Motor Neuron Disease and Oxygen Therapy

This is a disorder with an invariably lethal course that is resistant to all possible forms of therapeutic intervention and evokes many theories. At a microscopic level, several cell systems in different organs seem to be affected in ALS, which lends support to the concept of ALS as a multi system disorder. Neurodegenerative disorders account for an increasing morbidity worldwide.

Motor neurons control muscle movements, breathing, speaking, chewing and swallowing. The upper motor neurons, located in the brain, send nerve impulses to the lower motor neurons in the brain stem and spinal cord.

The single most telling symptoms is not really the weakness of the arms and the legs. For some reason it effects the speech (as in speaking loudly) then followed by a gradual weakening of arms, or legs, whichever, they attack the motor neurons.

Motor Neurone Disease (MND) is a progressive neurodegenerative disease. Degeneration of the motor neurones leads to weakness and wasting of muscles, causing increasing loss of mobility in the limbs, and difficulties with speech, swallowing and breathing. Patients may present with symptoms as diverse as a dragging foot, unilateral muscle wasting in the hands, or slurred speech. Signs and symptoms of ALS are very subtle at the beginning. The condition starts in one part of the body, gradually spreading to other parts until the entire body becomes paralyzed. Initial signs include the weakening of extremities such as the legs and hands, causing clumsiness and instability. People with these symptoms usually trip or fall a lot and often drop things as well. As the disease progresses, symptoms include muscle twitching and cramping, resulting in terrible fatigue. Finally, paralysis sets in, impairing walking, eating, and breathing.
It is important to realise not every symptom you experience will be caused by MND.

Types of Motor Neuron Disease

Progressive muscular atrophy (PMA): this is a less common form of MND and tends to progress more slowly than ALS. People with PMA do not experience muscle spasms. Some people with PMA go on to develop ALS. ALS (amyotrophic lateral sclerosis) is the most common form and accounts for approximately 60% to 70% of all cases.

Progressive bulbar palsy (PBP): this form of MND mainly affects the muscles in the throat, tongue and face and causes difficulties with speech, swallowing, coughing and clearing the throat. PBP can also affect the expression of emotions and people might laugh or cry for no apparent reason. This is called emotional labiality. PBP (progressive bulbar palsy) accounts for about 20% of all cases.

Primary lateral sclerosis (PLS): this is a very rare form of MND in which people experience spasticity but do not experience muscle wasting. PMA (progressive muscular atrophy) accounts for the remaining 10% of cases.

In all three MND forms symptoms are very similar. However, they progress at different speeds. PLS (primary lateral sclerosis) is a very rare form of MND. PLS, unlike the other forms, is not fatal. In some very rare cases, patients with PLS eventually have ALS.

MND can affect patients of any age, but most of them develop the disease and are affected by it after the age of 40 (specifically between the ages of 50 and 70 years). Out of every 10 people with AMD 6 are men and 4 are women.
What are the risk factors for motor neuron disease?

A risk factor is something that increases a person's chances of developing a disease. For example, smoking increases the risk of developing some types of cancer; therefore, smoking is a risk factor for cancer.

Heredity - approximately 1 in every 10 people with ALS in the USA are known to have inherited it from their parents. A child who has a parent with MND has a 50% chance of developing the disease.

Age - after the age of 40 the risk of developing MND rises significantly (but is still very small).

Sex - men are much more likely to develop the disease before the age of 65 than women. After 70 years of age the risk is the same for both sexes.

Where you live - incidence of MND is significantly higher in parts of Japan, West New Guinea and Guam, compared to other parts of the world (even so, the risk is still small in those areas).

Military experience - some studies have suggested that people who are or have been in the military (army, navy, air force, marines) have a higher chance of developing the disease than other people.

Symptoms:

PAIN

PAIN and discomfort are not caused directly by the MND but may have several indirect causes. Your GP should be able to prescribe a suitable painkiller.
Muscle cramps and spasms

May be relieved by changing position when relaxing in a chair or bed alternatively, your doctor may be able to provide a muscle relaxant.

Stiff joints

Can be helped with gentle exercise or using Super Oxygen™

Incontinence

Incontinence may occur if mobility is restricted and getting to the toilet becomes more difficult

Bowel problems

The bowel may become constipated due to restricted mobility and/or changes to diet.

Saliva and mucous

When swallowing becomes a problem an excess of saliva may pool in the mouth, or it may become thick and sticky

Coughing and feeling of choking

These may occur as a result of food or saliva becoming lodged in the airway, a speech therapist can teach you techniques to help manage these episodes.

Breathing
Eventually the breathing muscles will become affected by the MND. When this happens you will need a breathing assessment from a respiratory consultant.

Cognitive changes

Some people living with MND will experience difficulties with memory, learning, language and poor concentration.

What causes motor neurones to die?

Painstaking research has provided evidence of disruption to many processes within the cellular infrastructure of motor neurones and their support cells.

Tests and investigations

When people first notice symptoms developing, they usually visit their GP who can refer them to a neurologist or other specialist. MND cannot be diagnosed with one specific hospital test and doctors will usually carry out a series of tests and investigations. The symptoms of MND are similar to those of other conditions that need to be ruled out as part of the process. The first stages of a diagnosis of MND will involve checking your medical history and carrying out a thorough neurological examination. If the neurologist finds motor neuron signs in at least three regions of the patient’s body a definite MND diagnosis can be made.
Electromyography (EMG)

An EMG examination is used to measure the extent of damage to the motor neurones transmitting messages to a particular muscle. Small needles are used to record the amount of nerve impulse activity in the muscle. A variation of the EMG test called a nerve conduction test can also be used to measure the speed at which messages (nerve impulses) are travelling via nerves to particular muscles. The results are checked for any abnormalities.

An EMG (electromyography) - needles are used to measure the electrical activity in the patient’s muscles. A fine wire electrode is inserted into the muscles that the doctor wants to study - usually muscles from each limb and the bulbar (throat). An instrument records the electrical activity or the muscle while it is resting and contracting. Most patients find this test mildly uncomfortable. Muscles which have lost their nerve supply can be identified because their electrical activity is different from healthy muscle. The EMG may appear as abnormal even if that particular muscle is not yet affected.

A nerve conduction test - measures how fast the nerves can conduct an electrical impulse. Electrodes are attached to the skin above the nerve or muscle that is being studied. A small electric shock is passed through the nerve to measure the strength and velocity of the nerve signals.

Trans cranial magnetic stimulation (TMS)

A TMS examination uses a special magnetic coil to measure motor neurone activity in the brain (the activity of the upper motor neurones). The results are checked for any abnormalities. TMS - the activity of the upper motor neurons is measured using a specially designed magnetic coil. This procedure may be carried out at the same time as a nerve conduction test.
Spinal tap (lumbar puncture) - the aim here is to analyze the cerebrospinal fluid; the fluid that surrounds the brain and spinal cord. Patients lie on their side with knees drawn up to the chest. A local anaesthetic is injected into the area where the spinal tap occurs. A needle is then inserted into the spinal canal and some fluid is collected.

Muscle biopsy - if the doctor thinks the patient may have a muscle disease, rather than MND, a muscle biopsy may be performed. A small portion of muscle is removed. The patient receives a local anaesthetic beforehand. The muscle sample is sent to the laboratory for analysis.

More recent evidence indicates that the nervous system's immune cells, microglia, are heavily involved in the later stages of the disease. What is clear, however, is that severe damage to motor neurons is caused by the action of free radicals and clogged mitochondria.

MRI scan

An MRI scan (Magnetic Resonance Imaging scan) produces detailed pictures of the brain and spinal cord using strong magnetic fields and radio waves. The scan cannot confirm whether you have MND but it can help doctors rule out other conditions which could potentially be causing your symptoms. An MRI (magnetic resonance imaging) scan - radio waves and a powerful magnetic field produce detailed images of the brain and spinal cord on a monitor. The patient lies on a movable bed that slides into a tube-shaped machine. When the machine is switched on and the patient is inside he/she will hear loud thumping and banging noises - this is normal. An MRI scan will not diagnose MND - damage caused by MND does not show up on an MRI. However, it is a useful test in ruling out damage caused by other conditions and diseases which do show up, such as stroke, Alzheimer's disease, Parkinson's disease, and others.

Blood tests
Blood tests cannot confirm whether you have MND but they are carried out to rule out other conditions that might be causing your symptoms, such as kidney or liver disease, problems with the thyroid gland, or inflammatory conditions such as lupus. A blood test can also determine whether there is any rise in creatinine kinase, which can sometimes be found in the blood of patients with MND. Creatinine kinase is not specific for MND and may also be an indicator of some other medical condition. Creatinine kinase is produced when muscle breaks down.

What are the treatments?

Unfortunately, there is no cure for MND. However, there are different treatments available. Some aim to slow the progress of the condition and others aim to treat your specific symptoms and improve your quality of life.

Alternative treatments, also known as unproven treatments, may appear to offer some hope. Those offering these treatments suggest that they will work better than Riluzole, claiming that they can cure MND or significantly slow disease progression. Examples of unproven treatments include: stem cell therapy, snake venom treatment and 'detox' regimes. Spinal cord ischemia sometimes causes paraplegia because the spinal motor neuron cells are vulnerable to ischemia. Although various protective remedies for spinal cord injury have been reported, there have been few established clinical methods. Although hyperbaric oxygen (HBO) has been used clinically as a treatment for ischemia, the reason for its effectiveness is still uncertain because sufficient experimental data are lacking.
Scientists are not sure why motor neurons start to lose function. They believe several inter-related factors cause MND, including:

**Excess glutamate** - glutamate is a neurotransmitter, a messenger chemical that transmits data from cell-to-cell. Some studies indicate that people with MND have too much glutamate. Abnormally high levels of glutamate may be toxic and could lead to a disturbance in the chemical communication required for good nerve function.

**Cell metabolism** - transport systems exist in all cells that bring nutrients and chemical components into the cell, while at the same time moving waste products out. Scientists say there are indications that these transport systems are disturbed in the motor neurons during the initial stages of MND., resulting in poor nerve function.

**Aggregates** - unusual clumps of protein molecules have been found to accumulate in the motor neurons of MND patients. Scientists believe these aggregates undermine the normal functioning of motor neurons.

**Lack of antioxidant production** - research indicates that the motor neurons of patients with MND do not produce enough antioxidants to neutralize the free radicals that emerge as a natural by-product of cell activity. Oxygen free radicals are a type of toxic waste cells produce - antioxidants mop them up.

**Mitochondria of motor neurons** - research has found that the mitochondria of motor neuron cells of people with MND appear to be abnormal. Mitochondria provide the energy cells need to carry out their normal function - they are normal structures responsible for energy production in cells.
Neurotropic factors - these are molecules, usually proteins, that facilitate the growth or repair of nerve cells. It has been found that neurotropic factors are not produced properly in patients with MND, making the motor neurons more susceptible to damage.

Glia cells - these cells surround neurons and provide support for them and insulation between them. They also provide motor neurons with nutrients and relay data from one cell to another. In some cases, problems with glia cells can affect the motor neurons.

A new study out of Boston University and the Veterans Administration, published in the Journal of Neuropathology & Experimental Neurology, offers "the first pathological evidence that repetitive head trauma experienced in collision sports might be associated with the development of a motor neuron disease." The same kinds of head trauma have become the signature injury of troops in Iraq and Afghanistan. Resulting memory problems may be misdiagnosed as Alzheimer's disease as well.

Alan Schwarz of the New York Times provides a winning overview of the paper and Gehrig's famous battle with the disease - Which raises the question: If hyperbaric oxygen therapy is proven efficacious in the treatment of traumatic brain injury (TBI), may we then assume it works for ALS, too?

There Is Hope....
But there is hope. New findings in neuroscience prove that the brain continues to develop new neurons throughout life, that the brain can grow new connections, and that with proper treatment the seemingly intractable cases of brain injury can improve remarkably. One treatment that has proven quite effective is Hyperbaric Oxygen Therapy - a treatment in which patients breathe pure oxygen inside a special chamber with a slightly increased amount of atmospheric pressure (less pressure than an airplane). In many cases those who suffer from various conditions show great improvement in speech, memory, social and cognitive abilities after undergoing a series of hyperbaric oxygen treatments or using Super Oxygen™

Extra blood supply over a period of time means you build new neuron connections. For example, when the blood is well oxygenated, the haemoglobin makes the skin appear pinkish. When the blood is not well oxygenated, the haemoglobin is darker and the skin appears bluish (cyanosis).

The National Institute of Health announced that work on canaries and gorillas showed that neurons could indeed regenerate, although no one knew how. It has been hoped that stem cells might be the answer. Perhaps that will prove to be true, but we already know that Oxygen Therapy can bring about the recovery of idling neurons and cause neural pathways to regenerate. Most Physicians has never heard of these breakthroughs. Oxygen Therapy has also been called the Cinderella of modern medicine.