Motor unit’s relationship with Electromyography (EMG)

Motor unit:
A single motoneuron and its axons supply not only just a muscle fiber, but also several muscle fibers. The muscle fibers that are supplied by one motor neuron through a single axon, along with its branches, are called a motor unit. A variety of numbers of muscle fibers are present in a motor unit—for instance, it is observed in cat leg muscles that approximately 120-165 fibers are present in one motor unit.

EMG
A motor unit’s activity is measured through by placing a coaxial electrode into the muscle that is to be studied. Next, the muscle is connected to electromyography (EMG). A recording is obtained during muscular activity. This recording is called an electromyogram (EMG).

A hollow needle can be made into a coaxial electrode by introducing an insulated inner wire with it. Possible changes are recorded from a small volume of the muscles in the immediate neighborhood vicinity of the tip of the needle. Thus, it is has been observed that most of the electrical activity comes from the active fibers near the electrodes. Sometimes, surface electrodes are used in stead of deep muscle coaxial electrodes. In this recording method, two surface electrodes are placed over the muscles to be studied, at a reasonable distance.

When the muscle is at rest, no action potentials are recorded; however, as soon as the muscle becomes active, potentials are recorded. The potential recorded during activity is the result of the asynchronous discharge of motoneurons in the vicinity of the electrodes. During minimal voluntary activity, only a few motor units discharge, and as the voluntary effort increases, the more number of units are activated. This phenomenon is called recruitment of motor units.
The graduation of muscular activity is a part of the function of the number of motor units activated. Electromyographic studies have clinical importance in diagnosing motor unit disorders, including peripheral nerve injuries and neuromuscular disorders such as myotonia and myasthenia gravis, so on and so forth.