Biomechanics

Biomechanics is the study of the structure and function of biological systems such as humans, animals, plants, organs, and cells by means of the methods of mechanics.

The biomechanical changes in the spinal column are considered to be the main responsible for rachialgia. Although radiological techniques use ionizing radiation, they are the most applied tools to assess the biomechanics of the spine. To face this problem, non-invasive techniques must be developed. Vertebral Metrics is an ionizing radiation-free instrument designed to detect the 3D position of each vertebrae in a standing position. Using a stereo vision system combined with low intensity UV light, recognition is achieved with software capable of distinguishing fluorescent marks. The fluorescent marks are the skin projection of the vertex of the spinal processes. This paper presents a major development of Vertebral Metrics and its evaluation. It performs a scan in less than 45 s with a resolution on the order of 1 mm, in each spatial direction, therefore, allowing an accurate analysis of the spine. The instrument was applied to patients without associated pathology. Statistically significant differences between consecutive scans were not found. A positive correlation between the 3D positions of each vertebra and the homologous position of the other vertebrae was observed. Using Vertebral Metrics, innovative results can be obtained. It can be used in areas such as orthopedics, neurosurgery, and rehabilitation. Graphical abstract [1].

see Biomechanics of the cervical spine

1)
Gabriel AT, Quaresma C, Secca MF, Vieira P. Development and clinical application of Vertebral Metrics: using a stereo vision system to assess the spine. Med Biol Eng Comput. 2018 Jan 20. doi: 10.1007/s11517-018-1789-0. [Epub ahead of print] PubMed PMID: 29352433.