Rare Disease research: a personal journey

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29.10.2014, Let’s talk about disability, Royal Holloway
a disclaimer ...
What is he talking about???

- What is a rare disease?
- Are all genetic mutations really bad?
- Why is there a Rare Disease Day?
- Why do we have an event at Royal Holloway?
- Talking politics...
- ...and art
- A note on commitment...and determination
What is a Rare Disease?

In Europe, a disease is rare if fewer than 1 in 2,000 people are affected...

...6,000-8,000 rare diseases, 6% of people, 20% of Health budget...

...75% of rare diseases affect children and 30% of rare disease patients will die before their 5th birthday...

...but most of us just do not know about it.
Most Rare Diseases are genetic...
Genes store the info to make proteins

normal gene

normal protein

mutant gene

abnormal protein or no protein
Are all genetic mutations really bad?
Some are irrelevant, others minor...
But it can be very different...

Spinal Muscular Atrophy
and not just for the patients

Disabled children 'murders' - what is spinal muscular atrophy?

The three young children suffered from a genetic neuromuscular disease that limits physical abilities, such as moving, walking and breathing.

Gary Clasen with his twin boys, who were suffering from spinal muscular atrophy

By James Edgar
6:00PM BST 23 Apr 2014

Spinal muscular atrophy (SMA) is a genetic neuromuscular disease that
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...but most of us just do not know about it.
The importance of awareness, diagnostics and coordinated care

Diagnosis can take 5 years or longer
- Lack of awareness among professionals
- Lack of validated diagnostic tests

Care at Centres of excellence that should:
- Coordinate care
- Have adequate caseload for expertise
- Not depend on a single clinician
- Arrange for transition from children’s to adults’ services
- Engage with people with rare conditions and their families
- Be research active
- Educate and train medical professionals
- Be members of international networks of excellence.

“Join together for better care”
80% of rare diseases are inherited...

...many are potentially amenable to genetic and stem cell therapies...

...and Holloway has an international reputation in this field of regenerative medicine
Is there hope? - Research

Successes in gene therapy clinical trials:
• Several Immunodeficiencies
• X-linked Adrenoleukodystrophy
• Haemophilia B
• Graft versus host disease...

First licensed gene therapy medicinal product in EU:
• Glybera, for lipoprotein lipase deficiency, October 2012

International Rare Disease Research Consortium (IRDiRC), goals for 2020:
• Diagnostics for most rare diseases
• Cure for 200
EUROPLAN:

- Since 2008 rare diseases are a priority area for action in EU Public Health Programmes

UK Royal College of General Practitioners:

- Rare Diseases are a clinical priority (2012-2015)
- “This programme focuses initially on Motor Neurone Disease but it will provide generic tools and learning across the spectrum of Rare Diseases.”

UK strategy for rare diseases (November 2013)

- “The UK Strategy aims to ensure no one gets left behind just because they have a rare disease…”
Pricing:
- £1,000,000 for one-off therapy?
- Generic drugs have become much more expensive when applied to “Orphan diseases”

Research Funding in the UK:
- Highly skewed towards genomic sequencing
- Unsupportive of E-rare (http://www.erare.eu/)
- Case in point: Number of Rare Diseases _versus_ Number of Diseases screened for in newborns
Is it all rosy? – Newborn Screening Programme

Welcome to the NHS Newborn Blood Spot Screening Programme

Revised CHT preterm repeat policy
Find out more about the revised policy for CHT screening in preterm infants. The policy was implemented in all four UK countries on 1 April 2012.

LATEST NEWS
24/10/14 2012-13 blood spot data analysis report published
17/10/14 Screening of individuals with uncertain or incomplete screening status
13/10/14 October SCT newsletter published
02/10/14 UK NSC screening policy 2012/13 summary report published

QUICK LINKS
For the public: Sickle cell disease (SCD) | Cystic fibrosis (CF) | Congenital hypothyroidism (CHT) | Inherited metabolic diseases (IMDs) | Information leaflets | What is a blood spot test for? | Parents' screening stories |

For professionals: Education and training | Standards | Revised CHT policy | Blood spot sampling guidelines

http://newbornbloodspot.screening.nhs.uk/
Is it all rosy? – Newborn Screening: 5 + 4 diseases!

http://newbornbloodspot.screening.nhs.uk/screening
Is it all rosy? – European consortia are critical for (my) research
Is it all rosy? – UK Government does not fund E-Rare participation

http://www.erare.eu/
The Department of Health through the National Institute for Health Research (NIHR) recognises the importance of collaboration in rare disease research. However, the NIHR does not contribute funding to European Union medical research initiatives. The NIHR works to fund and support research within the NHS in England.

I hope this clarifies the position of the NIHR.

Yours sincerely,

Liberty

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We need therapies!

and Europe-wide/worldwide efforts!
Gene and Stem Cell Therapy at RHUL
Spinal Muscular Atrophy
Severe Combined Immunodeficiency
Parkinson Disease
Spinal injury
Muscular Dystrophy
Motor Neuron Disease (ALS)
Anti-Bacterials / Virals
Yáñez lab: Developing safer gene therapy methods

Episomal vectors

Genome editing
Viruses are gene carriers

(http://biology.kenyon.edu/slonec/gene-web/Lentiviral/Lentiviz.html)
Ramiya Lakshman

'I Am only Existing. I want to Live.' (2012)

_Gouache and Pen on Paper_

“Title taken from the words of my dad before he lost his speech (diagnosed with MND 5 years ago)”
Rare Disease Day and Art – From beautiful drawing to lab logo
The best at the hardest times: commitment of RD community

Royal Holloway to develop pioneering treatment for spinal cord injury

Dr. Robert Yelle-Vuiz, from the School of Biological Sciences at Royal Holloway, University of London, is leading a team of researchers working to develop a novel treatment for spinal cord injury, which leaves sufferers with devastating lifelong effects including paralysis.

Dr. Yelle-Vuiz, together with colleagues from King's College London, Cambridge University, and the National Institute for Neurosciences has secured in excess of £3.0 million from the International Spinal Research Trust (ISRT) for the pioneering CHIRICAT project.

Spinal cord injury (SCI) leads to the permanent loss of neurological function, often with a lifetime of high dependence care with incapacitating physical and emotional costs to the patient and their family.

More than 220,000 people are affected by SCI worldwide and with more than 100,000 new cases each year and patients now living near full-time expectancy, SCI represents a significant and increasing problem to health care and society.

Dr. Yelle-Vuiz said: "There are currently no therapies for SCI, with current treatment options limited to relieving secondary complications and maximising muscle function, we are very excited to contribute our expertise and be involved with this excellent consortium of scientists to help make a real difference to the quality of life for millions of SCI sufferers."

The project aims to develop an engineered form of chondrocyte, a natural tissue, as a clinical therapy for SCI. Chondrocytes have been found to be one of the most promising therapeutic strategies emerging from preclinical studies. Patients with SCI are protected from recovery by the presence of scar tissue. Chondrocytes efficiently replace scar tissue and has been shown to increase regeneration, plasticity and recovery of function in several mammalian models.

Chondrocyte tissue has huge potential for translation to a clinical therapy. However, the delivery of chondrocytes to the injury site needs to be achieved. Overcoming this technical hurdle is critical for the path to the clinic – something which this project addresses.

Dr. Mark Bacon, Executive and Scientific Director commented: “Spinal Research are proud to be supporting this important ground-breaking work. The researchers possess world-class facilities in the UK who have made impressive progress already. Collaborative research is vital to the successful translation of discovery science into the clinic and the group are proving how it can be done.”

Academics from the School of Biological Sciences at Royal Holloway continue to create new ground with their research into new and improved treatments and cures for a multitude of conditions including Duchenne Muscular Dystrophy, Epilepsy and Tuberculosis.

https://www.royalholloway.ac.uk/aboutus/newsandevents/news/newsarticles/royalhollowaytodeveloppioneeringtreatmentforspinalcordinjury.aspx
“Can do” people...
Advanced Gene and Cell Therapy Lab-2014

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