Brilliant Bones

Tubular bones are superb examples of lightweight construction. They are extremely resistant to tensile, compressive, and torsional forces. However, they break if they are overloaded. Then therapy and medical technology are needed

Lightweight

10%

of a human being's body weight is due to bones. Muscles account for up to **50%**.

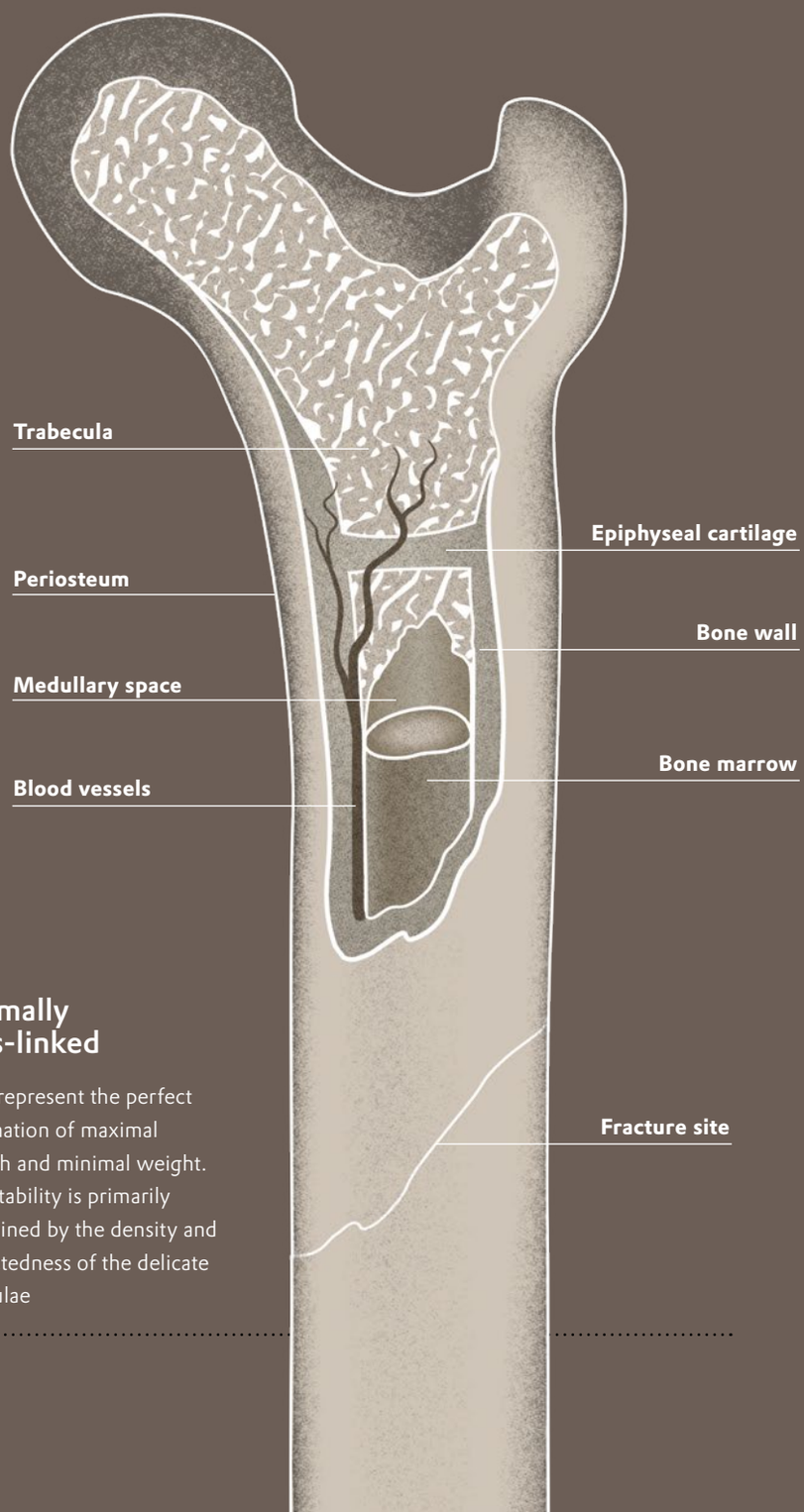
Flexible

20 times

her body weight is cushioned by a gymnast's skeleton when she lands on the mat after a somersault. Upon impact, her thighbones may bend by as much as two millimeters

Optimally cross-linked

Bones represent the perfect combination of maximal strength and minimal weight. Their stability is primarily determined by the density and connectedness of the delicate trabeculae



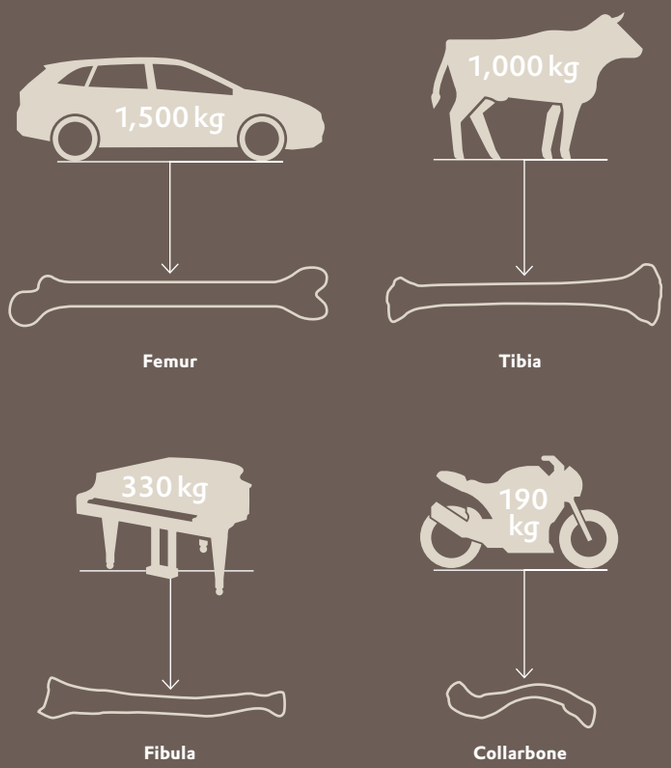
Effective mix of materials

Bone strength is dependent on the bone's mineral content. The elasticity the bone requires comes from the collagenic bone matrix

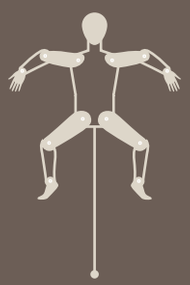
A 20% water
B 25% organic components (bone matrix)
C 55% inorganic components (minerals, primarily calcium hydroxyapatite)

Resilient

A comparison of various human bones' load-bearing capacity:



Bones need…



…movement:
primarily dynamic exercises with power input that alternately stress and relax the body

…calcium and Vitamin D:
through healthy, balanced nutrition and sunlight

Adaptable

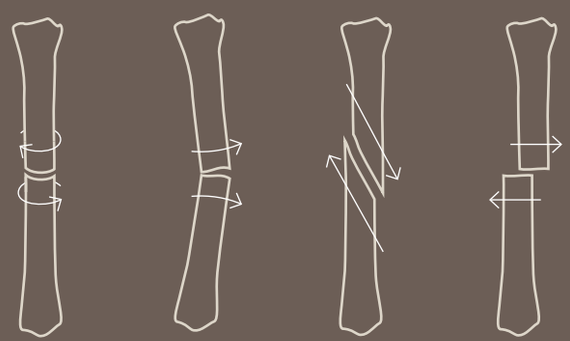
8% to 10%

of bony tissue is formed and broken down within one year. This enables the bone to adapt to changing stress situations and grow as a whole

Atrophy of the bones

Until the age of about 30, the bone formation processes are predominant. With advancing age, more and more bone mass is broken down. A disproportionate decrease of bone density is known as osteoporosis

Pressure from all directions



Bones are subject to tensile, compressive, shearing, and torsional forces. A bone breaks if it is overloaded. That is most likely to happen if the bone is twisted

Osteoporosis risk

8.9 million

bone fractures

are caused by osteoporosis worldwide every year