Motor areas of cerebral cortex

**Definition:**
These are areas which when stimulated causes muscle contraction.

**They include:**
1- Primary motor area (area 4).
2- Premotor area (area 6).
3- Supplementary motor area.
4- The somatic sensory area I & II.
Motor areas of the cortex

Functional areas of cortex
(as determined by measurement of regional blood flow)
1- Primary motor area (area 4):

- **Site**: It occupies the pre-central gyrus of the frontal lobe.
- It controls the muscle activity in the opposite side.
- It contains highly excitable large cells (Betz cells) from which 30% of the fibers of the pyramidal tract arise.
- **Body representation**:  

1- Crossed.  
2- Inverted.  
3- Area of representation is related to the degree of skilled movement performed not the size of the part.

- E.g. the area that control the speech muscles much larger than area that control the trunk muscles.
Body organization in primary motor area
Functions:

1. It is the only area that initiates the voluntary fine movements especially that of the hand & fingers.

2. It shares area 6 in initiating the gross movement done by proximal parts (trunk).

3. Facilitatory to the stretch reflex.
2- Premotor area (area 6): (Motor association area)

- **Site**: Anterior to the area 4.
- It is less excitable because it contains no Betz cells.
- Representation similar as area 4.
**Functions:**

1- It initiates the gross postural movements in **proximal parts** of the body to allow fine skilled movements to be done perfectly by positioning of **distal parts**.

2- **Inhibitory to stretch reflex.**

3- It initiates **the subconscious automatic** movements e.g. swinging of the arm during walking.
Motor areas of the cerebral cortex

- Supplementary Motor area
- Motor area 4
- Sensory area I
- Sensory area II
- Motor area 6
- Frontal
- Parietal
- Temporal

- Hand Skills
- Head rotation
- Eye movement
- Broca’s area
- Motor area 6
4- It contains the following areas:
Figure 55–3

Representation of the different muscles of the body in the motor cortex and location of other cortical areas responsible for specific types of motor movements.
<table>
<thead>
<tr>
<th>Site</th>
<th>Broca’s area (word formation area): anterior to motor area 4 &amp; immediately above the lateral sulcus.</th>
<th>Eye movement area: Immediately above Broca’s area</th>
<th>Head rotation area: above the eye movement area</th>
<th>D-Hand skills area: Immediately anterior to the hand and finger region of area 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>function</td>
<td>It is the motor center for spoken speech, so its damage causes aphasia.</td>
<td>It allows directly movement of eyes towards the desired objects</td>
<td>head rotation toward different objects.</td>
<td>memory for hand skilled movements. Damage of this area causes incoordination of hand movements motor apraxia</td>
</tr>
</tbody>
</table>
3- Supplementary motor area:

**Site:** Anterior to area 4 & superior to area 6.

**Body representation:** Face anterior & leg posterior.

**Function:** It supplement the premotor area in:

1- Control of gross postural movements.

2- Programming some complex movements.

4- Somatic sensory area I & II.
Knowledge itself is power

THANK YOU