Royal College of Physicians

Dr Adrian Woolfson' Biography

Adrian Woolfson was educated at King's College, London where he was awarded the Jelf Medal, Balliol College Oxford, and Gonville and Caius College Cambridge. His clinical medical training was completed at the John Radcliffe Hospital in Oxford, and his post-graduate training at Addenbrooke's hospital in Cambridge. He was the Charles and Katherine Darwin Research Fellow at Darwin College Cambridge, and a Wellcome Trust Research Fellow at the MRC Laboratory of Molecular Biology in Cambridge. His undergraduate work on pneumococcal resistance in Zambia helped change WHO antibiotic policy in sub-Saharan Africa.

His doctoral thesis 'Natural and Artificial Forms of Human CD1 Genes' and post-doctoral fellowship was supervised by Nobel Prize-winner and inventor of monoclonal antibodies César Milstein. This led to the first demonstration that protein aggregation in the cells of patients with Huntington's disease is directly causal to the pathology. In collaboration with Professor Vincent Cerundolo in Oxford, he published the first synthesis of CD1 tetramers. His work with Milstein and Sir Alan Fersht at the Centre for Protein Engineering in Cambridge led to the patenting of a novel method for refolding proteins. His work with Milstein on soluble CD antigens led to the development of a diagnostic blood test for Tuberculosis.

He is currently Senior Director and Global Clinical Lead of Early and Late Stage Immuno-Oncology/ Hematology at Pfizer Inc, based at their Global Headquarters in New York. He was previously Global Medical Lead at Bristol-Myers Squibb in Princeton, New Jersey. He is the author of *Life Without Genes: The History and Future of Genomes* (HarperCollins/ Flamingo), *An Intelligent Person's Guide to Genetics* (Duckworth), and a contributor to: *The Wall Street Journal*, *The Financial Times*, *Spectator*, *Prospect Magazine*, *The Literary Review*, *The Sunday Telegraph*, *The Times Literary Supplement*, *Evening Standard*, *London Review of Books*, *Science*, and *Nature*.

Presentation Blurb

The history of medicine has reached a pivotal moment, where we may now reasonably contemplate the possibility of repairing and replacing abnormal human genes. This dramatic development is the result of remarkable advances in the technologies available for manipulating the human genome. Whereas earlier technologies such as zinc finger nucleases offered the possibility of editing human genes, more recent methods such as CRISPR and base editing have democratized gene editing, making it faster, cheaper, and easier to perform. Whereas such approaches are likely to work well for monogeneic diseases such as hemophilia and the hemoglobinopathies, they are unlikely to have a significant impact on polygenic diseases. The interconnectivity of gene circuits, the result of the haphazard manner in which evolution has constructed metabolic pathways, and the fact that many proteins perform more than one function, may comprise a fundamental constraint to the effectiveness of gene editing as a therapeutic strategy. It may be that the only way to treat polygenic diseases at the genomic level is through a fundamental overhaul of the human genome through synthetic redesign. Recent successes with the artificial synthesis of yeast chromosomes suggest that this is achievable.