AN ELECTROMYOGRAPHICAL ANALYSIS OF NOXIOUS ISCHAEMIC WORK

Brook, J. D., Cooper, D., Hamley, E. J., and Saville, B. F., Dept. of Ergonomics and Cybernetics, Loughborough University of Technology.

Isotonic muscle repetition in ischaemia was measured on subjects working to incapacity. The apparatus of Lewis (1) and of Ryan (3) was modified, with a sphygmomanometer cuff inflated to 250 mm. Hg. on the upper arm, and with delimiting strappings, work was done by flexor digitorum sublimis, and extensor digitorum communis. The flexor power output was approximately 50 mm. Hg/0.66 secs. With experimental environment controls, and in time to a metronome, subjects flexed the third finger (D3) against a compressed air bag (25 mm. Hg.p.) Total work time was measured. The mean score (N = 58) was 199 secs, S64. ANOVA day/day reliability was .77.

Using a Kaiser e.e.g. electronic integrator and 1 cm. domed silver disc surface electrodes, 2.5 cm. apart, muscle potentials during work were studied. Careful skin preparation gave good e.m.g. traces. The integrator results proved to be unreliable and were rejected. Records of isotonic fatigue were related to Lippold's work (2) on isometric contractions. In fatigue, amplitude and frequency of potentials increased; synchronous firing of muscle units was common; phasic firing occurred. The 46% variance in the day to day replication was associated with e.m.g. trace changes. Diffuse muscular tension levels dropped; movement artefacts related to migration of activity across muscles occurred; correct timing with the metronome improved; dynamic strength-learning appeared in reduced initial muscle potentials in day 2. Greater reliability can be expected after these changes. However, the differences between subjects may have changed with the introduction of the learning dependent variable.

1. Lewis, T., Pickering, G. W., and Rothschild, P., 1929 - 31 Observations upon muscular pain in intermittent claudication, Heart, 15,359
2. Lippold, O. C.J., Redfearn, J. W. T., and Vučo, J., 1960, The electromyography of fatigue, Ergonomics, 3,121-131.
3. Ryan, E. D. and Kovack, C. R., 1966, Pain tolerance and athletic participation, Perceptual and Motor Skills, 22, 2, 383-90.