Gene Therapy

Editorial for February 2017 issue

10 years of *Rare Disease Day*

*Rafael J. Yáñez-Muñoz**

SUMMARY

Rare Disease Day is a global awareness day celebrated on the last day of February each year, which in 2017 reaches its 10th anniversary. The Day aims to make the general public, stakeholders and decision-makers aware of these 6-8,000 diseases, which are mostly inherited, affect 6% of the population and consume a disproportionate part of Health budgets. Advanced gene and cell therapies have provided the first treatments for these diseases, albeit priced at very high levels, and will undoubtedly provide further therapies for many rare diseases. Successful clinical development of potential treatments requires involvement of all stakeholders to deliver effective, safe and affordable treatments in a form that is acceptable to the people affected.

MAIN TEXT

I find it very fitting that my first editorial for *Gene Therapy*, following my recent appointment as Editor-in-Chief**, is on the topic of *Rare Disease Day* (RDD). Rare diseases fall squarely within the remit of gene and cell therapies, and are at the core of my research interests (see http://agctlab.org).

A disease is defined as rare if it affects fewer than 1:2,000 people (in the EU) or fewer than 200,000 US Americans at any given time. There are 5-8,000 rare diseases, of which about 80% are genetic. Taken together, they affect 6% of the world's population and take a disproportionate share of the Health budget, estimated at 20%. Half or more of rare diseases affect children, and 30% of people with a rare disease will die before their 5th birthday. In some rare diseases only a handful of individuals are known to be affected, while in other disorders it can be hundreds of thousands. It is not unusual for diagnosis to take five years, and in many cases the person remains undiagnosed because the disease may not have been characterised, being part of the group so-called SWAN (Syndromes Without A Name). Rare diseases have a tremendous human, social and financial cost.

All these figures are important, but sometimes they fail to convey the message. When I do outreach talks on rare diseases, I typically use two examples to try to illustrate how common rare diseases are, and how many rare diseases there are. 6% of people being affected means that in your street, on the train that you use for your daily commute, in your child's school, at the gym where you train, there will be several people affected. At the universities or research organisations where we teach and research, hundreds of people will be affected. If you look around yourself, you may see them, giving an example of endurance and determination in their struggle with daily activities that we take for granted. And often, with a smile on their faces (see *Same but Different* at http://www.samebutdifferentcic.org.uk). My second example is the length

of time it may take to read out loud the list of names of the known rare diseases: I estimate it at 12 hours.

Rare Disease Day is a global awareness day coordinated by EURORDIS, a non-governmental alliance of patient organisations and individuals active in the field of rare diseases, dedicated to improving the quality of life of all people living with rare diseases in Europe. RDD is celebrated on the last day of February because in a leap year it falls on a rare day, February the 29th. As I write these words, events planned in 51 countries are showcased at RDD's homepage, http://www.rarediseaseday.org. The main objective is to raise awareness amongst the general public and decision-makers about rare diseases and their impact on patients' lives. Policy makers, public authorities, industry representatives, researchers, health professionals and anyone who has a genuine interest in rare diseases can be involved.

This year marks the 10th anniversary of RDD. These 10 years have been intense, exciting and full of milestones, but we are only just beginning to deliver the promise of genetics and stem cell research. The market approval of *H101* (an oncolytic adenovirus) in China in 2005 was followed in this decade by those of *Glybera* (adeno-associated virus vector, approved in 2012 but used only once) and *Strimvelis* (retroviral vector) in the EU, and *Eteplirsen* and *Spinraza* (antisense oligonucleotides) in the US. The only product currently approved in both EU and US is *Imlygic* (oncolytic HSV-1). Some of these approvals were controversial, as are their huge price tags. On the research front the development of human induced pluripotent stem cells and CRISPR/Cas genome editing technology have been tremendous advances, quickly progressing towards clinical development. In 2011 the *International Rare Diseases Research Consortium* (IRDiRC) was launched, with the ambitious goals of, by 2020, developing new treatments for 200 rare diseases and diagnostics for most of them. Repurposing of existing drugs for application to rare diseases has been quite successful, providing some treatments in record time. Politically, in Europe since 2008 rare diseases are a priority area for action in Public Health Programmes, and national strategies have been produced.

Most of these developments are very encouraging but much remains to be done. Learning from painful experience, we must ensure that all stakeholders of relevance, from patients, their families and associations to other funders, researchers, pharmaceutical and ancillary companies, clinical community and political authorities work in a coordinated manner to deliver effective, safe and affordable treatments for rare diseases. There is plenty of work to be done, and much to learn in the process – normal day at the office for us.

* Rafael J. Yáñez-Muñoz is a *Reader in Advanced Therapy* and *Director of Planning and Resources* at the *School of Biological Sciences*, *Royal Holloway, University of London*, UK (http://www.royalholloway.ac.uk). Rafael received his PhD and BSc in *Biochemistry and Molecular Biology* from the *Autonomous University of Madrid*, Spain. He leads the *Advanced Gene and Cell Therapy lab* (http://AGCTlab.org) at Royal Holloway. Rafael is a member of the Board of the *British Society for Gene and Cell Therapy* (http://www.bsgct.org) and currently its Treasurer. He believes it is very important to engage with the wider society, is a trustee of the *Genetic Alliance UK* (http://www.geneticalliance.org.uk) and organises a yearly outreach event on *Rare Disease Day* (http://www.royalholloway.ac.uk/rdd). He is delighted to have been appointed as Editor-in-Chief of *Gene Therapy* and will set out his vision for the journal in an editorial to be published on 20th April, in a special issue devoted to *Spinraza* and more generally

to the importance of involving all stakeholders for the successful development and marketing of advanced therapies.

** The outgoing Editors Joe Glorioso and Nick Lemoine, who have steered *Gene Therapy* for the last two decades and cemented the journal's excellent reputation, formally stepped down last December but have very kindly provided a smooth transition for the incoming Editor-in-Chief. Joe and Nick will write a farewell editorial to be included in the *Spinraza* special issue next April. Rafael wants to acknowledge their outstanding mentoring and on-going support, and on behalf of the journal, thank them for their leadership and contributions.