ECRONICON OPEN ACCESS

EC ORTHOPAEDICS
Short Communication

Biomechanics and Functionality of the Arches of the Feet

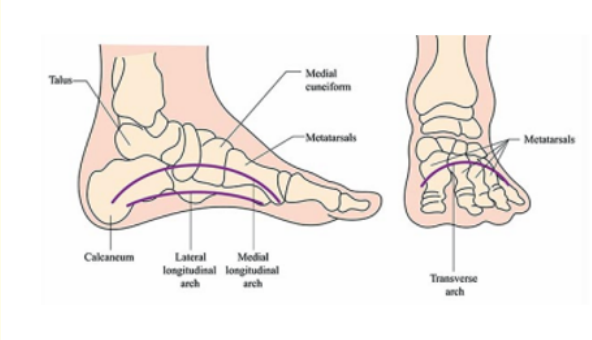
Gusyev Valentyn*

President, Member of Pedorthic Association of Canada, Canada

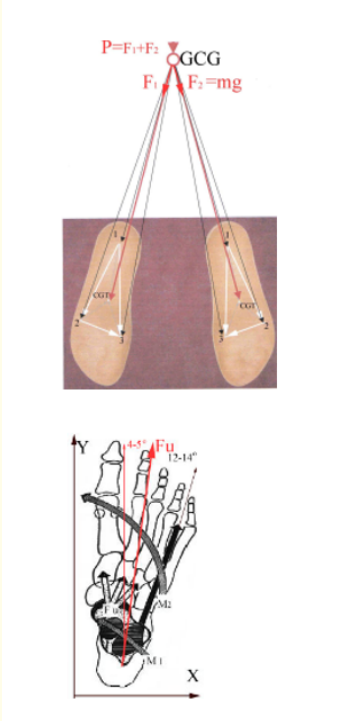
***Corresponding Author:** Gusyev Valentyn, President, Member of Pedorthic Association of Canada, Canada.

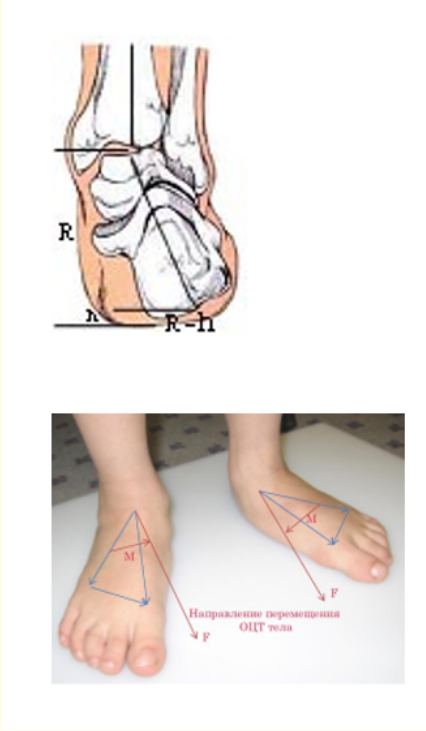
Received: March 17, 2023; **Published:** March 25, 2023

Speaking about the deformities of the feet, the rapid increase in the number of people diagnosed with flat feet involuntarily wonders what is the reason. For all the previous millennia and until the 1950s, they talked about 6 - 19%, but today more than 90% of the population of developed countries suffer from flat feet. Is this the merit of modern medicine? If earlier biomechanics prosthetists were engaged in orthopedic insoles only at factories of prosthetic products, today there are offices for the manufacture of insoles in every quarter of the city. These are specialists who do not know the anatomy of building the arches of the feet, the laws of geometry, that two surfaces are in contact with each other at three points, unable to understand the functionality of their own. Compare both schemes, and you will see not only the difference in the designation of the arches, their position, but also the fact that the calcaneus is simultaneously part of the internal and external arches. This shows ignorance not only of the anatomy but also of the biomechanics of the feet. The internal arch rests on a spherical protrusion of the calcaneus, with which it forms a subtalar joint. The bone itself is an element of the external supporting arch, which, with the transverse arch, forms the supporting triangle of the feet. These are the three points of support of the skeleton. The function of the internal arch is to dampen the speed of the transfer of the leg to zero, when it is placed on the supporting surface and the next step is taken from the other leg. This is not depreciation, when the tops of the outer and transverse arches fall vertically, but the turn and movement of the bones of the arch along a radial path. It's kind of like a brake. Therefore, it is impossible to raise the inner vault, filling the gap under it. This will be the foot equivalent to flat feet. Such actions indicate ignorance of the basics of theoretical mechanics, which as a result manifests itself in circulatory disorders in the body. The elimination of this violation should be the main task of the correction of the feet. The orthopedist will not explain how the elastic foot, able to adapt to uneven ground, turns into a rigid lever when rolling and pushing with the fingers. All types of deformations are associated with the position of the General Center of Gravity (GCG) of the body, its displacement relative to the center of gravity CG of the support triangle of the feet. But this is not taken into account in the manufacture of insoles. The specialist does not know that the CG of the reference triangle is located at the intersection of the medians, based on the tops of the arches. Thus, in the stance phase, the cuboid bone of the outer arch descends vertically until it touches the ground, and then an overturning moment of forces arises, overturning the inner arch at the subtalar joint. The overturning moment of forces also occurs during functional shortening of a long limb. When the calcaneus is turned, the internal arch also overturns. This process also takes place when walking with outward toes, when the GCG projection goes beyond the area of the reference triangle. But today, in most cases, shoes contribute to the development of deformations. One has only to be surprised at such a general illiteracy of specialists. The anchor points of the shoes do not match the anchor points of the skeleton. Therefore, such complex deformations are observed in the structures of the feet and the entire skeleton, up to the level of the position of the vestibular apparatus. Without eliminating the difference in the lengths of the limbs, it is impossible to eliminate the displacement of the GCG of the body, bring the arches to a neutral position, and correct the scoliotic posture. As a result, arterial blood flow disorders are in the first place in terms of mortality: ischemia of the heart, lower extremities and brain. Without any exaggeration, we can say that the specialist who deals with the correction of the feet is the therapist on whom the normalization of the work of the self-regulating system, which is our body, depends.


Talus
Medial cuneiform
Metatarsals
Calcaneum
Lateral longitudinal arch
Medial longitudinal arch
Metatarsals
Transverse arch


Arches of the feet
3-4 Trasverse Arch
1-2; 2-3 Supporting shock-absorbing arches


P=F1+F2
GCG
F1
F2=mg
Y
Fu
4-5°
12-14°
M2
M1
X



Volume 14 Issue 4 April 2023