Transmission of signals between the entire body & the brain is carried out by the 'Spinal Cord'. This transmission to the remotest parts in the body is done by neurons. Neurons are of two types: motor neurons & association neurons. The association neurons work within the same segment of the spinal cord; with a segment being the horizontal section of the cord that gives rise to a pair of spinal nerves. These second order lower motor neurons - the spinal nerves, form part of the final common pathway for information traveling from the central nervous system to the periphery.Recently, recurrent nerve monitoring has become increasingly frequent, as studies show decreased incidence of postoperative vocal paralysis in monitored cases.

Electromyography (EMG):
Conventionally, EMG is used during spine surgery to monitor spinal nerves. By monitoring the muscles that are stimulated by these nerves, technologists determine if a nerve root is being disturbed during the procedure. If disturbed in any way (bumping, stretching, etc.), the nerve will depolarize, causing an action potential, which causes the corresponding muscle to twitch. Electrodes record this twitch & immediate feedback is sent on the monitor, alerting the surgeon.

Disadvantages of EMG:
- EMG fails on patients administrating medication affecting nervous system.
- Even though an EMG provides real-time feedback of nerve root irritation, sometimes the damage has already been done. Therefore, determining that a nerve was affected does not necessarily mean that it will lead to a more positive post-operative outcome.
- Electrical stimulus like electrocardiogram (ECG) and from other hospital machinery may be picked as noise.

Mechanomyography (MMG):
MMG is the epidermal measurement of the mechanical activity ("muscular sound") of contracting muscles; i.e. MMG non-invasively records and quantifies the oscillations generated by dimensional changes of the active skeletal muscle fibers. MMG v/s EMG:

Study Purpose: To compare the effectiveness of MMG with EMG in detecting nerves.
Study Design:
- EMG muscle electrodes were placed into muscles of the hindquarters of adult sheep where insulation was confirmed. MMG sensors were placed adjacent to the EMG electrodes onto the surface of skin. Their clocks were synchronized.
- Through a lateral exposure, a grid was placed over the psoas muscles.
- The current ramp was turned "ON" & binary O/P recorded.
- This was repeated for remaining 65 holes locations with 4160 trails in total.

Results:
- Overall Agreement: 94%
- Positive Agreement: 98%
- Negative Agreement: 71%MMG detected nerves up to 7s before EMG. On an average MMG detected presence of a nerve 1.2s earlier than EMG.

<table>
<thead>
<tr>
<th>Time</th>
<th>Same</th>
<th>1s</th>
<th>2s</th>
<th>3s</th>
<th>4s</th>
<th>5s</th>
<th>6s</th>
<th>7s</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerves</td>
<td>1021</td>
<td>1337</td>
<td>603</td>
<td>245</td>
<td>112</td>
<td>58</td>
<td>18</td>
<td>6</td>
<td>1.2</td>
</tr>
</tbody>
</table>

[Table 1]
Conclusion:
- Even though both use electrical events as stimulus (same pulse duration & waveforms), their sensor designs are different: MMG detects motor response, EMG detects electrical current.
- Remarkable observations:
  o High positive agreement: 98%
  o MMG sensors have increased sensitivity compared to EMG sensors.
  o MMG sensors detected nerves on average 1.2s and as much as 7s faster than EMG.