

## **31-phosphorus Magnetic Resonance Spectroscopy Following Isovolumetric Muscle Exercise**

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### **Rationale and Objectives:**

<sup>31</sup>P-magnetic resonance spectroscopy (<sup>31</sup>P-MRS) after muscle exercise, has been utilized for the non-invasive study of muscle metabolism. Most of the researches were performed after isotonic stress exercise. These studies need the various custom-built exercise devices made by nonferrous materials and were limited by the space constraints. However, isovolumetric exercises have a little limitation under these circumstances.

The objective of this work was to assess the feasibility of <sup>31</sup>P-MRS study following isovolumetric muscle exercise.

### **Materials and Methods:**

Five posterior lower leg musculatures of five normal volunteers were studied. They were placed supine in a 1.5T magnet-resonance scanner and performed isovolumetric dorsi-flexion exercise of the calf and isotonic plantar flexion exercise for 3 minutes, 5 minutes and 10 minutes. All volunteers feel the calf pain during exercise. At cessation of exercises, <sup>31</sup>P-MRS spectra were acquired at 30s intervals for 5 minutes.

### **Results:**

All <sup>31</sup>P-MRS spectra after isotonic and isovolumetric exercise showed similar phosphocreatine (PCr) recovery curve. At the end of exercise, all calf muscles of the volunteers showed marked decreased concentration of the PCr. After 10 minutes exercise, all volunteers showed recovered concentration of the PCr at the 5 minutes. After 3 minutes and 5 minutes exercise, various PCr recovery rate was obtained from 2 min 30sec to 5 min.

### **Conclusion:**

<sup>31</sup>P-MRS study following isovolumetric muscle exercise was effective for evaluating the muscle metabolism without specialized device and space constraints.