
Angus Macdonald

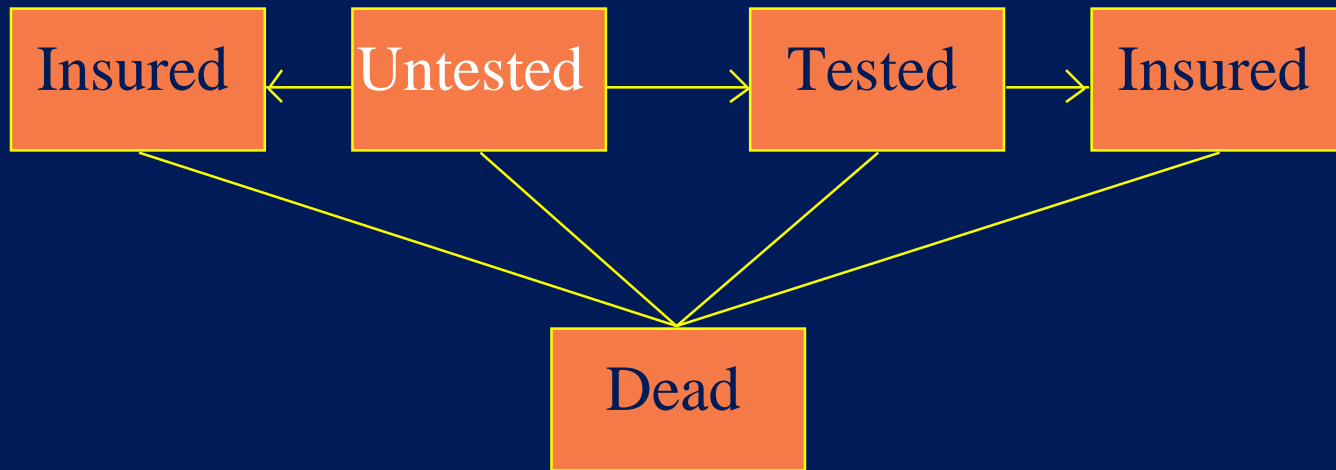
Genetics and Insurance Research
Centre

Heriot-Watt University, Edinburgh

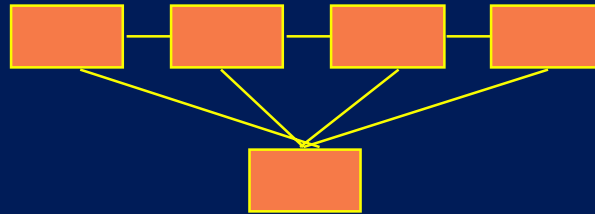
The Cost of Genetic Information

- ◆ If insurers do have genetic information:
 - People at higher risk might pay more
 - Question: how much more?
- ◆ If insurers do not have genetic information:
 - People at higher risk might over-insure (adverse selection)
 - Question: how much would that cost?
- ◆ Quantitative questions = actuarial models

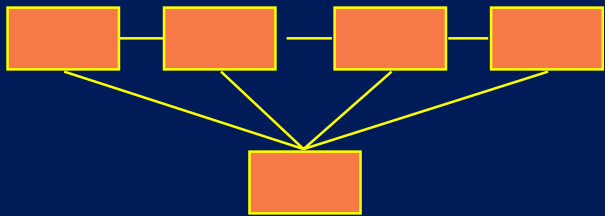
A Simple Life Insurance Model



A Simple Population Model

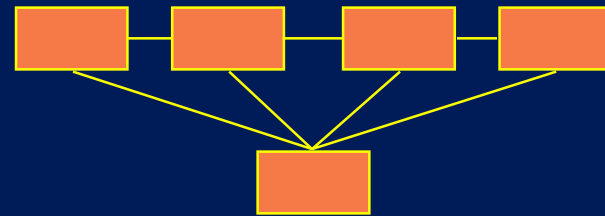


No Family History



Family History

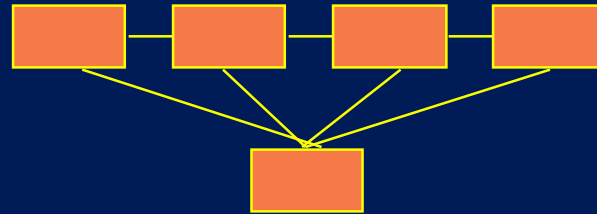
No Mutation



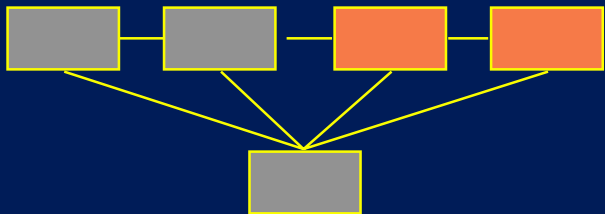
Family History

Mutation

No Moratorium

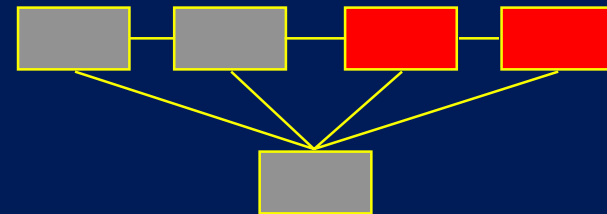


No Family History



Family History

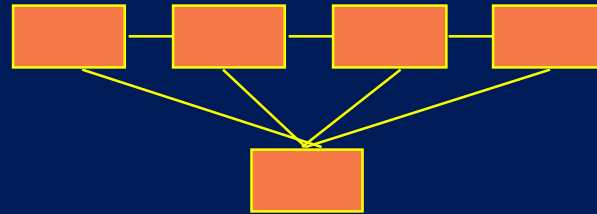
No Mutation



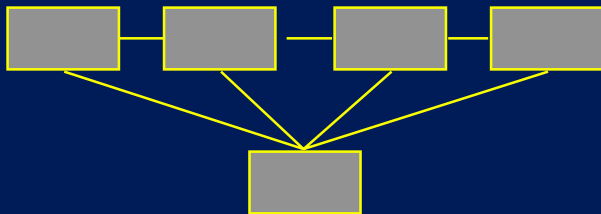
Family History

Mutation

Moratorium on All Test Results

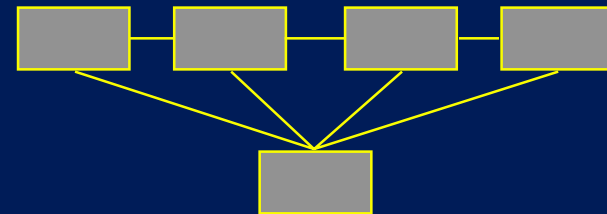


No Family History



Family History

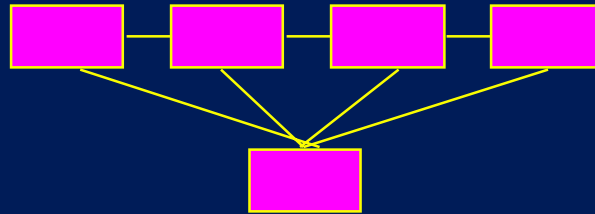
No Mutation



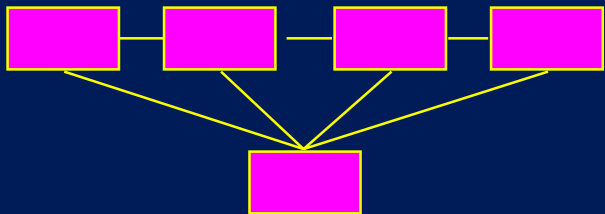
Family History

Mutation

Moratorium on Family History

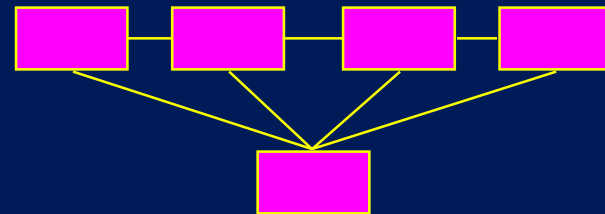


No Family History



Family History

No Mutation



Family History

Mutation

Features of the Model

- ◆ The “normal” level of insurance
- ◆ The extent of genetic testing
- ◆ The probability of a positive result
- ◆ The behaviour of “adverse selectors”
- ◆ The behaviour of insurers

Examples of Conclusions

- ◆ Multifactorial disorders unlikely to matter for life insurance
- ◆ Adverse selection may be a problem
 - if overinsurance is allowed
 - in small (e.g. new) markets
 - for critical illness or long-term care insurance
- ◆ Penetrance of many genes is overstated

Genetic Epidemiology

- ◆ Sequence of events:
 - Association of disease and gene loci
 - Discovery of gene(s)
 - Discovery of molecular pathway(s)
 - Epidemiology in high-risk families
 - Epidemiology in general population
- ◆ Timescale, 10 years or more?

The Way Ahead?

- ◆ Evidence-based underwriting
 - Demanded by regulators?
 - New standards for all use of medical data?
 - Precautionary principle in favour of applicants?
- ◆ The evidence base
 - Published, peer-reviewed research
 - Comparison with standards of `normal science`