MC Sensor - A Novel Method for Measurement of Muscle Tension

S. Đorđević, S. Stančin, A. Meglič, V. Milutinović, S. Tomažič

References:
SENORS, pp. 9411-9425, Jan, 2012

Abstract:
This paper presents a new muscle contraction (MC) sensor. This MC sensor is based on a novel principle whereby muscle tension is measured during muscle contractions. During the measurement, the sensor is fixed on the skin surface above the muscle, while the sensor tip applies pressure and causes an indentation of the skin and intermediate layer directly above the muscle and muscle itself. The force on the sensor tip is then measured. This force is roughly proportional to the tension of the muscle. The measurement is non-invasive and selective. Selectivity of MC measurement refers to the specific muscle or part of the muscle that is being measured and is limited by the size of the sensor tip. The sensor is relatively small and light so that the measurements can be performed while the measured subject performs different activities. Test measurements with this MC sensor on the biceps brachii muscle under isometric conditions (elbow angle 90° showed a high individual linear correlation between the isometric force and MC signal amplitudes (0.97 ≤ r ≤ 1). The measurements also revealed a strong correlation between the MC and electromyogram (EMG) signals as well as good dynamic behaviour by the MC sensor. We believe that this MC sensor, when fully tested, will be a useful device for muscle mechanic diagnostics and that it will be complementary to existing methods.

Keywords: