Recent developments in our understanding of the cellular and molecular basis for MND and Spinal Muscular Atrophy are, for the first time in history, giving real hope that a cure for these devastating diseases can be found within the next 10 years. Please join the researchers in Oxford in this quest.

Christopher Kennard, Professor of Clinical Neurology
The thousands of people diagnosed with Motor Neuron Disease (MND) every year face the stark reality that there is no treatment and premature death within two to five years is inevitable. For them and their families, there is no hope of recovery.

At Oxford, we have one of Europe’s leading MND clinics and research teams, led by Kevin Talbot, Professor of Motor Neuron Biology and founder of the Oxford MND Care and Research Centre. Professor Talbot (pictured, left) is an Honorary Consultant Neurologist at the John Radcliffe Hospital in Oxford. Professor Talbot works with Professor Dame Kay Davies, the world-renowned geneticist. In the 1980s, her group developed the groundbreaking test for screening of foetuses whose mothers have a high risk of carrying muscular dystrophy.

Unlike most other research groups, our MND team is also working on Spinal Muscular Atrophy (SMA) – a form of MND which affects babies and children. We believe increasing our understanding of the cellular and molecular causes of each disease will inform the other.

Both of these dreadful diseases occur when motor neurons become unhealthy and die, causing communication between the brain and muscles to break down. Work in Oxford investigates what causes motor neurons to die and how we can stop this. We also need to be able to diagnose MND much earlier than is the case today, so that any treatments we develop can lead to material improvements in the quality and length of life. Damage to motor neurons is irreversible and it is imperative that diagnosis is as early as possible.

This work is groundbreaking and vital. We are seeking £2 million in philanthropic support. This will fund Professor Talbot’s post for 10 years, establish a new lecturership and contribute towards essential upgrading of our laboratory facilities.

We are delighted that the Motor Neurone Disease Association – the UK’s leading MND Charity – is supporting this appeal with a gift of £500,000. In addition, the SMA Trust, the only UK charity dedicated to funding SMA research, has made a gift of £100,000.

Our vision is that MND will cease to be a disease with no hope and that we will be able to offer patients a real prospect of a cure. Please give hope by supporting this appeal.

Summary

The thousands of people diagnosed with Motor Neuron Disease (MND) every year face the stark reality that there is no treatment and premature death within two to five years is inevitable. For them and their families, there is no hope of recovery.

At Oxford, we have one of Europe’s leading MND clinics and research teams, led by Kevin Talbot, Professor of Motor Neuron Biology and founder of the Oxford MND Care and Research Centre. Professor Talbot (pictured, left) is an Honorary Consultant Neurologist at the John Radcliffe Hospital in Oxford. Professor Talbot works with Professor Dame Kay Davies, the world-renowned geneticist. In the 1980s, her group developed the groundbreaking test for screening of foetuses whose mothers have a high risk of carrying muscular dystrophy.

Unlike most other research groups, our MND team is also working on Spinal Muscular Atrophy (SMA) – a form of MND which affects babies and children. We believe increasing our understanding of the cellular and molecular causes of each disease will inform the other.

Both of these dreadful diseases occur when motor neurons become unhealthy and die, causing communication between the brain and muscles to break down. Work in Oxford investigates what causes motor neurons to die and how we can stop this. We also need to be able to diagnose MND much earlier than is the case today, so that any treatments we develop can lead to material improvements in the quality and length of life. Damage to motor neurons is irreversible and it is imperative that diagnosis is as early as possible.

This work is groundbreaking and vital. We are seeking £2 million in philanthropic support. This will fund Professor Talbot’s post for 10 years, establish a new lecturership and contribute towards essential upgrading of our laboratory facilities.

We are delighted that the Motor Neurone Disease Association – the UK’s leading MND Charity – is supporting this appeal with a gift of £500,000. In addition, the SMA Trust, the only UK charity dedicated to funding SMA research, has made a gift of £100,000.

Our vision is that MND will cease to be a disease with no hope and that we will be able to offer patients a real prospect of a cure. Please give hope by supporting this appeal.
The most common neuromuscular disorder is MND (also known as Amyotrophic Lateral Sclerosis or Lou Gehrig’s Disease). Half of all patients with MND die within two years of diagnosis and only 10 per cent survive beyond five years. In the UK in 2008, 1,956 people died of MND. Today, there are some 5,000 people living with MND in the UK and as many as 30,000 in the USA. MND occurs throughout the world without any racial, ethnic or socioeconomic boundaries.

MND is a relentlessly progressive condition of the brain and spinal cord which leads to muscle weakness because the cells that provide the crucial signal for muscle activity – the motor neurons – degenerate and die. MND affects mobility, speech and swallowing and in all cases results in premature death. For most forms of cancer, there are now treatments available which can lead to initial remission, improvement of symptoms and even a cure. Patients with MND face the reality that there are no drugs to slow the disease and that loss of independence and premature death is inevitable.

Spinal Muscular Atrophy (SMA), the childhood onset form of motor neuron degeneration, is the most common inherited neurological cause of infant death, with half of the most severe cases dying by the age of two. Children with a less severe form of SMA face the prospect of progressive muscle wasting, loss of mobility and motor function. But their brains are unaffected, resulting in bright, intelligent children with minds trapped in remorselessly dying bodies. Many will live long but disabled lives. One in 40 people are carriers of the SMA gene and, at any one time, there are around 6,000 people in the UK living with SMA.

Until recently, we have had a very limited understanding of why motor neurons are vulnerable to degeneration. In the case of MND, it is now clear that there is no single cause which explains all cases. Clinical research shows that in some patients it is genetic mutations, in some patients environmental factors may play a role, and in some cases a mix of both. Unravelling this complex spectrum of causes will require more time and research resources.

Conversely, SMA is caused by disruption to a single inherited gene and this offers the tantalising possibility of developing drugs to counter the effect of loss of this gene, so that the progression of SMA is slowed or stopped altogether. This may also help us develop treatments for some MND patients.

Left: A device to assist MND patients with eating.
The Oxford MND Care and Research Centre

The Oxford MND Care and Research Centre is one of the largest clinics in Europe and is one of very few centres in the world where the research is led by the clinicians seeing the patients. Recognised as a flagship centre by the Motor Neurone Disease Association, around 140 new patients are referred to Oxford each year from all over southern England. For information about the Centre, see: http://oxfordmnd.clneuro.ox.ac.uk.

The Centre’s globally recognised programme in neuromuscular research, set within the University’s biomedical campus and Oxford’s main hospital, draws together world-leading researchers of genetics, cellular and molecular biology, modelling, imaging and neurophysiology. Additionally, it has one of the world’s largest brain banks donated by MND patients, allowing us to study changes in the brain and understand better why cells are dying. This truly multidisciplinary approach distinguishes Oxford as pioneers in this field.

The lack of progress in developing effective treatments for MND and SMA is a reflection of the enormous complexity of the nervous system. However, our study of the function of the defective genes of a minority of MND patients, revealed following research at Oxford and elsewhere, is establishing which processes we need to target to protect motor neurons from degeneration. By investigating what is happening at a cellular and molecular level, we can determine how to intervene with drugs to stop these processes, thus slowing the progression of MND.

The Centre’s combined approach to MND and SMA research is unique in the UK. We are using cell and mouse models based on genetic variations found in MND patients to develop our understanding of the biochemical processes that lead to motor neuron degeneration and to develop and test potential new drugs to stop or change these processes. Through this research, we are also identifying processes that might be common to many MND patients as this will give us an opportunity to develop treatments that could benefit them all.

Another important aspect of our research is to identify unique biochemical features (known as biomarkers) that identify MND and can be used to measure its progression and to assess the impact of drug treatments. Not only will this help earlier diagnosis, but these biomarkers are also critical to drug development – without them, we have no way of measuring if a drug is effective other than through muscle strength and survival, which may seriously underestimate the therapeutic value.

Initial research has yet to lead to improvements in survival rates for MND patients, but we are confident that, with time and resources, we can make a difference to the lives of those living with MND and SMA.
Developing treatments and finding a cure

Our vision is that MND will cease to become a disease with no hope and that we will be able to offer patients a real prospect of a cure. To achieve this ambitious goal, researchers need a better understanding of the disease at every level.

- **Why are motor neurons vulnerable to degeneration?**
  Oxford’s basic science programme is using cutting-edge genetic technologies to create new mouse models of MND which better reflect the human disease. In parallel, we are developing techniques to study motor neurons made from stem cells derived from the skin of patients with MND. For the first time, this will allow us to study the cells which are actually targeted by the disease. Understanding what triggers motor neuron death gives us the best chance of designing new treatments that really work.

- **How can we diagnose the disease at an earlier stage?**
  In order for treatments to work, we must apply them at the earliest possible stage. At Oxford, we continue to identify new biomarkers of the disease to improve early diagnosis and measure the effects of any new therapies.

- **How can we understand how the disease varies from one person to another?**
  The variation in disease severity between patients and how these relate to the response to drugs and other treatments will give us important clues as to which therapies work most effectively. As one of the largest MND centres in the country, Oxford is uniquely placed to take a national and international lead in this area.

Our £2 million appeal will provide financial security for our research for the next 10 years. The tremendous growth in neuromuscular research in Oxford in the last decade has been based on short-term funding to individual researchers. In order to ensure that what has been achieved so far is sustainable and can be translated into advances in therapy, we need financial security. This has never been more important, as the budget for UK Government funding for medical research faces very considerable pressure over the next few years.
Medical research at Oxford

Ever since we discovered how blood is supplied to the brain in 1664, the University of Oxford has consistently been at the forefront of innovative and life-saving science.

Some of our most important achievements include:

- The development of penicillin in 1941, which saved the lives of many wounded soldiers during World War II and launched the modern era of antibiotics that we now take for granted.
- The confirmation of the link between smoking and cancer, which led to an increased understanding of how lifestyle choices impact on health, changing the lives of millions.
- The discovery of cell fusion – how to join cells together – which enabled the mass production of antibodies for treating diseases like cancer and HIV/AIDS.

Today, the pursuit of scientific discoveries and their rapid translation into treatments are still the twin aims of our medical research. We focus on maintaining and building our traditional strength and depth in sciences while investing in translational research centres that enable us to transfer scientific discoveries into clinical practice and encourage multidisciplinary approaches to clinical questions.

Our world-leading programmes are housed in state-of-the-art facilities and cover the full range of scientific endeavour, from genes and molecules to systems and populations. Our broad research themes include: cancer; cardiovascular science; diabetes, endocrinology and metabolism; infection and immunology; musculoskeletal science; neuroscience; and reproduction and development.

The needs of the patient are at the heart of all our research as we seek to improve diagnosis, treatment and care. We work in close collaboration with our National Health Service partners in the UK and with many scientists and clinicians in Africa and Asia as we strive to address the most pressing health problems facing mankind.
Benefactor recognition and involvement

Oxford would not exist without the vision and generosity of its donors. Our unbroken tradition of learning and discovery has been maintained through strong relationships with individuals and organisations who share our commitment to advancing knowledge. These relationships are increasingly important in today’s volatile funding environment.

We are delighted to recognise and celebrate benefactions and we welcome discussing with you ways in which you could develop a lasting and rewarding relationship with the University.

The Chancellor’s Court of Benefactors is the University’s most prestigious donor recognition society. It recognises benefactions which cumulatively total more than £1.5 million by an individual or £3 million by an organisation. The Court meets annually in Oxford for the formal ceremony of admission and provides an opportunity to engage with the Chancellor, Vice-Chancellor, Heads of House and senior academics. Members are invited to private events throughout the year.

The Vice-Chancellor’s Circle recognises benefactors who have provided generous support of between £250,000 and £1.5 million, cumulatively. In addition to receiving regular communications from the Vice-Chancellor and senior University officers, members are invited to an annual meeting of the Vice-Chancellor’s Circle.

In addition, the University hosts special events throughout the year to which we invite our friends and supporters. One such event is the Oxford versus Cambridge Boat Race, which draws millions of viewers from around the world. Guests are invited to watch the race from a private cruise liner with senior University officers, moored in London by the starting line. Benefactors may also be invited to Encaenia, the annual ceremony where honorary degrees are awarded. Held in the Sheldonian Theatre since 1670, it provides the opportunity to meet senior University officers, other donors and the honorands.
Contact details

For further information, please contact:

**Professor Chris Kennard**
Professor of Clinical Neurology
Head of Department
Nuffield Department of Clinical Neurosciences
University of Oxford
Level 6, West Wing
John Radcliffe Hospital
Oxford OX3 9DU
United Kingdom
T: +44 (0)1865 234633
E: chris.kennard@clneuro.ox.ac.uk
http://oxfordmnd.clneuro.ox.ac.uk

**Diana Stent**
Head of Development – Medical Sciences
University of Oxford Development Office
University Offices
Wellington Square
Oxford OX1 2JD
United Kingdom
T: +44 (0) 1865 611535
E: diana.stent@devoff.ox.ac.uk
www.campaign.ox.ac.uk/medicine