The New Science of Ageing

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The New Science of Ageing

Genetics

Statistics

Engineering

Mathematics

Sociology

Computer Science

Epidemiology

Ageing

Medicine

Biology

Psychology

Bioinformation

Economy

Demography

Politics

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EU and Ageing

The EU and Ageing

Logos and Organizations

- SHARE: Survey of Health, Ageing and Retirement in Europe
- ERAAGE: European Research Area in Ageing
- GEHA: Genetics of Healthy Aging
- Yopan: Older People and Ageing Research & Development Network
- LifeSpan: Development & Ageing
- U.S. National Institutes of Health: National Institute on Aging
- EU Twin: New Dynamics of Ageing
- nda Programme: A Cross-Council Research Programme
A systematic look at an old problem

Thomas B. L. Kirkwood

As life expectancy increases, a systems-biology approach is needed to ensure that we have a healthy old age.
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Politics
Mean Life Expectancy

The country with the lowest life disparity usually has the highest life expectancy

Source: Vaupel et al., Science 2009
The Fourth Age

Medical treatment of very old people – are we doing good?

Does exceptional longevity lead to exceptional levels of disability?
1905-Cohort - Denmark

1998

2,262 (63%)

314 Drop-outs

1998

1,086 (78%)

127 Drop-outs

2000

437 (77%)

58 Drop-outs

2003

166 (74%)

1998

862 died

1998

522 died

2000

522 died

2003

213 died

2003

862 died

2000

522 died

2003

213 died

2003
92 years – half way to 100

<table>
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Independence in the 1905-Cohort

Christensen et al. PNAS, 2008
Independence in the 1905-Cohort

Christensen et al. PNAS, 2008
The Fourth Age

EXTREME AGES

100 year olds are doing as good as 92 year olds
The Fourth Age

50% more made it to 100 years in the 1905-Cohort compared to the 1895-Cohort

Still no increased disability level

European Twin Registries
Twin Design

- **Heritability**
  - Lifespan 25%
  - Functioning 50%
  - Alzheimer 70%
  - Parkinson 5%
Molecular pathways that lengthen lifespan in C. elegans and the corresponding components in humans

Christensen, Johnson, and Vaupel: Nat Rev Genet. 2006
Education and good ageing – causal or selection?

- US Twin studies indicate causal
- Danish Twin study indicate selection
- Other European countries?
Number of Danish centenarians 1970-2008
Female advantage in life expectancy at birth in 2004

- Russia**: 13.4
- France**: 7.1
- Brazil*: 7.0
- Japan**: 6.9
- Spain**: 6.7
- USA**: 5.1
- Cuba*: 5.0
- Denmark**: 4.7
- Morocco*: 4.0
- Bangladesh*: 1.0

* indicates lower female life expectancy; ** indicates higher female life expectancy.
Male Excess Mortality

Behavioral?

Biological?
Are males seeking medical help too late?

- Trivial diseases – big reaction
- Serious diseases – little reaction
Are males seeking health care too late?

Denmark 2005

All contacts to GPs: 34.8 Mio
All somatic hospitalizations: 1.2 Mio

Juel & Christensen 2008
Male health

Juel & Christensen  2008
MEN in Europe

Falling behind

- Biological barriers
- Behavioral barriers
- Cultural barriers