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The Challenge of Longevity Risk

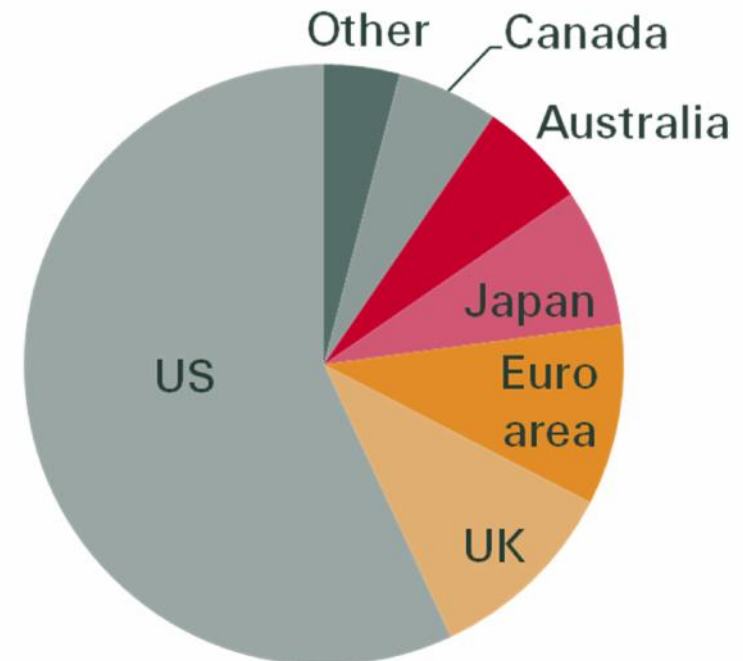
Nardeep Sangha

Global longevity risk is a huge issue

- Global longevity exposure estimated to be approx USD 20 trillion of pension assets
- 90% of exposure related to pension funds, and 10% pension insurance contracts
- Insurers' exposure dominated by markets with compulsory annuitisation
- Corporate sponsors exposed to defined benefit pension schemes
- Governments committed to fund old-age pension/health benefits



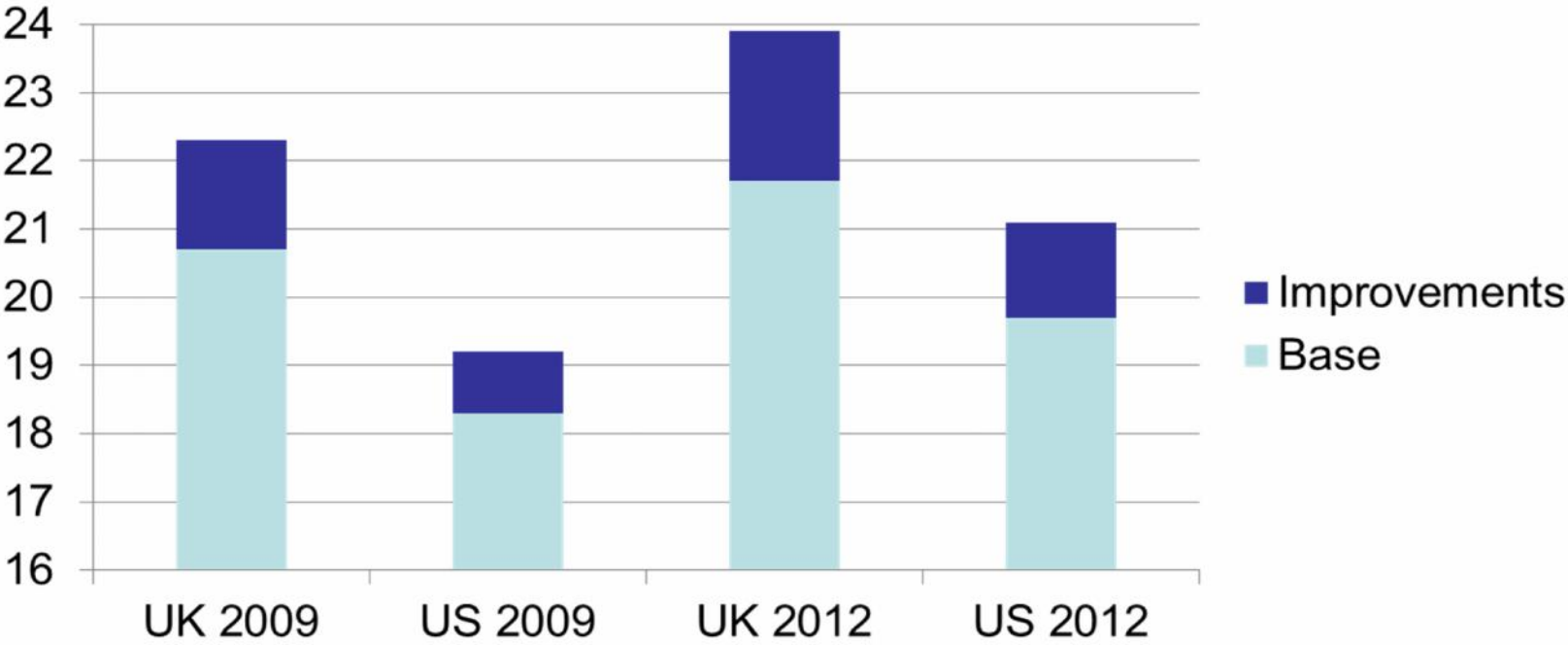
**OECD Pension Assets
(USD 18.6 Trillion)**



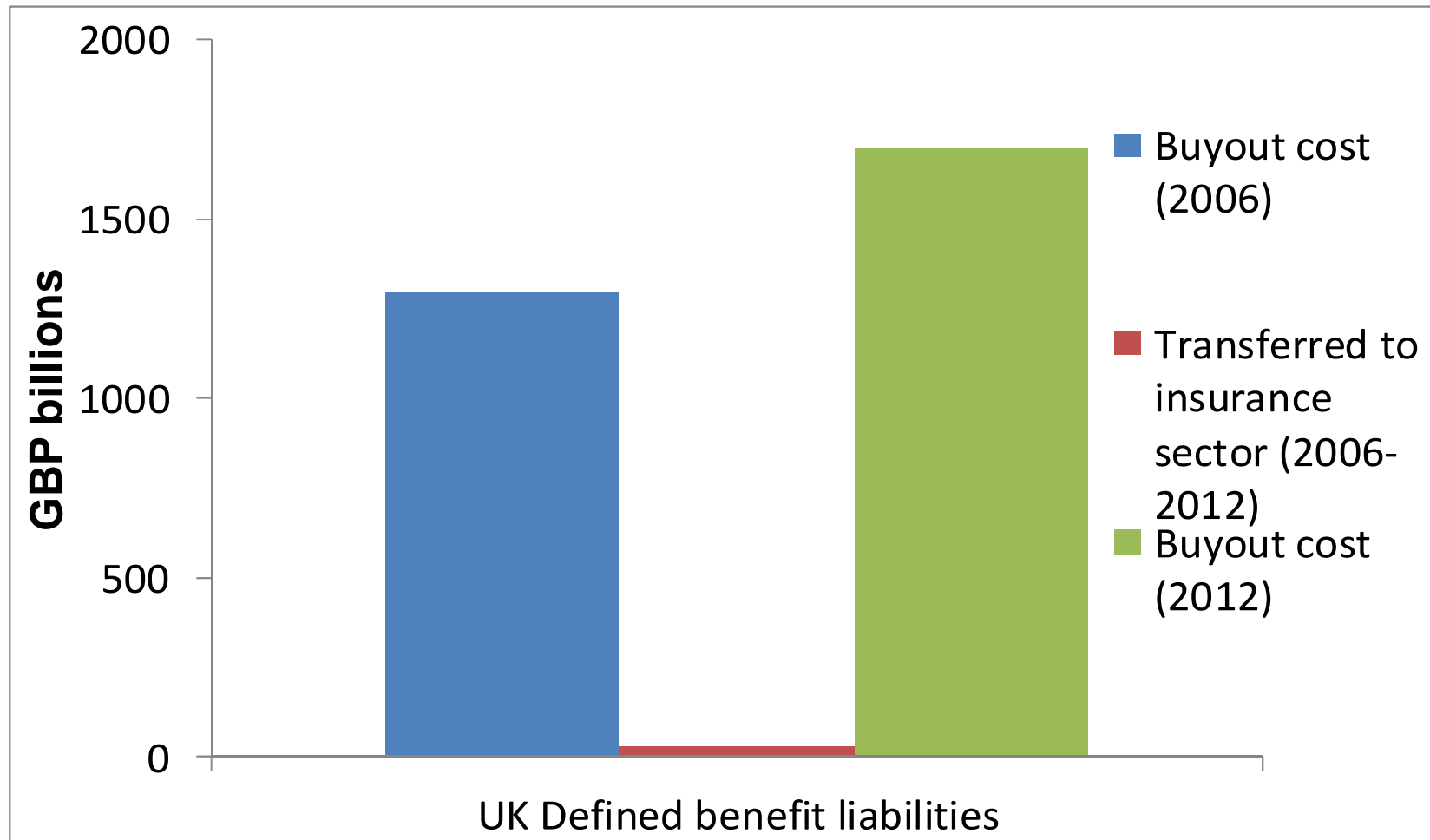
Source: OECD Global Pension Statistics

The global longevity issue is systematic

Multinational corporation life expectancy by pension plan

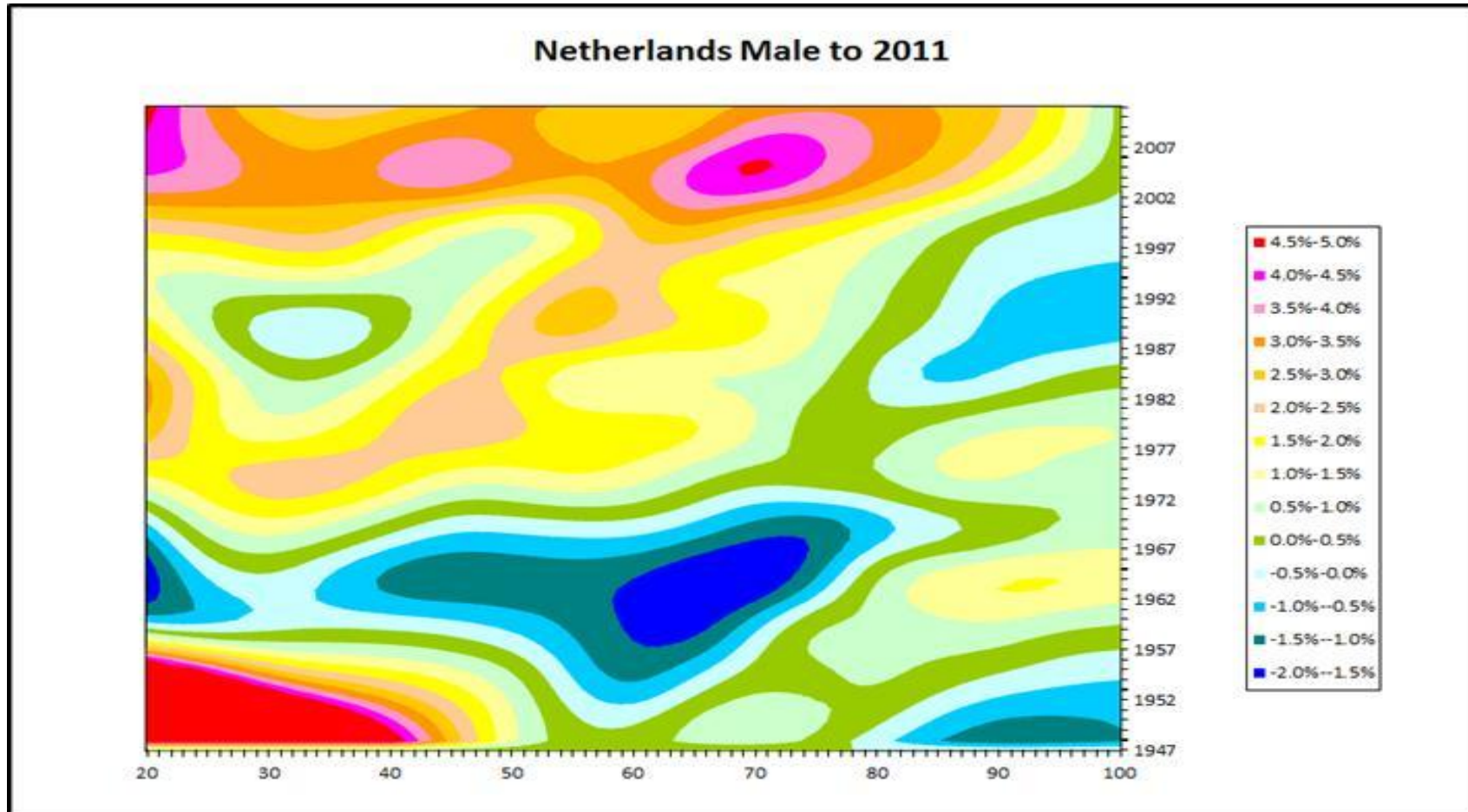


Liabilities stretch in a low interest rate environment



Source: The purple book, pension protection fund, Swiss Re estimates

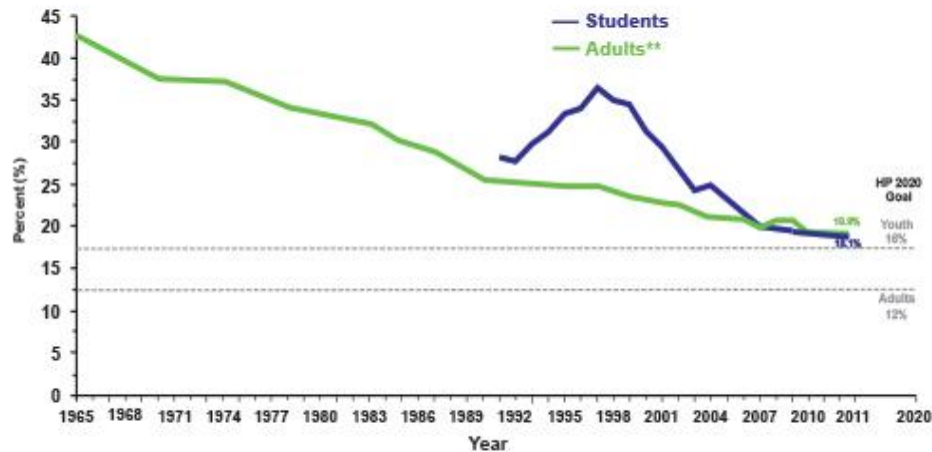
Mortality improvements uncertain



Centraal Bureau voor de Statistiek data, Swiss Re calculation

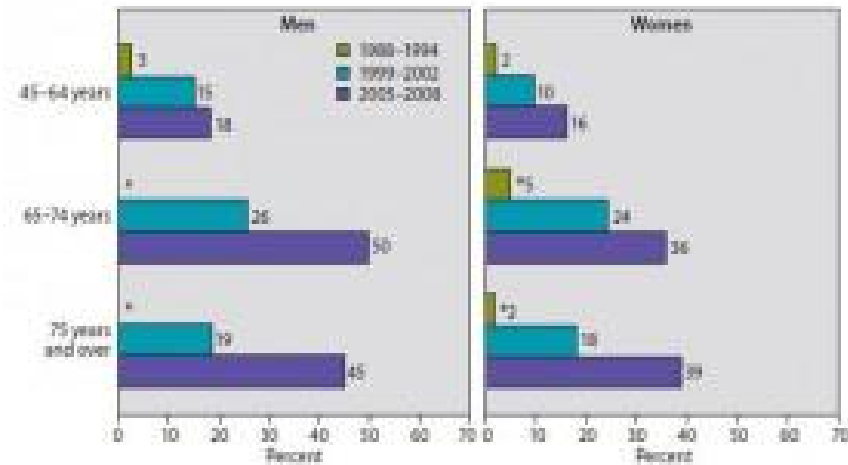
Current mortality improvements derive from known trends

Trends in Current Cigarette Smoking by High School Students* and Adults** — United States, 1965-2011



*Percentage of high school students who smoked cigarettes on 1 or more of the 30 days preceding the survey (Youth Risk Behavior Survey, 1991-2011).
 **Percentage of adults who are current cigarette smokers (National Health Interview Survey, 1965-2011).

Statin drug use in the past 30 days



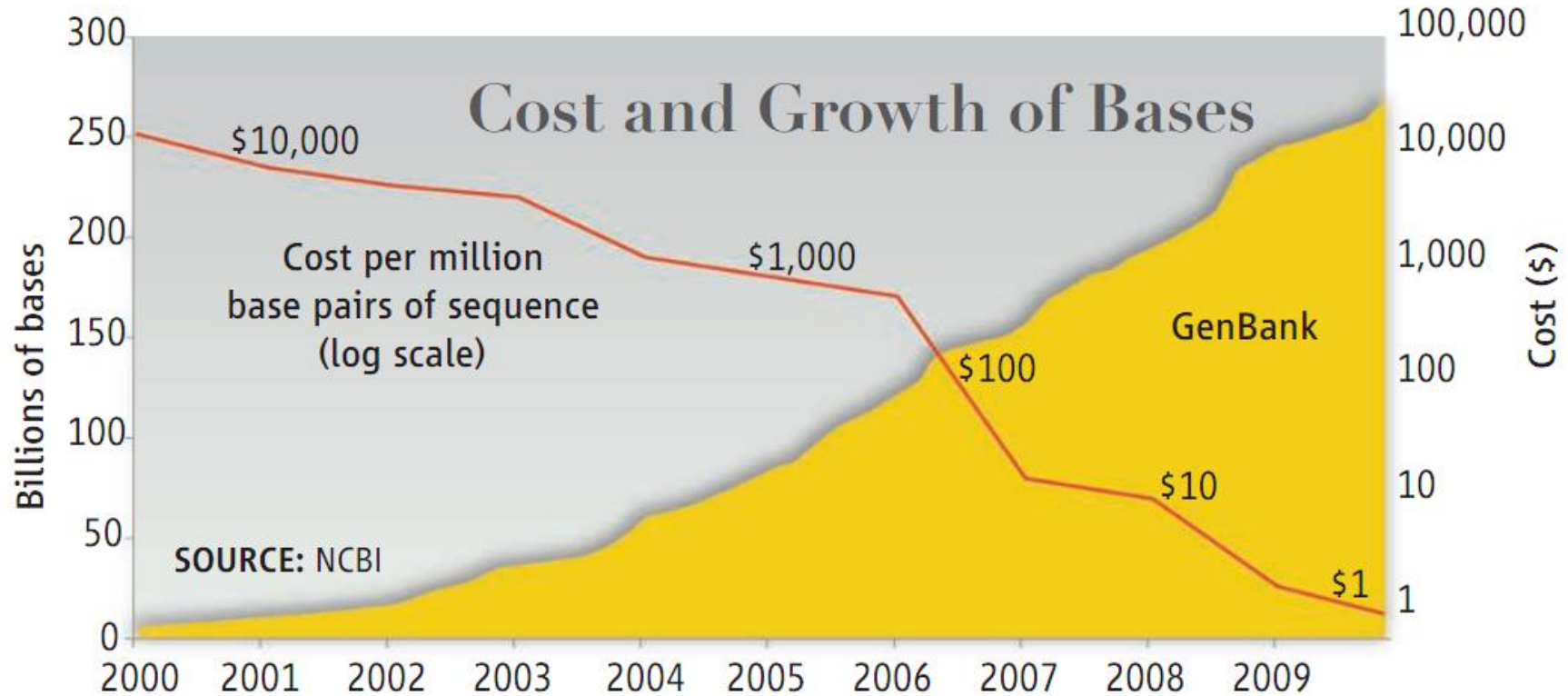
- Drive more efficient application of existing therapies

- Daily aspirin reduces cancer risk and slows its spread, study confirms

- Overall risk of dying from cancer was reduced by 16% among people who took daily dose of aspirin when healthy



Technology for future drivers already here: Exponential reduction in cost of genome sequencing

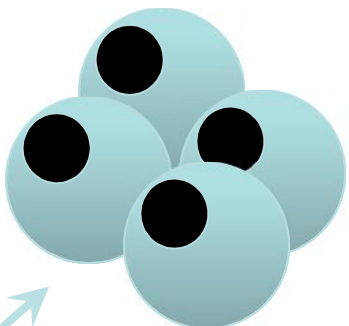


Personalised medicine can identify specific genetic targets for therapies such as monoclonal antibodies

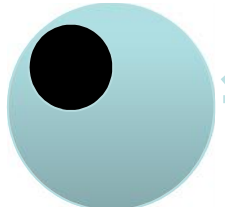
New dawn for regenerative medicine

Ability to produce new stem cells from adult cells

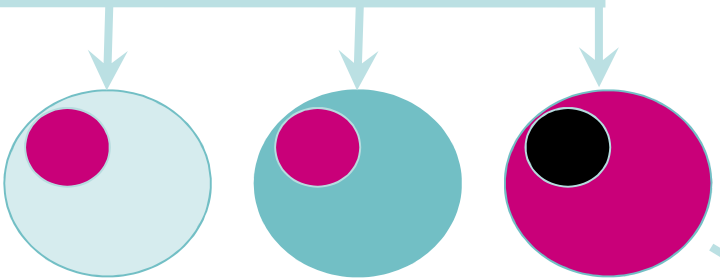
High capacity self-renewal



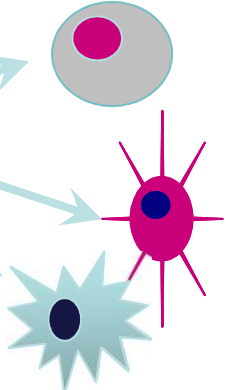
Major boost to regenerative medicine that sidesteps moral and practical difficulties associated with embryonic stem cells. New insights into ability to transform one cell type into another - e.g. replacing insulin-producing cells in pancreas to cure diabetes



Induced Pluripotent Stem Cell iPSC
Potential to make 'all' cell types



Adult cells e.g. bone, cartilage



Nobel Prize October 2012
John Gurdon & Shinya Yamanaka

Examples of innovations in curative healthcare

Stem Cell Educator for type 1 diabetes

Zhao et al. *BMC Medicine* 2012, **10**:3
<http://www.biomedcentral.com/1741-7015/10/3>



RESEARCH ARTICLE

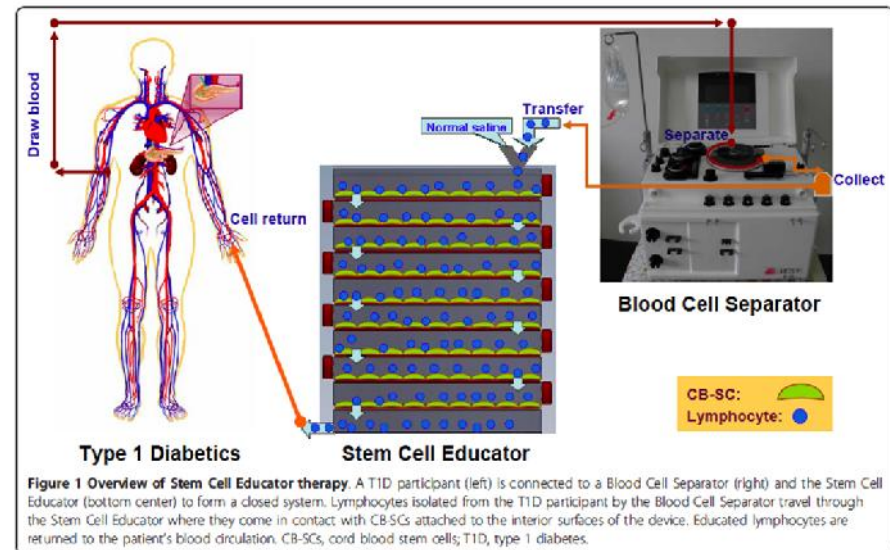
Open Access

Reversal of type 1 diabetes via islet β cell regeneration following immune modulation by cord blood-derived multipotent stem cells

“..... a single treatment produces lasting improvement in metabolic control. Initial results indicate Stem Cell Educator therapy reverses autoimmunity and promotes regeneration of islet β -cells....”

Phase 2 – recruiting

- Estimated enrolment target 100
- Estimated study completion date Sept 2014



Increased awareness of Longevity risk

- Society of Actuaries publishes RPEC/Scale BB 2012
- Longevity risk in Casualty lines
 - Structured settlements/Periodic payment orders
- Increasing range of models
 - Lee-Carter family, P-Spline, Cairns-Blake-Dowd Plat, RMS structural model....
 - Inconsistent output => High levels of model Risk



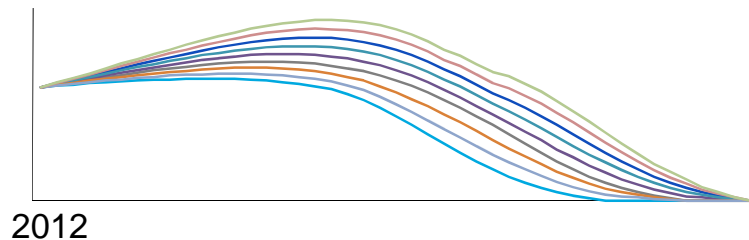
What is longevity insurance?



Longevity insurance is simply an annuity where premiums are spread over a number of years instead of being paid upfront

Longevity insurance

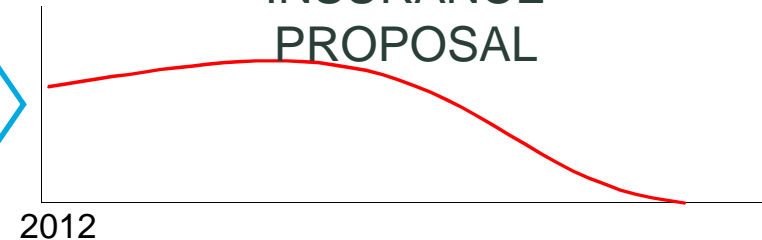
CURRENT CASHFLOW



Uncertainty around longevity makes it difficult for insurance companies and pension sponsors to budget and invest to meet future liabilities



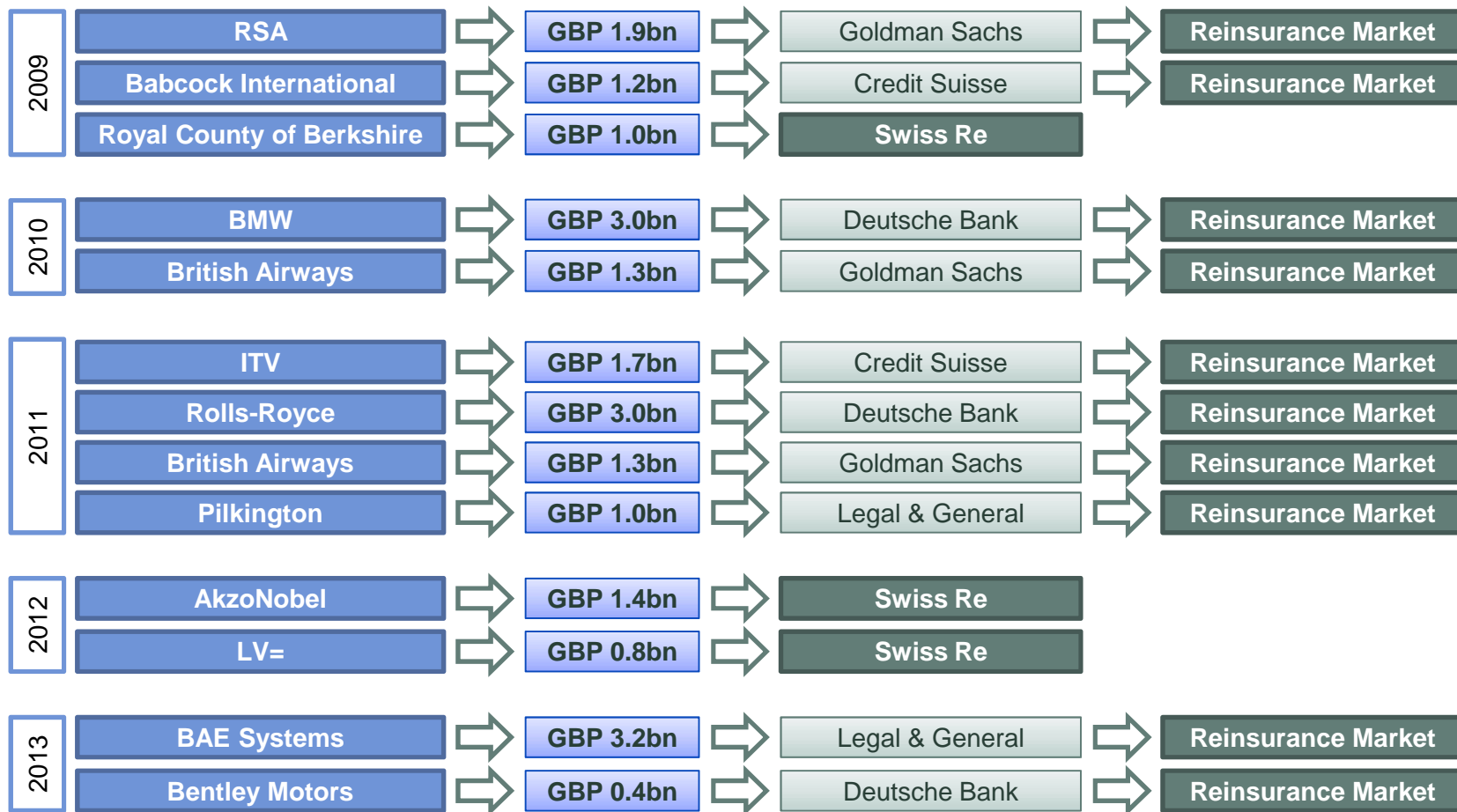
LONGEVITY
INSURANCE
PROPOSAL



Uncertain annual cashflows over an unknown future timeframe become certain annual insurance premiums over a known premium term

Longevity insurance removes the financial impact of uncertain life expectancies for life companies and pension plans especially on systematic risk

UK pension plans normalise longevity risk transfer ... will other countries follow?



Longevity risk capacity derived from reinsurance market

Finite capacity, disproportionate demand

UK corporate pension liabilities	Proportion of UK corporate pension liabilities insured each year	UK Life Companies Annuity reserves
Over GBP 1 trillion	Under 1%pa	GBP 150bn

- Although the bulk annuity market is growing, activity is still small in comparison to the total pensions market
 - Over the last 5 years GBP 30 billion of pension liabilities has been transferred through bulk annuity and longevity hedging

There is insufficient capacity in the insurance market to absorb the future demand for longevity risk transfer from UK pension plans alone



Develop capital market investor base

- Limited Capital Market participation in Longevity risk to date - Term of Longevity risk a particular challenge to investor appetite
- Swiss Re entered into a transaction with Kortis Capital Ltd. ("Kortis") to receive up to \$50m of payments in the event of a large increase in the differential in mortality improvements between male lives aged 75-85 in England & Wales and male lives aged 55-65 in the US
- First tradable rated security providing protection against trend risk
- In 2012/2013 Aegon hedged out of the money longevity risk exposure in two transactions via investment banks
- [LLMA](#) launched to develop capital market products

Management Highlights

"Swiss Re's longevity strategy focuses on providing our clients with indemnity protection, while supporting the development of efficient capital market solutions on an indexed basis as a source of future long-term capacity"

– Brian Gray, Chief Underwriting Officer, Swiss Re

"The Kortis programme is of particular note as it provides protection against adverse deviation in mortality improvements for both Swiss Re's mortality and longevity portfolios, whilst taking into account the complementary nature of the two risks"

– Christian Mumenthaler, Head Life & Health, Swiss Re

Key challenges for actuarial profession

- Develop cross-disciplinary approaches to prospective longevity risk
- Develop capital market appetite for Longevity risk transfer
- Build more stable financing structures for longer lives facilitating public-private risk transfer



Seeking solutions

