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**Patterns of leg muscle recruitment vary between novice and highly trained cyclists.**  
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This study compared patterns of leg muscle recruitment and coactivation, and the relationship between muscle recruitment, coactivation and cadence, in novice and highly trained cyclists. Electromyographic (EMG) activity of tibialis anterior (TA), tibialis posterior (TP), peroneus longus (PL), gastrocnemius lateralis (GL) and soleus (SOL) was recorded using intramuscular fine-wire electrodes. Four experimental conditions of varying cadence were investigated. Differences were evident between novice and highly trained cyclists in the recruitment of all muscles. Novice cyclists were characterized by greater individual variance, greater population variance, more extensive and more variable muscle coactivation, and greater EMG amplitude in periods between primary EMG bursts. Peak EMG amplitude increased linearly with cadence and was not different at individual preferred cadence in either novice or highly trained cyclists. However, EMG amplitude in periods between primary EMG bursts, as well as the duration of primary EMG bursts, increased with increasing cadence in novice cyclists but were not influenced by cadence in highly trained cyclists. Our findings suggest that muscle recruitment is highly skilled in highly trained cyclists and less refined in novice cyclists. More skilled muscle recruitment in highly trained cyclists is likely a result of neuromuscular adaptations due to repeated performance of the cycling movement in training and competition.