



**The University of Toledo  
Department of Kinesiology**

**Core Trainer  
Initial EMG Test Results**

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## Background

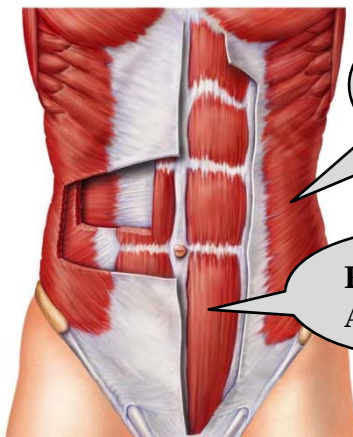
- During the original research and development conducted at The University of Toledo, electromyographic (EMG) testing confirmed that the Core Trainer successfully targeted the muscles that drive trunk rotation.
- Now that the Turing Point has manufactured a market ready professional version of the Core Trainer, additional, more rigorous EMG testing is being conducted.
- This summary presents the initial findings.
- Specifically, EMG recordings have been taken from the left and right sides of the following 7 muscles that are key to trunk rotation:
  - Rectus abdominis,
  - External abdominal oblique,
  - Paraspinal muscles at L2
  - Paraspinal muscles at L5
  - Gluteus maximus
  - Rectus femoris (Quadriceps)
  - Biceps femoris (Hamstring muscles)
- To facilitate the clear capture of EMG signals, testing was conducted on young, physically fit adults.

See next page



## Muscles Evaluated

**Front View**

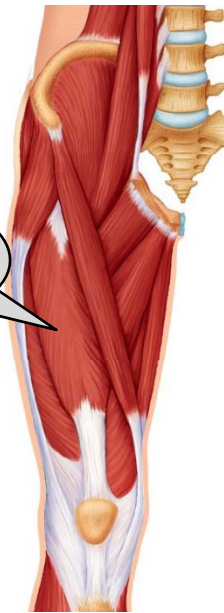


**External  
Abdominal  
Oblique**

**Rectus  
Abdominis**

**Rectus  
Femoris**

**Front View  
Right Leg**



**Back View  
Right Leg**

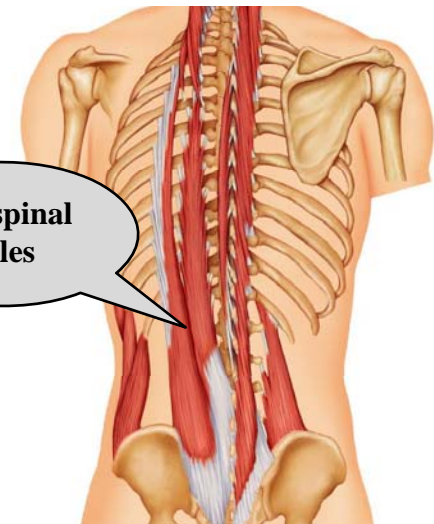


**Paraspinal  
Muscles**

**Gluteus  
Maximus**

**Biceps  
Femoris**

**Back View**



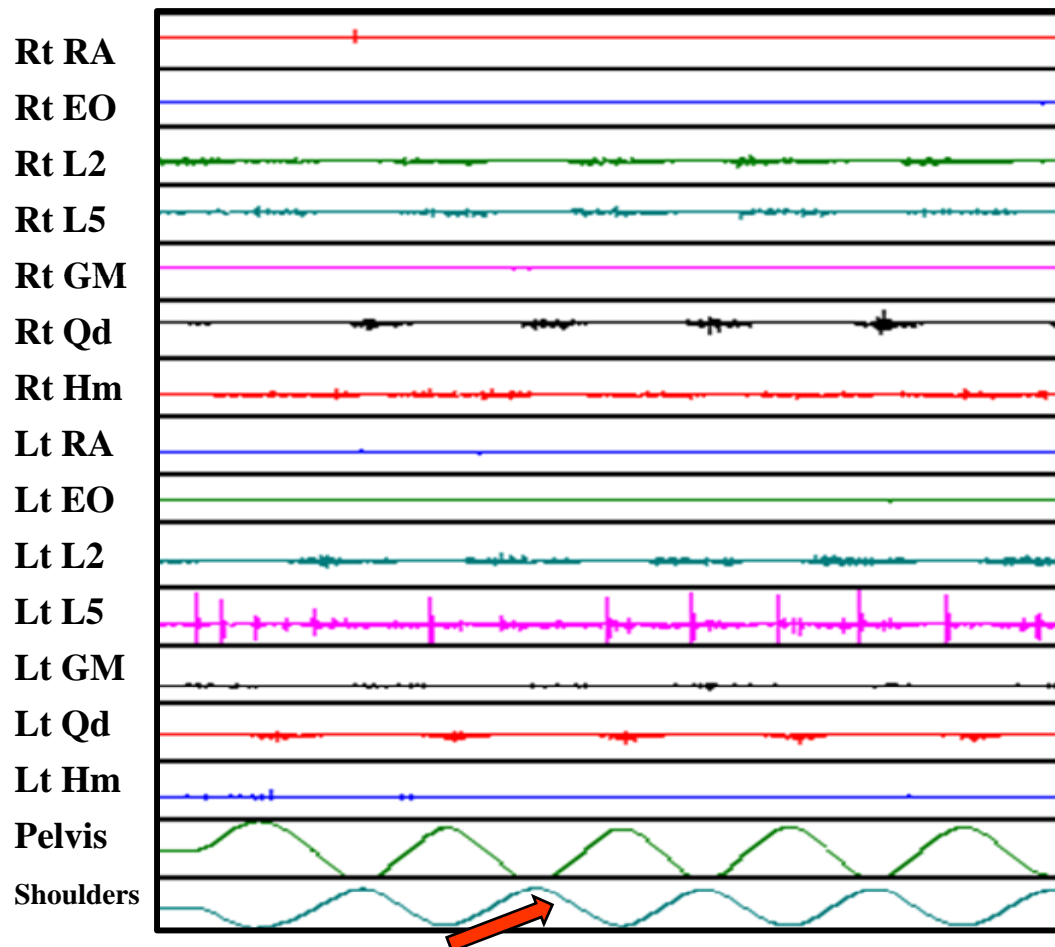


## Testing Approach

- Surface electromyography was used to sampled activity during exercise on the CoreTrainer for superficial muscles of the trunk, hips and thighs
- The following explains the graphs on the next 3 pages:
  - The first seven channels (i.e., the top 7 tracings) are produced from the muscles on the right side of the body,
  - The next 7 tracings, the second 7 channels, are produced from the muscles on the left side of the body,
  - The abbreviations are:
    - Rt RA – Right Rectus abdominis
    - Rt EO – Right External Oblique
    - Rt L2 – Right Paraspinal muscles at L2
    - Rt L5 – Right Paraspinal muscles at L5
    - Rt GM – Right Gluteus Maximus
    - Rt Qd – Right Quadriceps
    - Rt Hm – Right Hamstring Muscle
    - Lt RA – Left Rectus abdominis
    - Lt EO – Left External oblique
    - Lt L2 – Left Paraspinal muscles at L2
    - Lt L5 – Left Paraspinal muscles at L5
    - Lt GM – Left Gluteus maximus
    - Lt Qd – Left Quadriceps
    - Lt Hm – Left Hamstring Muscle
  - The bottom two bars show the magnitude of rotation of the Hips/pelvis and Trunk/shoulders
  - The test results from 3 different resistance levels are presented



## Resistance Level 1



## Observations

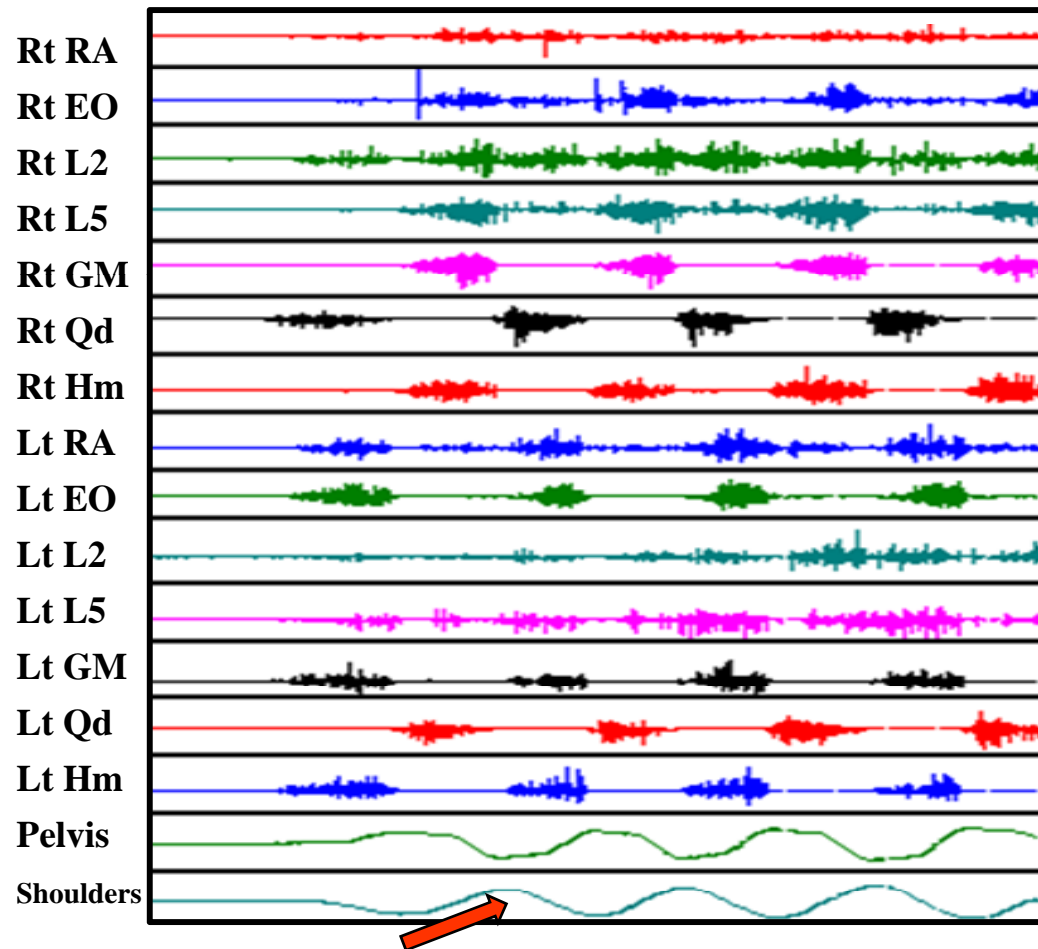
Given the very low resistance:

- There are low bursts of EMG activity for all muscles
- Large degrees of rotation are achieved for both pelvis and shoulders

The red arrow indicates left to right rotation



## Resistance Level 7



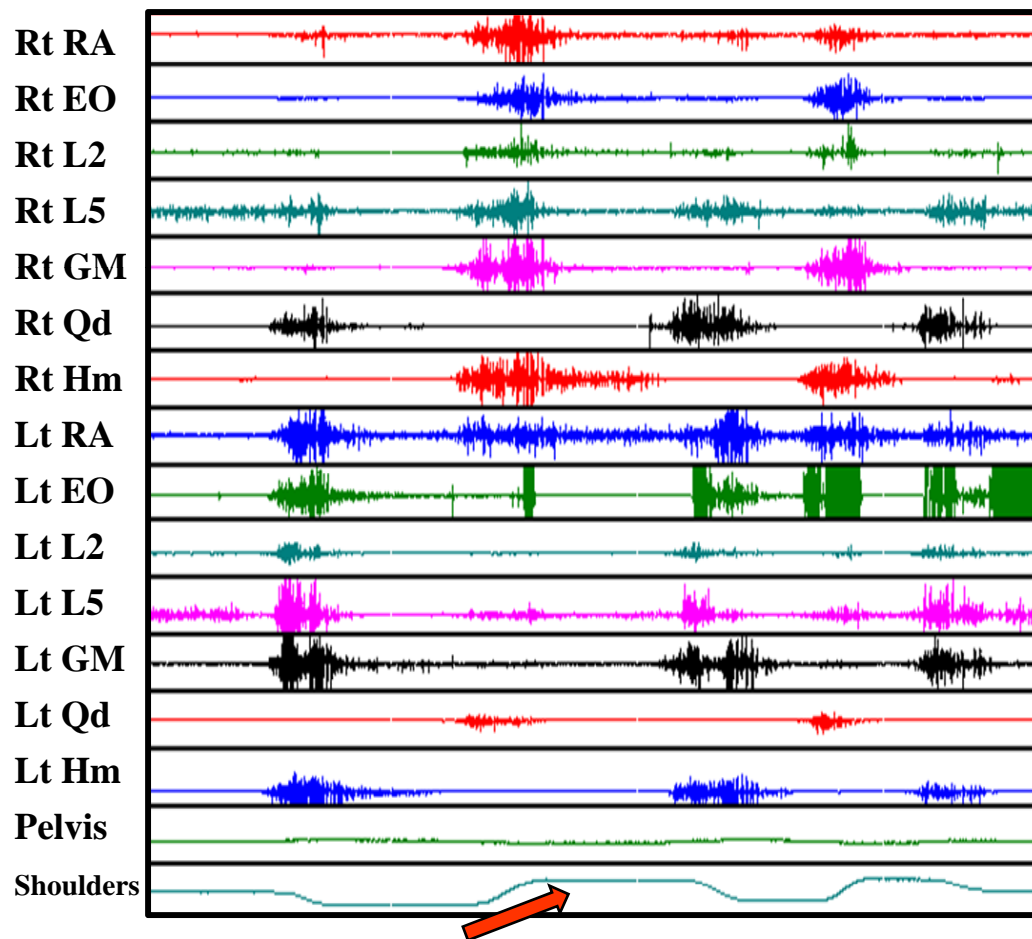
## Observations

With greater resistance:

- High bursts of EMG activity are seen for all muscles
- Lesser rotation of both pelvis and shoulders is achieved
- Notice the general pattern of alternating burst of EMG activity, i.e., as the right side is active, the left side muscles are relatively quiet



## Resistance Level 10



## Observations

With maximum resistance:

- Highest bursts of EMG activity for all muscles
- No rotation of pelvis
- Very slow shoulder rotation
- Notice the right quadriceps are active with the other left side muscles and vice versa, suggestive of a shift of body weight
- These findings support bilateral and reciprocal recruitment of agonist and antagonist muscles as seen in activities such as walking



## Next Steps

- Additional testing is underway, including:
  - Different resistance levels and different durations of exercise
  - Comparison of perceived exertion to actual resistance level
  - Subjects with different profiles
  - EMG testing of Latissimus Dorsi and Adductors



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