanisms have unique effects on bone growth, leveraging the body's natural adaptive processes through the following pathways:

### Mechanisms for Height Changes in Inversion/Rotation

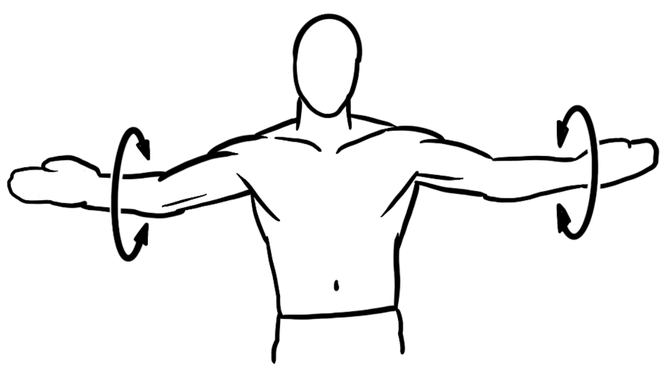
1. **Inversion and Rotational Forces**:
   Axial rotation induces stress that stimulates osteocyte activity, bone remodeling, and potentially cartilage regeneration. Exercises that incorporate such forces are critical for growth stimuli.
2. **Vibrational Forces**:
   Vibrations create micro-stimuli that enhance interstitial fluid movement and osteogenic responses, amplifying the effects of torsional forces.
3. **Threshold-Based Stimuli**:
   Exceeding specific thresholds for fluid flow or torsional stress may activate osteocytes and chondrocytes more effectively, explaining why high-intensity upper-body exercises could lead to noticeable bone length increases.


## ARM ROTATIONS

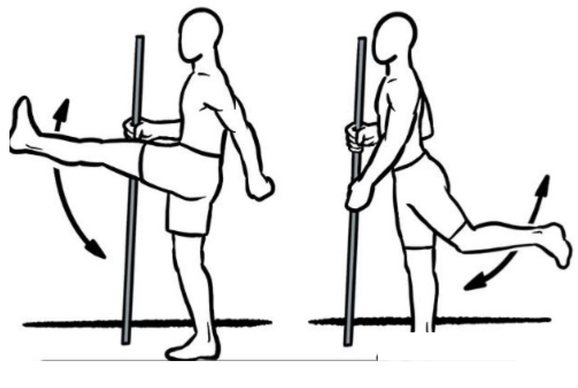
Stimulate this rotation with your arms. They get this rotation all day long on the vertical axis, it is possible to add weight and twist the arms. Baseball pitching/tennis have rotation on the vertical axis with evidence of growth.

– Arm rotations weighted and without weight to stimulate interstitial fluid and the mechanisms that help bone growth for rotation alone



## LEG ROTATIONS

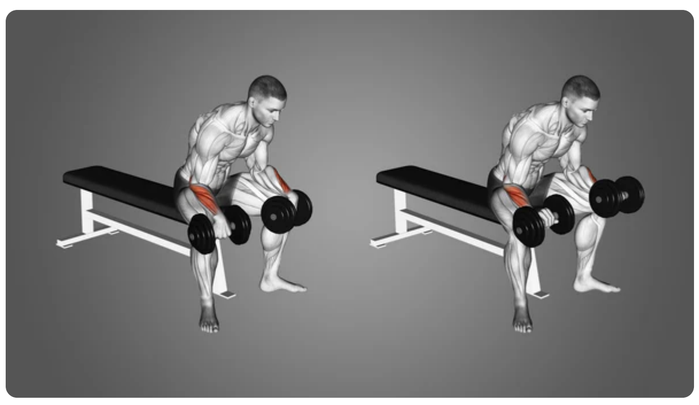
Another great method- leg swinging rotations, try to do a full rotation but a half rotation is still great. Flexibility matters for this, thats why I advocate for myofascial release and lubricating/loosening fascia in previos modules- again everything must be done in conjunction for optimal results. Add ankle weights and do it on a vibrating platform for even more results (more in vibration module)



## ROTATIONAL WRIST LOADING/CURLING

Wrist curls with added rotation involve inversion and eversion of the hand (on the vertical axis)

The image below shows a standard wrist curl, add rotation to the wrist curl by using dumbells and curl at the same time as rotation.Do this on either  with your forearm facing outwards or facing downwards. Whichever generates more force on the rotation segment and vertical axis.



**Decline situps**

Decline situps are a way to incorporate the rapid inversion and eversion to stimulate interstitial fluid flow in cartilage of spinal discs and you can incorporate vibration using a foam roller in this twist as well (simply position the foam roller below your spine) Less weight is needed for this specific variation as cartilage is softer tissue and requires less weight to generate adaptation.

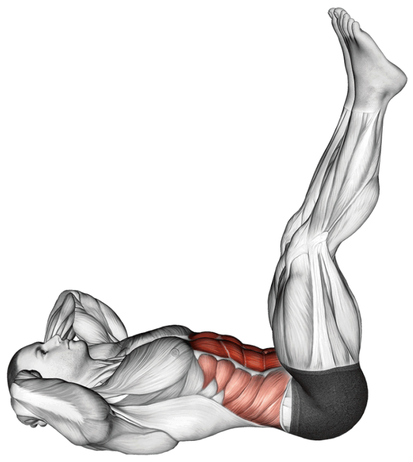
Again if you are confused about the foam rollers and vibration, just keep reading the course!


**Standing hamstring curls with rotation on the feet**

Standing hamstring curls are another way to achieve inversion on the tibia, rotate feet inward/outward at the same time to create more torsional forces. (MORE ON TORSION MODULE.)


**Reverse crunches + below parallel + rotation of feet**

Reverse crunches below a parallel invoke inversion and eversion on the legs, add weight to the leggs using ankle weights ot leg weighted vests, rotate feet inward/outward for torsion (more in torsion module.)



**PRAVILO SETUP**

A pravilo device is great for this, but VERY inconvinient, expensive, and very unlikely you will incorporate this into your routine unless you can replicate it using another device or setup. Add weight with a weighted vest.

**IMPORTANT NOTE**

For ALL future exercises:

If you have open growth plates, use LIGHTER weights. Closed growth plates? Use heavier weights.

Studies indicate that elevated loading forces with OPEN growth plates actually inhibit the longitudinal growth, but LOWER intensity actually stimulate it. For closed plates it is the opposite.