# MYASTHENIA GRAVIS

DR PREM KAPOOR

# Myasthenia Gravis

James Carter
US Olympic Team
Track & Field

**Amitabh Bachchan**
**Indian Actor**

# Myasthenia Gravis -- MG

- **Autoimmune Neuromuscular** disease
- Defect in **transmission** of nerve impulses of skeletal ms

# What's in a Name ?

- Name is Latin and Greek in origin, literally means "**grave muscle weakness**"
- Hallmark is **fatigue and weakness** of the **skeletal (voluntary) muscles** that fluctuates

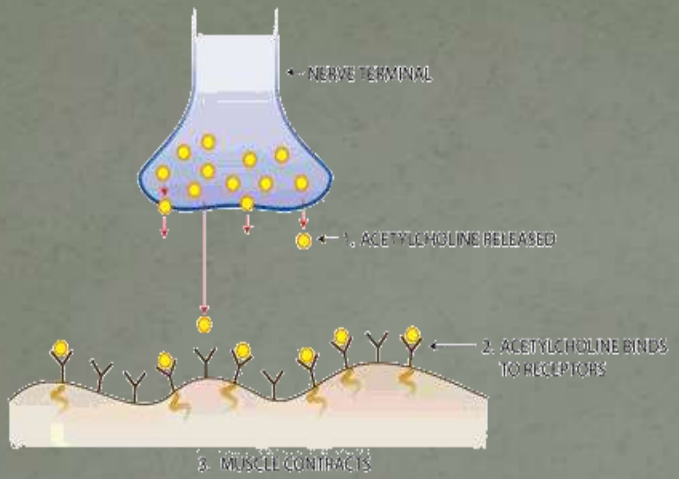
# MG

- Not Uncommon
- Chronic
- Autoimmune
- Women tend to get it earlier (20 – 40)
- Men get it later (60 – 80)

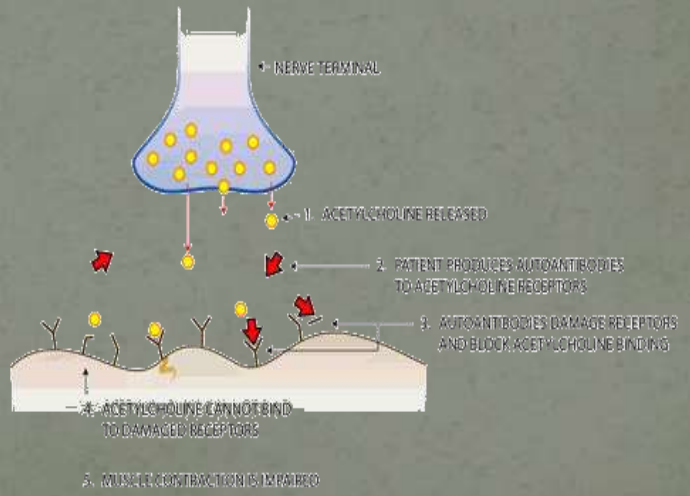
# Pathophysiology

- Normally impulses travel along the nerve to the ending and release the neurotransmitter substance **acetylcholine**
- Acetylcholine travels through the neuromuscular junction and binds to acetylcholine receptors, which are activated, and generate a muscle contraction
- In myasthenia gravis, person's own **antibodies** block, alter, or **destroy the receptors for acetylcholine** at the neuromuscular junction, preventing muscle contraction

A. NORMAL NEUROMUSCULAR JUNCTION




B. NEUROMUSCULAR JUNCTION OF PATIENT WITH MYASTHENIA GRAVIS



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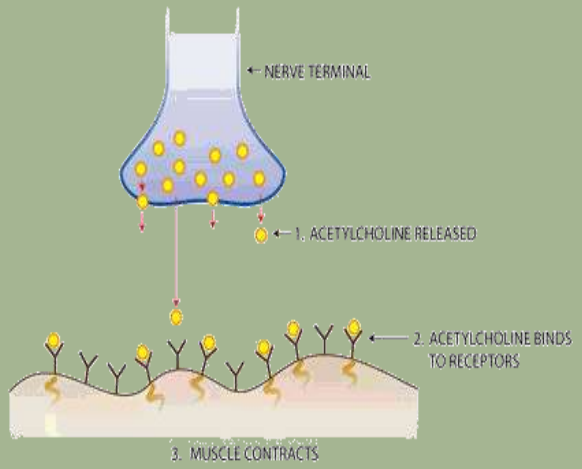


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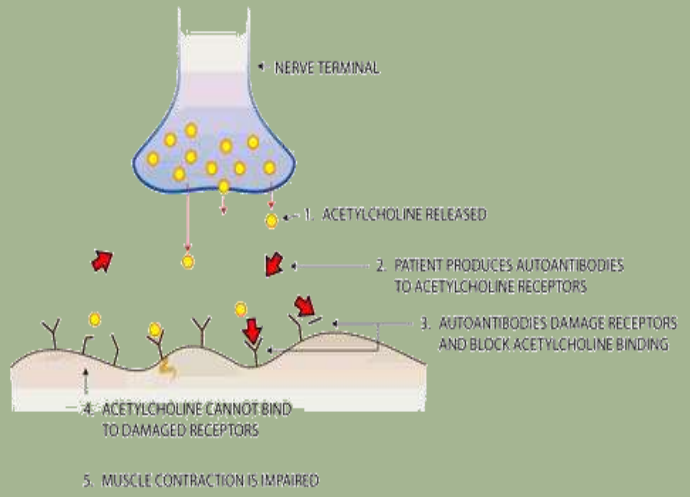


# Always A B Cs ...

The degree of muscle weakness involved in MG varies greatly among patients

Within a **year** of onset, approximately **85–90%** will develop **Generalized** myasthenia gravis, which is characterized by weakness in the trunk, arms, and legs

If no progression in 3 years --- Occular MG

May lose muscle strength for breathing and **need ventilator**

# Why …?

- **Thymus** believed to be the site of antibody production

- 75% of MG people have Thymus abnormality
- Thymus **hyperplasia—65%** or
- Thymus **tumor---10%**

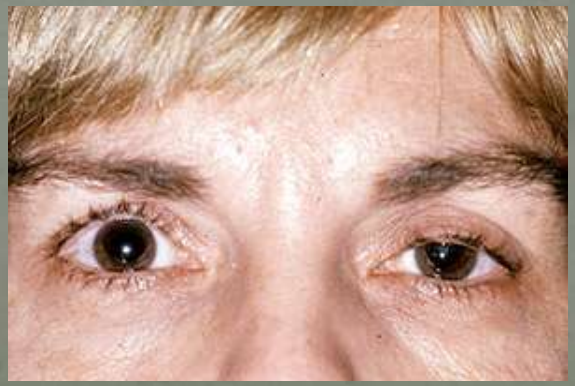
- 50 – 85% of MG people have **auto-antibodies** directed at acetylcholine receptor sites

# S & S's

**In most cases, the first noticeable symptom is weakness of the eye muscles**

**Diplopia** (blurred or double vision)

**Ptosis** (drooping of one or both eyelids)



# Also Common …

- **Majority also have weakness of face and throat muscles**

  **Dysphagia** (difficulty in swallowing)
  **Dysarthria** (slurred speech)
  **Dysphonia** (voice impairment )

- **Therefore, RISK of choking + aspiration**

# Diagnostics

- **Antibodies to** AcetylCholine Receptor in 80% of Gen & 50% of Occular MG----DEFINITE

  **Antibodies to** MuSK in 40% of AChR antibody negative Gen MG-- *CLUSTERING of AChR

- **EMG** (**nerve conduction**) tests for specific muscle "fatigue" by repetitive nerve stimulation, and may demonstrate decrements of the muscle action potential due to impaired nerve-to-muscle transmission
- More than 15% at 3 Hz--- PROBABLE

# Diagnosis

- **Tensilon IV (edrophonium chloride)** blocks the degradation of acetylcholine and temporarily increases the levels of acetylcholine at the neuromuscular junction

***Significant but temporary****

**increased muscle strength**

**within minutes**

**2mg + 8mg I.V. --------PROBABLE**

# DIFFERENTIAL DIAGNOSIS

- CMS
- LEMS
- D.I. MG
- NCA
- H Thyr
- Botulism
- I Cr L

# Treatment Goals

- **Control** symptoms
- **Maintain** functional ability (PT, OT, Speech)
- **Prevent** complications:
  - **Cholinergic** crisis
  - **Myasthenic** crisis
  - Respiratory distress
  - Aspiration pneumonia
  - Malnutrition

# Treatment

- **Physical and Occupational Therapy:** help maintain daily activities during almost all phases of the disease by reducing and improving muscle weakness
- **Thymectomy:** surgical removal of thymus gland (reduces symptoms in more than 70 % of clients without thymoma, and may cure some individuals, possibly by re-balancing the immune system)
- **Plasmapheresis:** abnormal antibodies are removed from the blood
- **High-dose IV Immune Globulin:** temporarily modifies immune system and provides body with normal antibodies from donated blood

* (Last 2 therapies may be used to help individuals during difficult periods of weakness)

# Medications

## Anticholinesterase agents

edrophonium (Tensilon)
neostigmine (**Prostigmin®**)
**pyridostigmine** (**Mestinon®**)

Prevent ACh destruction and increase the accumulation of ACh at neuromuscular junctions

- First line of treatment
- Take with food to prevent GI side effects
- **EAT within 45 minutes** of taking Mestinon when ability to chew and swallow is peaking
- Must be **taken at same time every day** to maintain therapeutic blood serum levels

# Medications

**Corticosteroids** suppress antibodies that block AChR at neuromuscular junction and may be used in conjunction with anticholinesterase. Corticosteroids improve symptoms within a few weeks and once improvement stabilizes, the dose is slowly decreased

**Immunosuppressants** such as **azathioprine (Imuran®)** and **prednisone (Deltasone)** used to treat generalized MG when other medications fail to reduce symptoms

# Myasthenic Crisis

**UNDER MEDICATION**

- **Exacerbation of disease** = SEVERE generalized muscle weakness and respiratory failure + **HTN**
- Medical Emergency requiring a ventilator / assisted ventilation
- **GIVE** **anticholinesterase** meds:

# Cholinergic Crisis

**OVER MEDICATION**

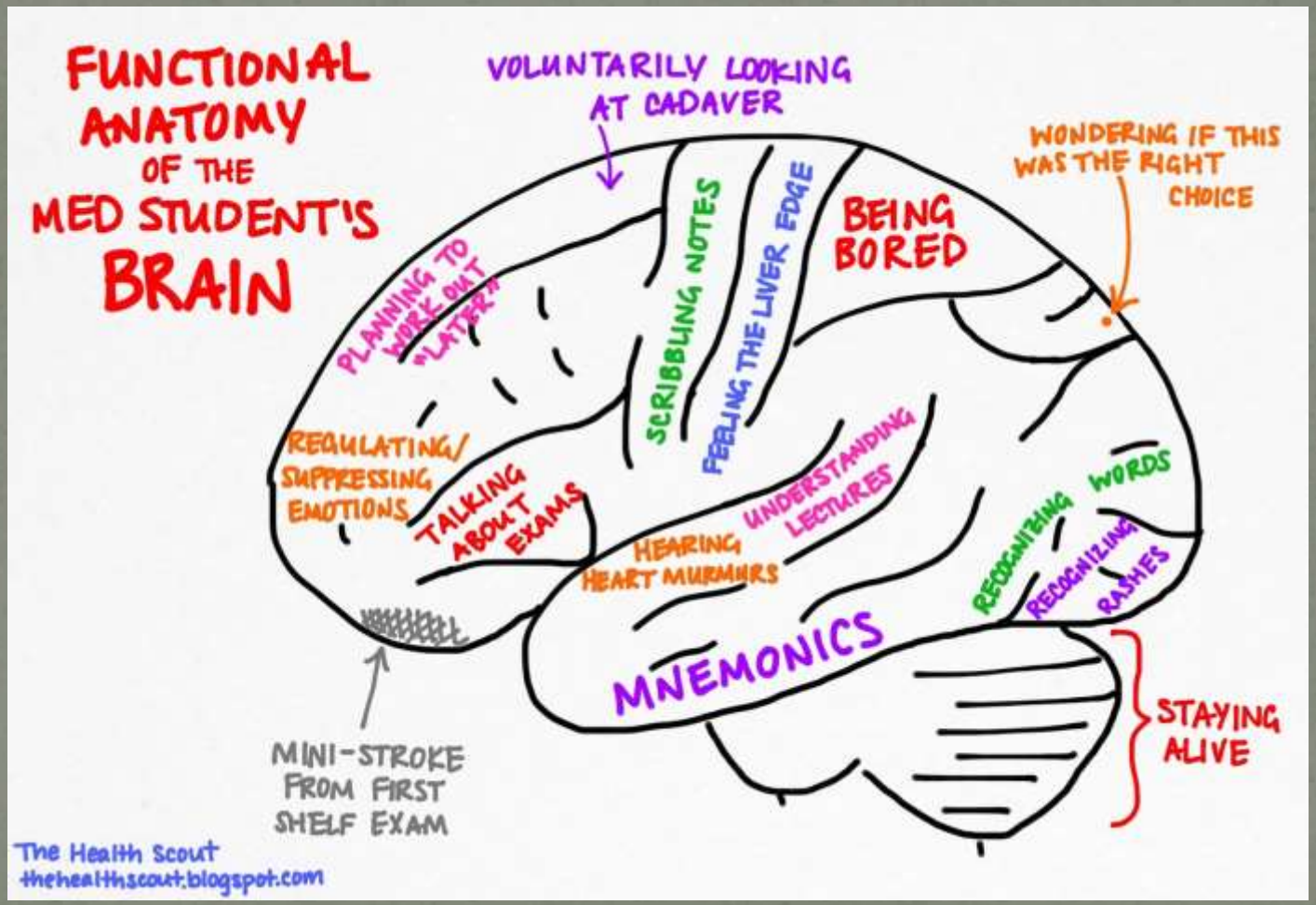
- **Too high a dose of cholinergic treatment meds**
- **Muscles stop responding to the bombardment of ACh, leading to flaccid paralysis and respiratory failure and LOW BP**
- **Cholinergic Sx**: hypersecretions / hypermotility
- **STOP all anticholinesterase meds**
- **Treat with Atropine** (anticholinergic)

- Minimize infections with careful hygiene and avoiding sick people
- Meds need to taken as scheduled
- Meds to peak at mealtimes / upright positioning / thick liquids / suction needed? (re: choking hazard)
- Small, frequent, soft high protein meals
- Do not become overheated or too chilled
- Avoid overexertion / energy conservation strategies / REST (HC Plates)
- Artificial tears / tape eye closed / eye patch
- Effective stress management

# Prognosis

- Symptoms usually progress in severity during first couple of years, then may stabilize, go into remission, or be fatal
- Patients over the age of 40, those with a short history of severe disease, and those with thymoma have a worse prognosis

# THANK YOU


FUNCTIONAL ANATOMY OF THE MED STUDENT'S BRAIN
VOLUNTARILY LOOKING AT CADAVER
WONDERING IF THIS WAS THE RIGHT CHOICE
PLANNING TO WORK OUT "LATER"
SCRIBBLING NOTES
FEELING THE LIVER EDGE
BEING BORED
REGULATING/ SUPPRESSING EMOTIONS
TALKING ABOUT EXAMS
HEARING HEART MURMURS
UNDERSTANDING LECTURES
RECOGNIZING WORDS
RECOGNIZING RASHES
MNEMONICS
STAYING ALIVE
MINI-STROKE FROM FIRST SHELF EXAM
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