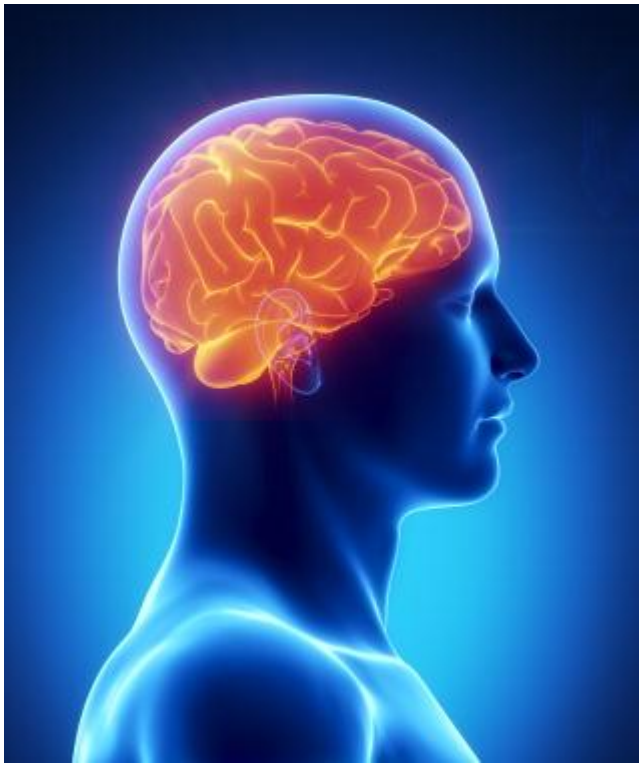
# Neurology



Cases and Concepts

John Marlow

# Medical Heroes

Lewy body dementia

Subarachnoid haemorrhage

Motor neurone disease

Chronic Inflammatory Demyelinating Polyneuropathy

Neurofibromatosis

Cerebral Palsy

Stroke

Guillain Barre syndrome

Parkinson's Disease

Hereditary Motor
Sensory Neuropathy

Myasthenia Gravis

Progressive supranuclear palsy

Essential tremor

Multiple sclerosis

Epilepsy

Syringomyelia

# What do I need to know?

**The Medical Bits**

- Especially to recognise the presentation of disease
- Most neurological diseases (except for SAH, stroke, epilepsy) present to a GP. Diagnosis is often delayed

**The GP bits**

- To understand the *impact* of neurological disease
- To manage what is usually chronic and incurable disease

# 3.18 Care of People with Neurological Problems

Key messages:- (RCGP)

- Many neurological conditions can be managed in primary care. When making referrals, you need to be aware that there is a shortage of neurologists in the UK
- As a GP you play an essential role in the management of chronic neurological disability in the community

# Aims and objectives

- Aim

Understand the primary care management of neurological disease

- Objectives

1) See how 3 neurological cases presented

2) Identify the key features of each disease

3) Analyse the impact of the diseases using the 6 RCGP competences and 3 essential features

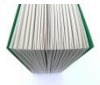
# Neurology cases

Case 1

# Mrs B

- 52 year old lady, married, 2 children at university
- Design and technology technician at private school
- Marathon runner and triathlete

# 15 March 2010 (ST3)

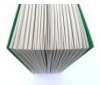


c/o unable to run as she used to, falls after about 5 mins of running, feels she can't skip, feels thighs are stiff, does lots of strength and core training with personal trainer

FROM back, SLR 85 degrees bilaterally, normal tone, brisk knee reflexes, sensation intact, normal heel-toe walking, cranial nerves normal

Keep watch over next 6 weeks, suggest easing up on training, review if any worsening

# 19 March 2010 (GP)

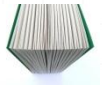


Really struggling with training. Last year preparing for ultramarathon but really struggling to even run up stairs, worse last 6 months. Coach worried, she is worried. Has noticed muscle twitching.

No wasting. Normal tone/sensation. Hyperreflexic all reflexes. Clonus++ at ankles

Perhaps training now masking symptoms, discussed uncertainty, refer

# 24 March 2010 (Neurologist)



Become aware of dragging of right leg, some calf cramps and occasionally in quads, and what sounds like occasional muscle fasciculation.

Slight limp. Cranial nerves normal. Bilateral ankle clonus, brisk reflexes. Mild 4+/5 weakness hip flexion and ankle dorsiflexion on the right

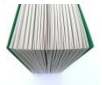
History and examination suggest an inflammatory process particularly affecting high spinal cord.

MRI requested.

# MRI brain and C-spine

- Disc prolapse in the neck at level C5/6, more so on the left with distortion of the spinal cord but no cord signal change
- Referred to neurosurgeon

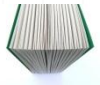
# 13 May 2010 (Neurosurgeon)



Overall she has got features suggestive of myelopathy and her MRI scan of the cervical spine has shown predominantly left sided disc protusion at C5/6 which is indenting the theca.

Offered C5/6 anterior cervical discectomy and fusion. Main aim is for her to not get any worse and any more than that would be a bonus.

# 19 Jan 2011 (Neurologist)



- Symptoms relentlessly worsened without any particularly worsening post-operatively (and MRI shows satisfactory post-op appearances).
- 11 falls, legs feeling weak- sometimes hardly able to walk, difficulty with grip and dexterity, seen odd muscle twitch

- Tone normal, sparse fasciculation in thighs. Reflexes pathologically brisk in both upper and lower limbs. No wasting. Sensation normal.

Investigations:-

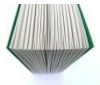
Anti-GAD and NMDA receptor antibodies, CK

Nerve conduction studies/EMG requested

It remains unclear what is going on and there are certainly some discrepancies here.

Should the above indicated tests return all unremarkable, I think there would be some rather difficult questions to answer.

# 2 March 2011 (Neurologist)



More muscle weakness, in particular in lower limbs proximally now requiring a wheelchair.

Fasciculation has become very widespread across the posterior chest and all limbs.

Anti-GAD and NMDA antibodies negative

CK mildly raised

Needle EMG examination of all four limbs showed extensive acute on chronic denervation consistent with…

# Motor neurone disease

= a progressive neurodegenerative disease that attacks the upper and lower motor neurones

# Epidemiology

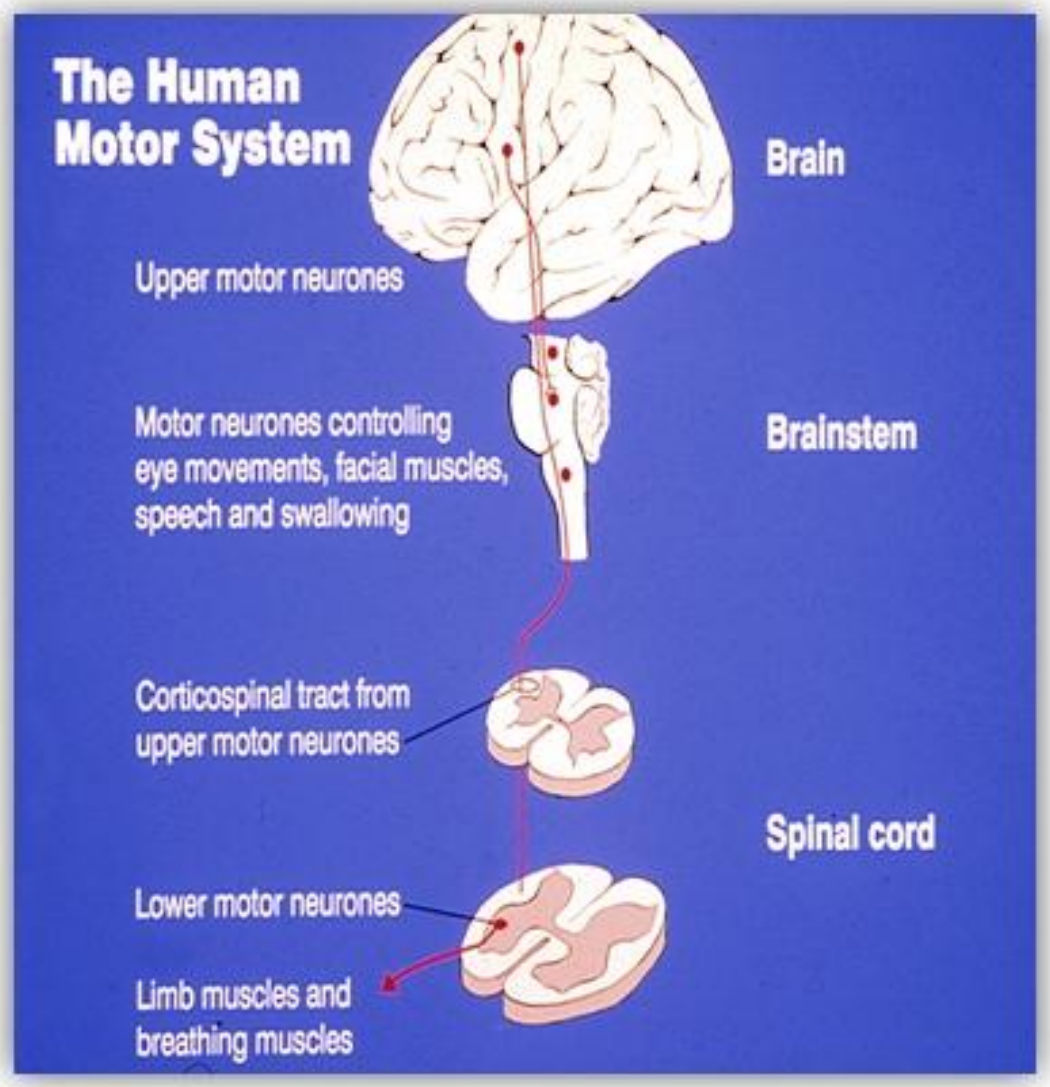
- incidence: approximately 2 per 100 000 per year except in endemic areas such as the Island of Guam

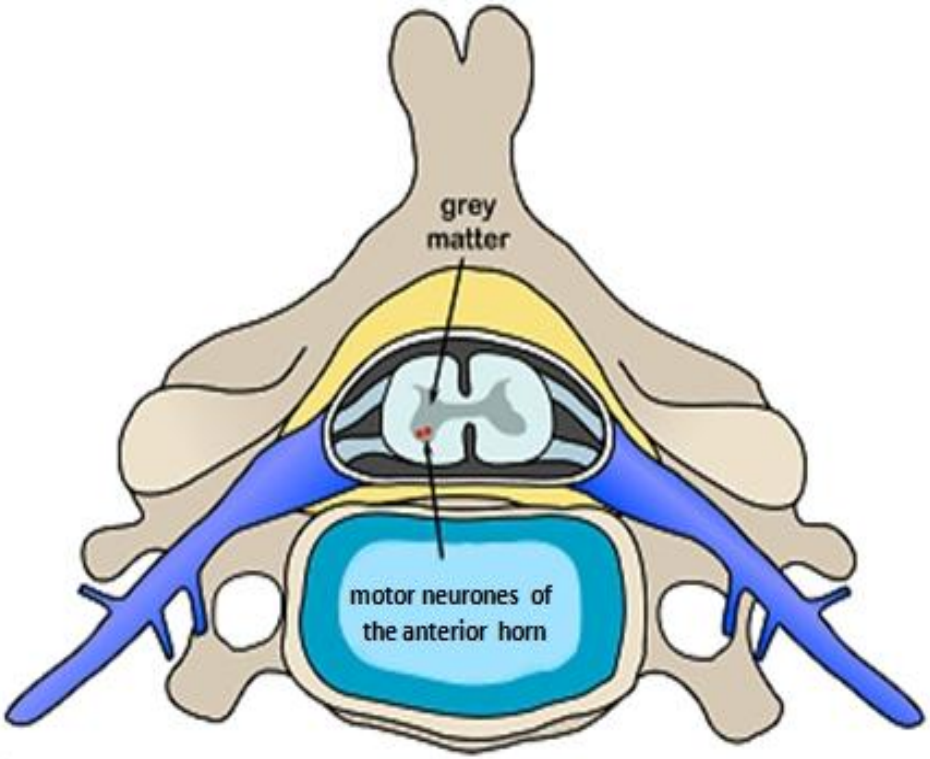
- Male:female ratio 2:1
- familial link in 5-10% of cases (SOD 1 gene- chromosome 21)
- age of onset - mean = 55 years; range = 16-77 years, but usually in fifth to seventh decades

# Pathology

- Linked to glutamate which is an excitatory neurotransmitter and excess results in overflow of calcium in cell, resulting in damage and death to neuronal tissue.
- Riluzole is a glutamate antagonist and has been shown to slow progression of MND.
- Degeneration of motor neurones in:

- Anterior horn cells – resulting in lower motor neurone lesions (LMN), which lead to secondary muscle wasting, weakness, fasciculation and reduced or absent reflexes
- Corticospinal tract cells – resulting in upper motor neurone lesions (UMN), which produce spasticity, weakness and brisk reflexes


The Human Motor System
Brain
Upper motor neurones
Motor neurones controlling eye movements, facial muscles, speech and swallowing
Brainstem
Corticospinal tract from upper motor neurones
Spinal cord
Lower motor neurones
Limb muscles and breathing muscles


grey
matter
motor neurones of
the anterior horn

# Amyotrophic lateral sclerosis

- Most common form: 85% of MND cases.
- Progressive motor weakness, involving both LMNs and UMNs
  Arm, leg or bulbar onset (equal proportions on diagnosis)
  Characterised by a combination of muscle wasting with spasticity. Bulbar involvement eventually is typical but may not be prominent in all patients.
- Average survival 2-5 years from presentation of symptoms. Where the initial onset is in the bulbar territory, survival tends to be shorter (1-3 years).

# Progressive Bulbar Palsy (PBP)

- A small group of patients have disease relatively confined to the bulbar region for several months (rarely years), before it moves to involve the limbs.
- Overall survival 6 months – 4 years

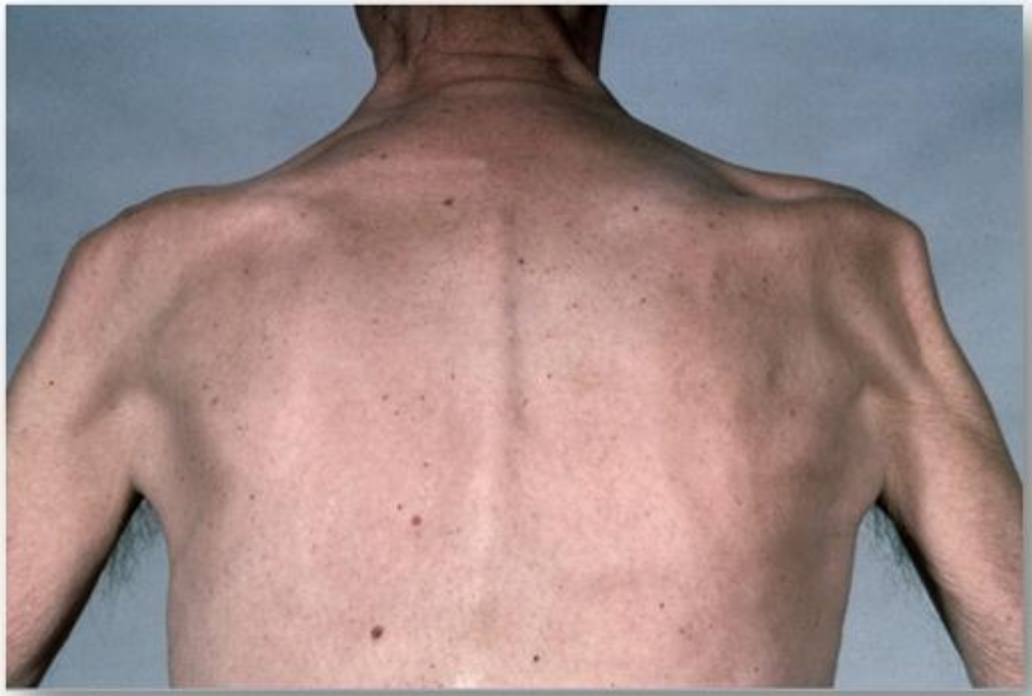
# Progressive muscular atrophy (PMA)

- Affects less than 10%.
- Predominantly LMN degeneration, characterised by muscle wasting
  Always limb onset, often with visible fasciculations

# Primary lateral sclerosis (PLS)

- Affects approximately 5%.
- Only UMN damage.
  Characterised by spasticity, increased reflex response, and balance is often affected.
- Survival is notably longer (10-20 years).

# MND muscle atrophy



# Symptoms and signs

- Signs and symptoms:
- Onset is insidious
- Early symptoms may include: stumbling, foot drop, weakened grip, slurred speech, cramp, muscle wasting and fatigue.
- Other (sometimes later) symptoms may involve swallowing and breathing
- Mixed signs are typical of Amytrophic Lateral Sclerosis (ALS)
- If associated upper motor neurone signs predominate there will be brisk reflexes, extensor plantars, clonus and increased tone. The main differential is cord disease (myelopathy).
- If lower motor neurone features predominate you will see wasting and reduced or absent reflexes, hyporeflexia

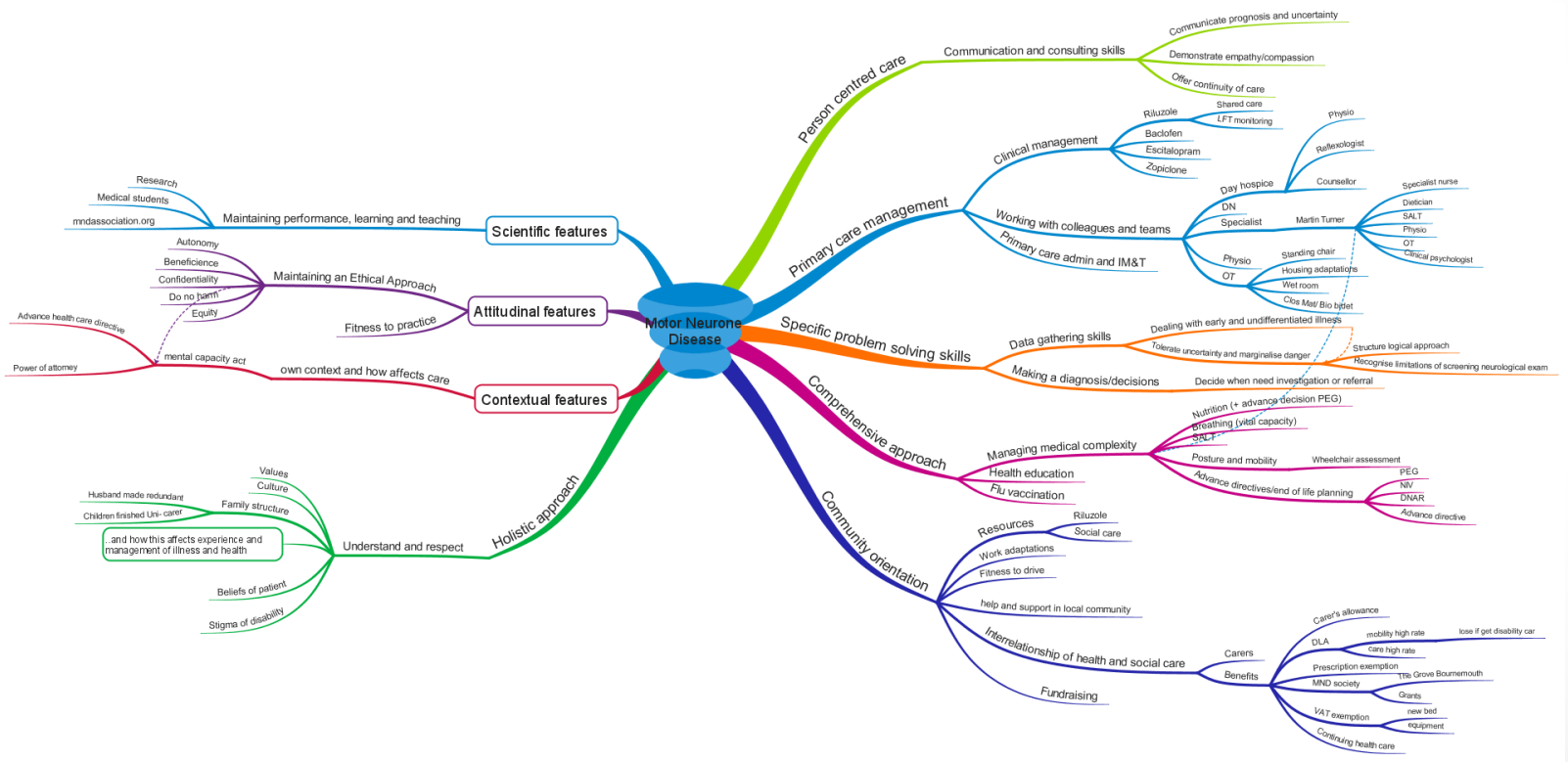
# When to refer to neurologist

- Painless progressive weakness and wasting
- Prominent fasciculation
- Painless dysphagia especially if early dysphagia for liquids
- Dysarthria
- Wasted muscles with retained reflexes

# Pick up rate

- 50% of cases are initially referred to non-neurologists and the diagnostic “hit rate” for other specialists is fairly poor. For example, it is 12% for Orthopaedics/ENT and 6% for GPs, but >95% for general neurologists

# MND Mindmap


Motor Neurone Disease
Person centred care
Communication and consulting skills
Communicate prognosis and uncertainty
Demonstrate empathy/compassion
Offer continuity of care
Primary care management
Clinical management
Riluzole
Shared care
LFT monitoring
Baclofen
Escitalopram
Zopiclone
Working with colleagues and teams
Primary care admin and IM&T
Day hospice
Physio
Reflexologist
Counsellor
DN
Specialist
Martin Turner
Specialist nurse
Dietician
SALT
Physio
OT
Clinical psychologist
Physio
OT
Standing chair
Housing adaptations
Wet room
Clos Mat/ Bio bidet
Specific problem solving skills
Data gathering skills
Dealing with early and undifferentiated illness
Tolerate uncertainty and marginalise danger
Structure logical approach
Recognise limitations of screening neurological exam
Making a diagnosis/decisions
Decide when need investigation or referral
Comprehensive approach
Managing medical complexity
Nutrition (+ advance decision PEG)
Breathing (vital capacity)
SALT
Posture and mobility
Wheelchair assessment
Advance directives/end of life planning
PEG
NIV
DNAR
Advance directive
Health education
Flu vaccination
Community orientation
Resources
Riluzole
Social care
Work adaptations
Fitness to drive
help and support in local community
Interrelationship of health and social care
Carers
Benefits
Carer's allowance
DLA
mobility high rate
lose if get disability car
care high rate
Prescription exemption
MND society
The Grove Bournemouth
Grants
VAT exemption
new bed
equipment
Continuing health care
Fundraising
Holistic approach
Understand and respect
Values
Culture
Family structure
Husband made redundant
Children finished Uni- carer
..and how this affects experience and management of illness and health
Beliefs of patient
Stigma of disability
Contextual features
own context and how affects care
Advance health care directive
Power of attorney
mental capacity act
Attitudinal features
Maintaining an Ethical Approach
Autonomy
Beneficience
Confidentiality
Do no harm
Equity
Fitness to practice
Scientific features
Maintaining performance, learning and teaching
Research
Medical students
mndassociation.org

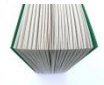
# Neurology cases

Case 2

# Miss C

- 16 year old girl (on presentation), living with parents
- PMH- asthma, eczema
- FH- grandfather MS
- Now 19, living with boyfriend, was doing IT course at college but had to give it up.

# 28 Aug 2009 (GP)

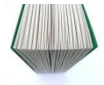


Past 2 weeks feeling of something in throat, then lips go tingly and finds difficult to talk. Mum says muddles words up. Pins and needles in fingers. Vision gone a bit blurry at times.

ENT- nad, neuro normal, BP 112/78, chest clear

? (? hyperventilation). Check FBC, ESR, Calcium, thyroid and see if persists

# 7 Oct 2009 (GP)



Review of neuro symptoms. 2 month h/o short-lived episodes where mouth goes numb, unable to eat or drink properly; accompanied by spasms of hands, can't get fingers to work properly. Episodes last ~15 mins, no obvious precipitating cause.

Recent blood screen normal. Rides scooter and worried if she has attack whilst driving

Neuro exam- normal

Refer neurology to exclude physical cause

# 29 Oct 2009 (Paediatrician)

- Episodes slurring speech, difficulty swallowing, numbness on tongue and lips, weakness of hands
- Worsening eczema
- Neuro exam fine except for brisk reflexes
- Raised lesions on face and annular area on abdomen
- Referred to dermatologist ?sarcoid
- Arranged ACE, MRI brain and SALT assessment

# 18 Nov 2009 (SALT)

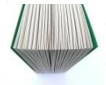
- Symptoms do not appear to link to fatigue and are intermittent and relatively short duration (10-15 mins)
- Speech, communication, swallow normal
- Referred to adult SALT team

- MRI and blood tests normal

# 4 Feb 2010 (Paediatrician)

- Had skin biopsy and rash now improved
- Still having intermittent episodes as before
- Refer EEG and review in 3 months

# 12 Feb 2010 (GP)



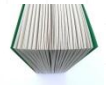
Ongoing 9 months, voice keeps going, hands cramp up and eye looks inwards, constant problem last 3 days, double vision, can't see far, fell yesterday as couldn't see kerb

MRI, bloods normal. Awaiting EEG

No nystagmus. Cranial nerves normal. Neurological exam normal.

Everything normal so far so to continue as is at present

# 12 Feb 2010 (A&E)



Attended A&E and reviewed by paediatrician.
Referred to adult neurology

EEG normal

??

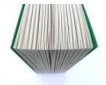
# 10-20 April 2010 (Neurology)

- Admitted with bulbar weakness, diplopia and ptosis. Difficulty swallowing solids
- Mild ptosis bilaterally which was fatigable. Minimal facial weakness. Mild shoulder abduction weakness
- Barium swallow normal
- Acetylcholine receptor antibodies positive
- CT chest- normal
- Neurophysiology confirmed high likelihood of…

# Myasthenia Gravis

- In young  patients thymectomy can lead to an early response and remission…
- 25% complete remission
- 50% improvement with maintenance on medication
- 25% no difference
- Rx:- steroids 50mg prednisolone alternate days
- Pyridostigmine
- Thymectomy on 10/8/2010

# Update 2011-2012

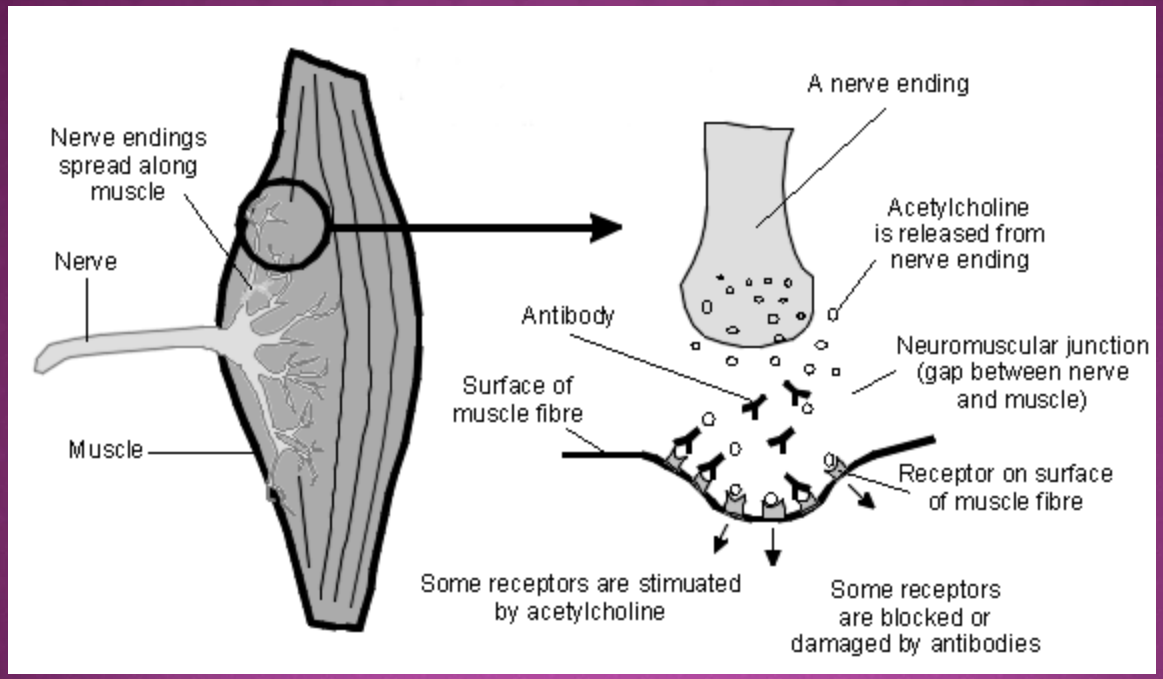


- Seen on several occasions by GP with relapses of symptoms. Steroids sometimes increased.
- Had few months off work. Immunoglobulin infusions. Azathioprine.
- Admitted to hospital for flare-up once.
- Become increasingly anxious, can't be left on her own. Will visit mum and dad when partner at work, or sleep at parent's if partner working nights

# Current Medication

- Adcal D3
- Alendronic acid
- Azathioprine 100mg bd
- Seretide
- Omeprazole
- Prednisolone 30mg alternate days
- Pyridostigmine 60mg 5 times a day
- Salbutamol

# MYASTHENIA GRAVIS



# MYASTHENIA GRAVIS

- = acquired autoimmune disorder characterised by weakness, typically of the periocular, facial, bulbar, and girdle muscles.
- It is associated with serum IgG antibodies to acetylcholine receptors in the postsynaptic membrane of the neuromuscular junction. Classically, the muscles are easily fatigued.

# EPIDEMIOLOGY

- Prevalence 5 people in every 100 000.
- Non-thymoma cases have a peak incidence at 10-30 years and again, at 60-70 years of age
- Thymoma have a peak incidence at 40-50 years of age.
- Females are affected more often in the under 40 year old age group whereas men predominate in cases which develop in older age groups. About 10% of cases develop during childhood.

# CLINICAL FEATURES

- external ocular muscles - affected in over 90% of cases, and are the muscles first affected in 65% of cases; diplopia or ptosis, often asymmetrical, are typical; ocular myasthenia describes myasthenia confined to the eyes
- limb weakness - characteristically, increased by exercise, i.e. easily fatigued; shoulder girdle is commonly affected

- bulbar - loss of facial expression - patient appears unable to smile and may seem to snarl; inability to whistle; dysarthria - often, slurring speech; difficulty in chewing and swallowing; weakness of the neck muscles
- respiratory - shortness of breath; may be exacerbated by lying down

# INVESTIGATIONS AND DIAGNOSIS

- diagnosis can be confirmed by observing an improvement in strength after administering a short-acting anticholinesterase drug, for example, edrophonium chloride
- Electromyography
- acetylcholine receptor antibodies are present. These are present in approximately 90% of patients with generalised disease
- CT mediastinum

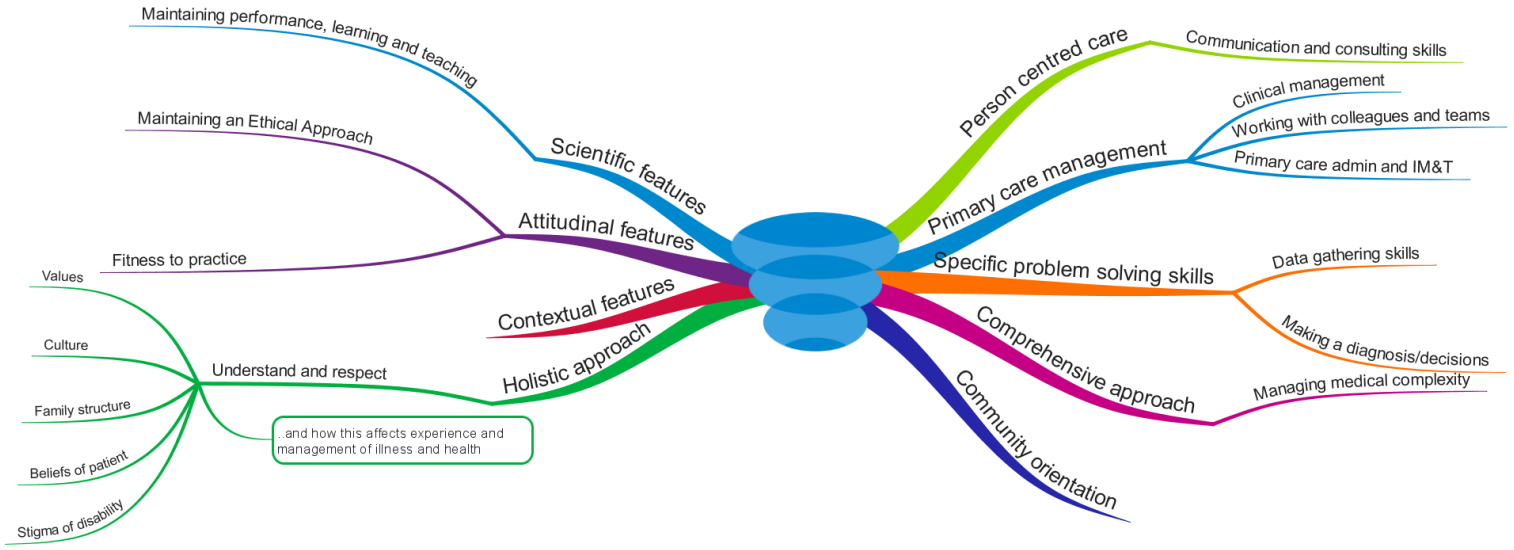
# TREATMENT

- Oral anticholinesterase medication e.g. pyridostigmine or neostigmine
- Thymectomy (usual practice if <40 & +ve Abs)
- Immunosuppresion
- Iv Immunoglobulin
- Plasma exchange

# PROGNOSIS

- Remission or substantial improvement can be expected in 80% of patients. For those with associated thymoma, the 5 year survival is approximately 30 %

# MIND MAP TEMPLATE



# Neurology cases

Case 3

# Mr C

46 year old research engineer (involving some manual work and up and down ladders)

Lives with wife and daughter aged 12 with Asperger's syndrome

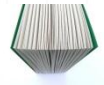
# April 2005 (GP)

- Onset blurred vision R eye, attended eye cas, nil obvious, will attend for follow-up next week. Loss of colour vision.

- (later in month)

  Feeling better, eyes recovering well. No headaches.

# December 2005 (GP)

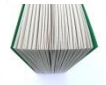


Pins and needles left arm and leg, no affect on power or sensation. Feels like sunburn. VA unchanged. Comes and goes. No trauma

Upper and lower limb neuro exam normal

Little to find, no obvious cause, review if not settling, BP raised, trying to lose weight, review 2 months

# February 2006 (GP)



Now pins and needles in both arms and legs over the last 48 hours. Generally run down.

Reflexes normal

Admit to exclude GB syndrome

# 10-23 Feb 2006

- MRI:- 2 or 3 white matter lesions identified within the brain including one within the pons and per ventricular lesion

# 2006-2012

- Several flare-ups since
- Severe fatigue main persistent problem
- Had to take redundancy
- Financial and marriage stress
- Part time work as prison instructor
- Further problems  with lots of time off work
- Dismissed from part time job

# Current Medication

- Amlodipine 10mg od
- Candesartan 16mg od
- Modafinil 100mg bd
- SLS Tadalafil 10mg
- Tolterodine 4mg od

# MULTIPLE SCLEROSIS

# WHAT IS MS?

- A cell-mediated autoimmune disorder characterised by repeated episodes of inflammation of the nervous tissue in the brain and spinal cord (but not the peripheral nervous system), causing loss of the insulating myelin sheath (demyelination)

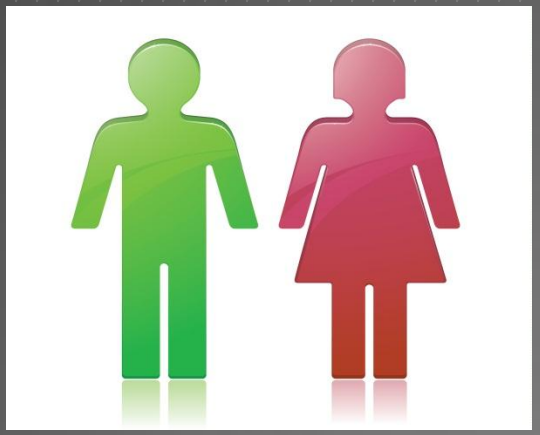
# CLASSIFICATION

- Relapsing/remitting
- Secondary progressive
- Primary progressive
- (some also include "benign MS" which is applied retrospectively if not accrued significant disability by 10 years)

- 85% have relapsing/remitting at onset.
- 65% of these go on to develop the secondary progessive form within 15 years of diagnosis
- In primary progressive (15%), symptoms gradually get worse over time (M=F)
- "benign" is essentially relpasing/remitting with no relapses (10-15% total)

# EPIDEMIOLOGY

- Prevalence is estimated to be about 164 per 100,000, so a full-time GP might expect to be caring for approximately two or three people with MS on their patient list.
- Worldwide, MS occurs more frequently at higher latitudes; it is five times more prevalent in temperate zones than in the tropics. In regions where the prevalence is high, MS is the most common nervous system disease causing disability in young people (Wikström, 2006).
- People born in an area of the world with a high risk of MS, but who move to an area where the risk is lower before their mid-teens, acquire the level of risk of their new home.



- 1:3
- 20-40 peak age
- 30 mean onset age
- 1-2 yrs later in men and more likely progressive disease at onset
- Can occur at any age

# AETIOLOGY

- Likely interaction genetic susceptibility and environmental trigger
- Genetic- combination of genes increase susceptibility e.g. tissue type HLA-A3, B7 and DR2
- Identical twin concordance 20-40%

# ENVIRONMENT TRIGGER?

- ?infection in childhood or adolescence, or even in utero
- 98% MS pts had EBV (90% of non MS)
- Recent research suggests vitamin D deficiency may play a role

# PRESENTATION

- MS can affect any area of the brain, optic nerve or spinal cord
- Visual problems
- Fatigue
- Spasticity
- Gait problems
- Tremor and ataxia
- Vertigo
- Pain
- Sensory disturbance (e.g. Lhermitte's phenomenon)
- Uhthoff's phenomenon

# VISUAL PROBLEMS

- 25% present optic neuritis
- Usually unilateral
- Progressive over ~2/52
- 70% get over time
- Pain especially on eye movement
- Area of poor vision and colour vision (red desaturation)
- Also can get diplopia, VI palsy, INO

# SPASTICITY

- 75% at some stage
- Most commonly in legs
- May be weakness and spasms
- Neurophysiotherapy helps
- MS society has free DVD on stretches for patient

# GAIT DISORDERS

- Toe drag
- Foot drop
- 'Vaulting' - a compensatory technique that involves raising the heel on the stronger leg to make it easier to swing the weaker leg through
- Compensatory hip hike
- Trunk lean
- Circumduction - where the leg is swung out to the side

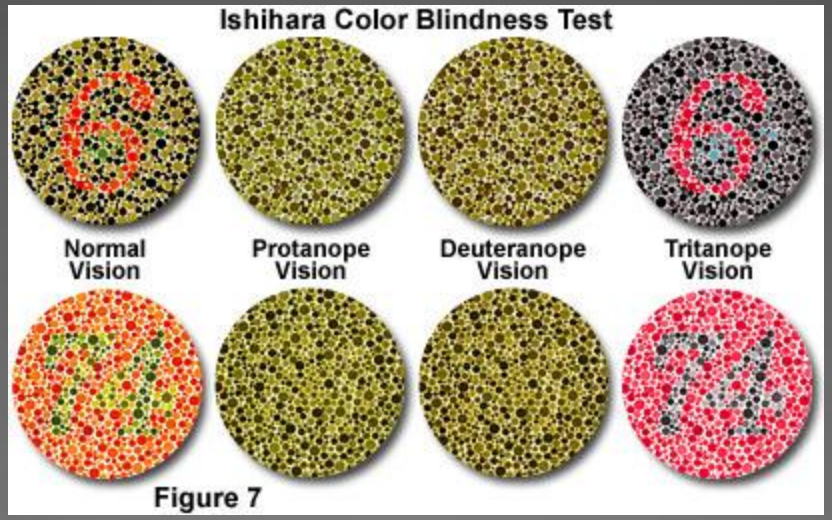
# OTHER FEATURES

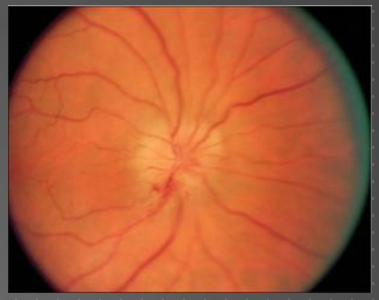
- Ataxia and tremor
- Vertigo and pain
- Sensory disturbance
- Lhermitte's phenomenon
- Uhthoff's phenomenon- neurological dysfunction when body temp raised. E.g. monocular visual loss on exercise

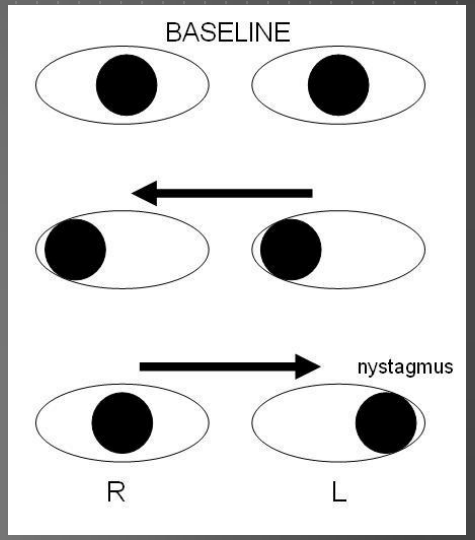
# DIAGNOSIS

- Early symptoms often vague
- Not based on any single symptoms or sign
- Must be objectively abnormal CNS physical signs at the time of significant symptoms

# VISUAL SIGNS



# OTHER NEUROLOGICAL SIGNS

- Brisk tendon reflexes
- Extensor plantar reflexes
- Cerebellar signs e.g. Romberg's test, heel-to-toe walking
- Spasticity
- Pyramidal weakness

# INVESTIGATIONS & REFERRAL

- MRI brain- 95% abnormal in MS
- Neurologist role is to confirm diagnosis, arrange secondary care drugs and consider disease-modifying drugs

# NICE GUIDELINES 2003

- Access to specialist neurological and neurorehabilitation services
- Rapid diagnosis <3/12 to complete Ix
- Seamless service across health and social care
- Service which is responsive to people
- Self-referral back after discharge

# TREATMENT OF RELAPSE

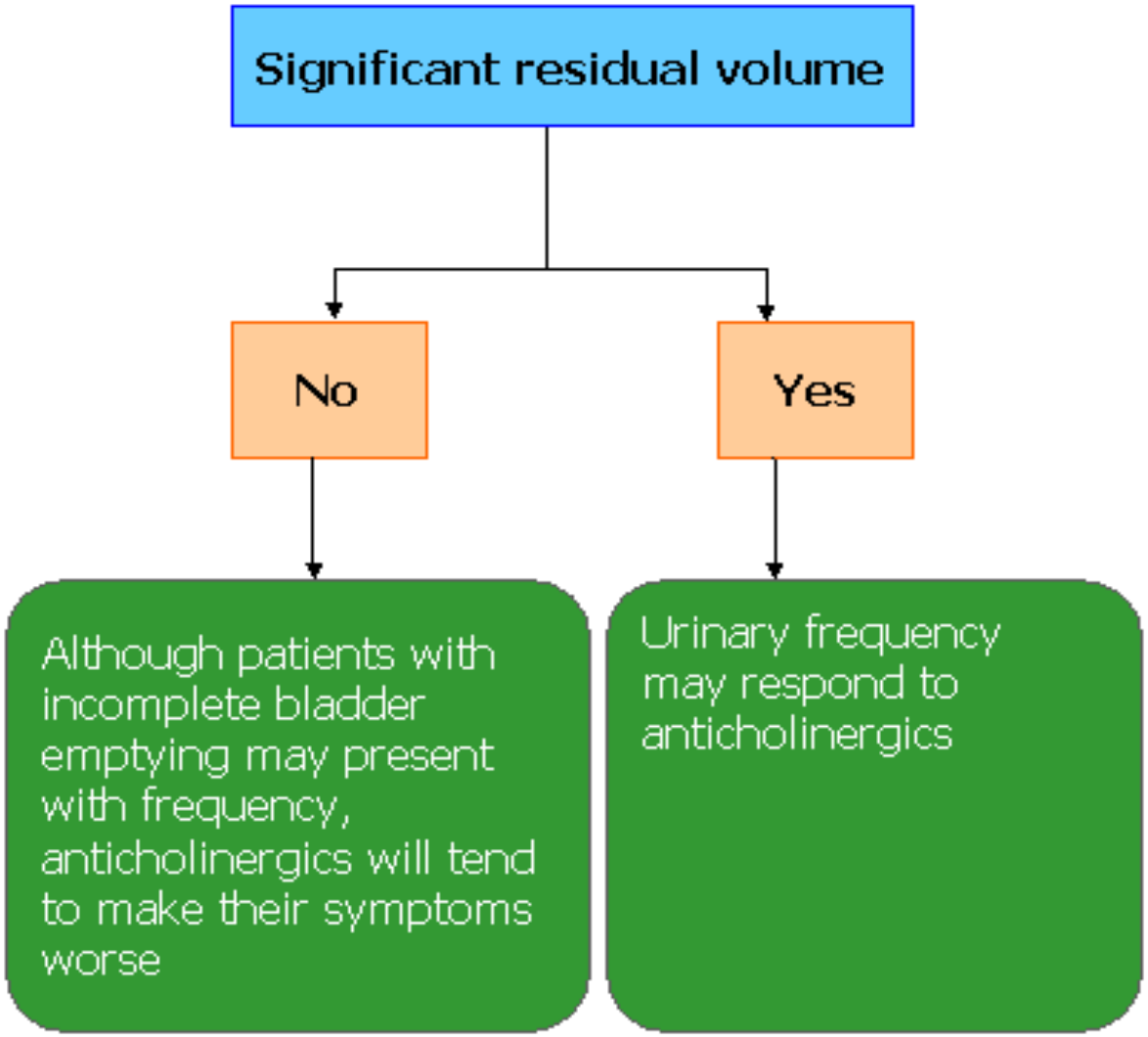
- High dose steroids (don't change overall recovery but can accelerate it) e.g. iv methylprednisolone 1g for 3 days or oral 500mg for 5 days

# DISEASE MODIFYING DRUGS

- 5 "first line"- Avonex, Betaferon, Copaxone, Extavia and Rebif
- 2 licensed "second line"- natalizumab (Tysabri) and fingolimod (Gilenya)
- Criteria:- 2 relapses in 2 years, no substantial progression, able to walk independently
- www.msdecisions.org.uk
- Assess response objectively

# CHRONIC MS SYMPTOMS

- Fatigue (modafinil, amantadine rarely)
- Spasticity (baclofen, gabapentin, Sativex, botox)
- Pain (amitriptyline, gabapentin, pregabalin, physio, exercise)
- Bladder dysfunction (drugs, ISC)


Significant residual volume
No
Yes
Although patients with incomplete bladder emptying may present with frequency, anticholinergics will tend to make their symptoms worse
Urinary frequency may respond to anticholinergics

# CHRONIC MS SYMPTOMS

- Bowel problems  (less of problem, usually constipation)
- Visual problems
- Mood (grief, lability, depression, stress, anxiety) and cognitive (50%, 10% severe) problems
- Speech and swallowing problems (late, severe disease)
- Sexual dysfunction (~50%)

# DEPRESSION

- 50% at some time
- 26% major depression 26-45 age group
- 7.5 x increased risk suicide (esp. young men)
- Treated with medication (usually SSRIs) and psychotherapy, often CBT.

# PROGNOSIS

- Life expectancy ~7 years less on average
- No cure, lifelong diagnosis
- Better prognosis: female, sensory symptoms at onset, optic neuritis onset, mild disability at 5 years, long intervals between relapses

# MULTIDISCIPLINARY TEAM

- Neurologist
- MS specialist nurse
- Physiotherapist
- Occupational therapist
- Continence advisor
- Rehabilitation specialist (e.g. home, wheelchair services, shopmobility, etc.)

# MS SOCIETY

- Information and support
- Grants for short breaks, respite, home adaptations
- Local support and services
- Specialist helpline

# MIND MAP TEMPLATE