



*Genetics and Insurance
Committee*

**Third Report from January 2004
to December 2004**

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Chairman's Introduction



Welcome to the third report of the Genetics and Insurance Committee (GAIC). For those of you who are unfamiliar with the Committee, **Annexes A & B** give some background and describe what we do.

During 2004, whilst the ABI has been putting together the basis of new applications to meet GAIC's revised criteria (**Annex C**), we have been keen to engage in more public discussions. The Committee has found it very informative to receive presentations from Mr Guy Thomas (a former actuary) at our October meeting, and from Breakthrough Breast Cancer, CancerBACUP, and the Alzheimer's Society at our December meeting. Their presentations are on our website and abstracts are in **Annexes D & E**.

We also held a second successful joint public meeting with the Human Genetics Commission (HGC) on the theme of "Insurance, Genetics and Fairness II"; and details of this, and the issues raised during the public discussion, are in **Annex F**. It has been a pleasure to work more closely with HGC this year, through the creation of an HGC/GAIC subgroup on future issues for genetics and insurance, chaired by Dr Bill Albert of the HGC, and you can find a brief background about the subgroup in **Annex G**.

Being a technical committee, we have also spent part of 2004 addressing specific technical issues to do with insurance and genetics. Early on in 2004 we held an actuarial workshop (**Annex H**) designed to assist the insurance industry to understand GAIC's revised actuarial criterion and methodology, and to satisfactorily address this when preparing applications. We have also been gathering data on the volume of predictive genetic testing in the NHS (**Annex I**), which should help to paint a picture of what is actually going on in practice. This has helped make clear the quite low numbers of predictive genetic tests, and the small proportion that are positive. This is an important point, as the general perception at times appears to be quite different.

I have enjoyed working with my fellow Committee members and the Secretariat over the past year on this important and fascinating topic, and I thank them all for their professionalism and for so generously contributing their time and expertise.

I do hope you find this report useful, and that you will let us know what you think by emailing your views to mb-gaic@dh.gsi.gov.uk

I look forward to meeting some of you at our next public meeting on 12 July 2005, the details of which are on our website. All are welcome.

A handwritten signature in black ink, appearing to read 'David Johns', with a long horizontal stroke extending to the right.

Professor David Johns CBE

Chairman of the Genetics and Insurance Committee

March 2005

Stop press note: As this report was being prepared, the Government announced on 14 March 2005 a “Concordat and Moratorium on Genetics and Insurance” – a copy of which has been included as **Annex J**. GAIC will look at this in detail during 2005, and will provide comments in its next report.

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GAIC's Work Programme

GAIC reports to Health, Science, and Treasury Ministers. Observers from these Departments are invited to attend meetings, as well as observers from the Human Genetics Commission (HGC), the administrations in Wales, Northern Ireland, Scotland, and the Association of British Insurers (ABI).

In 2004, GAIC held four full Committee meetings, a workshop on actuarial techniques, a second joint public meeting with HGC on “Insurance, Genetics and Fairness II”, and three joint HGC/GAIC sub-group meetings on “Future issues for genetics and insurance”.

The following is a brief summary of the main work that the Committee has done during 2004.

For convenience the report is divided into five sections covering the following:

1. **Applications to GAIC**
2. **Monitoring compliance**
3. **Resolving the genetics and insurance moratorium**
4. **Considering complaints**
5. **Public information**

1. Applications to GAIC

Outstanding applications

Since its creation GAIC has received eighteen applications from the Association of British Insurers (ABI) to use positive (adverse) results from predictive genetic tests in determining insurance premiums for life, critical illness, income protection, and long term care insurance. GAIC has only approved one application to date, in October 2000. This is for the use of Huntington's disease predictive genetic test results in determining insurance premiums for life insurance policies over £500,000. Seventeen other applications, submitted in December 2000, have been considered and returned with comments to the ABI.

These 17 applications covered five specific predictive genes for **Huntington's disease**, **autosomal dominant early onset (ADEO) Alzheimer's disease** (an extremely rare inherited form of Alzheimer's disease), and **hereditary breast and ovarian cancer** (a rare

form of inherited cancer). The five genes which formed the basis of all applications are **HD** for Huntington's disease, **PS1** & **APP** for ADEO Alzheimer's disease and **BRCA1** & **BRCA2** for hereditary breast and ovarian cancer. The applications cover a range of insurance products: life, critical illness, income protection, and long term care (not for the breast and ovarian cancer applications).

The eight autosomal dominant early onset (ADEO) Alzheimer's disease applications (PS1 and APP genes)

GAIC spent part of 2004 looking at the **eight ADEO Alzheimer's applications**, following on from discussions in 2003. The Committee is particularly grateful for the expert input of Professor Simon Lovestone of Kings College London during its discussions of these applications.

Only a very few people are thought to have genetic predisposition to ADEO Alzheimer's, currently estimated at around 600 in the UK. Clinical practice has been apparently very difficult to establish as there are too few families to justify a PS1 and APP gene testing service. Figures from the NHS Directory of Molecular Genetic Testing for May 2003 estimated that there were around 16 PS1 tests done a year, and no APP tests. Of the 16 PS1 tests it was not recorded how many were adverse, but it is possible that it could be as low as zero. GAIC considered that it would therefore seem unlikely that more than a handful of individuals a year, if any, would have an adverse PS1 test and be seeking insurance above the financial limits of the moratorium.

Given the lack of clinical testing and the very low numbers involved, GAIC questioned whether the eight PS1 and APP applications should be withdrawn. ABI have stated that they have no intention of resubmitting these applications in the foreseeable future.

The six hereditary breast and ovarian cancer applications (BRCA1 and BRCA2 genes)

As with the Alzheimer's applications, GAIC spent part of 2004, and late 2003, looking at the **six BRCA1 & BRCA2 applications**. There have been considerable advances in scientific and clinical knowledge about hereditary breast and ovarian cancer, as well as new NICE guidelines on the use of BRCA testing, and the original applications of 2000 need to be updated to take these factors into account.

With the BRCA applications, there are a number of additional points to consider when comparing these with the approved Huntington's disease application for life insurance. One of the major issues is the interpretation of mutations in the BRCA genes, as it is not always possible to determine the effect on risk of a particular mutation. A second major issue is

how insurers will consider preventative treatment for someone who does not display clinical symptoms, and treatment of those who do.

As of June 2005, the four BRCA1 and BRCA2 applications for life and critical illness are expected to be resubmitted for consideration towards the end of 2005.

The four Huntington's disease applications (HD gene)

As mentioned above, the only application to date that GAIC has approved is for Huntington's disease for life insurance policies over £500,000. GAIC had reconfirmed in 2003 that the approval of this application should stand. Of the three remaining Huntington's applications, the ABI has withdrawn the application for long-term-care, and the applications for critical illness and income protection are expected to be resubmitted in 2006 after the BRCA1 and BRCA2 applications.

Workshop on actuarial techniques

GAIC held an actuarial workshop on 26 January 2004 to look at the actuarial aspects of all future applications. More details are at **Annex H**.

2. Monitoring compliance

In 2001, the Government negotiated the terms of a moratorium on the use of predictive genetic tests by insurers with the ABI. This moratorium covers critical illness and income protection policies up to the value of £300,000 with the higher ceiling limit of £500,000 for life insurance. This moratorium came into effect on 1st November 2001 and will stand until November 2006, with provision for review of the financial limits after November 2004 (see below).

Above the ceilings of the moratorium, insurance companies will be allowed to use the results of tests which have been approved by GAIC. The only adverse predictive genetic test result that insurers can currently use is for Huntington's disease, and only for life insurance policies over £500,000. Also, insurance companies cannot ask a person to take a predictive genetic test in order to obtain insurance.

The moratorium is designed to provide breathing space during which all interested parties can discuss and agree a long-term policy. The HGC/GAIC Joint Public Meetings in September 2003 and July 2004 were part of that discussion process.

GAIC's remit includes a duty to: "Provide independent wide ranging oversight of how insurers are using genetic tests, specifically to provide independent scrutiny of compliance with the ABI Code of Practice and the terms of the 5-year moratorium agreed in 2001 on

the use of genetic test results by insurance companies.” This duty led to the following pieces of work:

ABI report on member’s compliance during 2002 with the genetic testing code of practice

GAIC was content with the ABI’s report on members’ compliance for 2002, and was pleased to note that the insurance industry continues to be compliant with the ABI’s Code of Practice and the moratorium.

GAIC did however consider that it should be possible to produce the compliance report much more quickly. Ideally, the Committee would like to see the compliance report within 6 months of the end of the year. The ABI has considered this and have assured the Committee that the Compliance report for 2003 should be with GAIC early in 2005, with the Compliance report for 2004 also being sent to GAIC in 2005.

GAIC gave a number of detailed suggestions for the 2003 compliance exercise and for ways to improve the data collected and the ability to interpret the results. GAIC would also be supportive of ABI further exploring the possibility of submitting the Code of Practice for approval by the Office of Fair Trading. An official response from ABI on this matter is expected in 2005.

ABI’s draft revised Code of Practice on genetic testing

GAIC considered early in 2004 a draft revised ABI Code of Practice on genetic testing, and provided a number of detailed comments back to the ABI. The Committee hopes that a revised Code of Practice will be issued in 2005.

3. Resolving the genetics and insurance moratorium

A major part of the Committee’s time in 2004 was spent discussing what might replace the moratorium, and listening to the views of various groups and individuals. The Committee is particularly grateful for the constructive input from Mr Guy Thomas, Dr Helen Wallace, Breakthrough Breast Cancer, CancerBacup, the Alzheimer’s Society, and to everyone who attended, and contributed to, the joint HGC/GAIC meeting “Genetics Insurance and Fairness II” (for details see **annex F**). This work covered four topics, which are detailed below:

Genetics & Insurance moratorium – appropriate financial limits

GAIC has discussed the appropriateness of the financial limits, and has recommended to Ministers that the limits should remain unchanged for the duration of the moratorium. The limits are £500,000 for life insurance, £300,000 for critical illness insurance, and

£30,000 a year for income protection insurance. The current limits protect over 97% of UK policies sold, and therefore only exceptionally large insurance policies fall outside of the moratorium. The Committee has not heard any evidence of adverse selection, that is, evidence that individuals with adverse predictive genetic tests results are using this knowledge to buy unusually large insurance policies. If adverse selection occurred on a large scale, this could potentially harm the industry's financial viability. However, as the moratorium prevents insurers from identifying applicants who have had adverse test results, such evidence is very difficult for the industry to identify. GAIC looks forward to the results of independent research on buying behaviour and adverse selection.

When the Government makes a decision about what should replace the moratorium, then, if financial limits remain, the ceiling limits should be reviewed taking into account a number of factors. These factors could include interest rates, inflation rates, mortgage interest rates, house prices, average mortgage size, average insurance policy size, and the percentage of individuals with policies under the limits. Any such review should be conducted regularly, and GAIC believes that a three-year period between reviews is acceptable in view of the above factors. GAIC believes that revisions of the limits more frequently would lead to wide scale confusion within the industry and for the public.

Working of the moratorium

As part of the work of the review of the moratorium, detailed above, GAIC has considered the workings of the moratorium itself, and concluded that it has worked well in allowing interested parties more time to consider the insurance implications of advances in genetics science. Three years on from the start of the moratorium, insurers' concerns about widespread predictive genetic testing, and the potential for adverse selection, seem increasingly unfounded at the present time. Equally, from the information so far presented by the industry, the concerns that access to existing test results by insurers would result in widespread exclusion from insurance coverage also seem increasingly unfounded.

GAIC has noted that the ABI has not yet come forward with revised applications to use predictive genetic tests for insurance purposes. The Committee believes this shows that GAIC is operating well in ensuring that only scientifically, clinically, and actuarially sound applications can be considered for insurance purposes.

One issue that needs attention is what happens to individuals who receive an adverse result before the end of the moratorium, but wish to take out an insurance policy after the end of the moratorium. The Committee terms this the "test now, buy later" problem. GAIC is concerned that public perception about what might happen after November 2006 may be discouraging individuals from taking potentially medically useful tests. Concerns about the use of tests by insurers discouraging the public from clinical testing still need to be examined in the light of the available evidence. GAIC does not yet have a solution for this

complex problem, but there will need to be a fair system that works irrespective of when a test result is obtained.

Resolving the moratorium

In response to a Government request for its advice, GAIC considered a number of options for what should happen after the current moratorium ends after November 2006. As part of this process GAIC is grateful for the comments it received from Professor Simon Lovestone, Mr Alistair Kent (Genetics Interest Group), Mr Guy Thomas, Dr Helen Wallace (Genewatch), CancerBacup, the Alzheimer’s Society, Professor Sandy Raeburn, and Mr Nicholas Pawson. The Committee stressed the importance of research (see item below) in this area. The Committee is still considering the issue, along with the HGC, and there is ongoing research that may be useful in evaluating different options. However GAIC has advised Ministers that its current, but not yet final, view is that it is in favour of an extension of the moratorium, and it also appears that there is a general view in favour of an extension.

Researching the moratorium

Early in 2004, GAIC looked at drawing together a summary of the on-going UK research work on genetics and insurance, in order to better inform its work. The Department of Health also hosted a meeting in January 2004, attended by GAIC members Professor David Johns, Mr Alan Tyler and Mr Phil Brown, designed to update people on current research in the area of genetics and insurance. Both these activities led to the view that informing people about what research was going on would be helpful, and resulted in the GAIC/HGC July public meeting having research as its main theme.

4. Considering complaints

GAIC has a role in considering complaints from individuals. Specifically, this is to: “Consider complaints from insurance applicants about the way an insurance company has dealt with their application under the moratorium, where such complaints have not been resolved to the satisfaction of the applicant by either their insurance company in the first instance or by the ABI.”

This role has led to two pieces of work, detailed on the next page:

Complaints about insurance

GAIC discussed two complaints in 2004. The first was a complaint in June 2004 about the use by an insurance company of a question about family history on an insurance form. This was discussed by a subgroup of GAIC and it was considered that it was a legitimate question to ask, and a written response to the individual was made in June 2004.

The second was a complaint to do with an individual being refused life insurance by one insurance company, who then bought insurance from another company. This was discussed by GAIC, and a response to the ABI (who had sent details of the complaint) was made in January 2005. As the complainant had not actually complained to GAIC, it was not considered appropriate for the Committee to comment, and a written response to the individual was made to that effect in January 2005.

5. Public information

Joint Public Meeting with HGC 13 July 2004

GAIC held a second well-received joint public meeting with the HGC. A note of the meeting, and an analysis of the feedback received, is at **Annex F**.

Breakthrough Breast Cancer's questionnaire about genetics and insurance

GAIC provided comments on Breakthrough Breast Cancer's questionnaire about genetics and insurance, which was designed as part of the charity's work to review evidence about insurance decisions.

Edinburgh University's research project surveying life insurance and health

Mrs Niamh O'Conner and Mr Paul Bennett attended the afternoon session of the January 2004 meeting, and interviewed some GAIC members as part of their research project which involved a "Citizen's Jury" on genetics and life insurance.

The matrix

GAIC spent some time discussing ways of presenting information to consumers, including proposals for a simple colour-coded matrix system. Such a matrix could be a method of tackling the complexity of considering what ages, and terms of policy would be "fair" to use the adverse results of a GAIC approved predictive genetic test. The Committee decided that it would consider various matrices when it looks at the first resubmitted application from the ABI, as without a real example to work from, it was difficult to construct a meaningful and useful matrix.

Answering correspondence

The GAIC secretariat routinely deals with general queries from individuals about genetics and insurance, the moratorium, and Government policy, and works with the Department of Health press office to respond to such queries from journalists.

Presenting GAIC's work

GAIC Members have also presented at a number of conferences and events to do with genetics and insurance. In 2004 these included:

Professor Johns attended as invited speaker to an education day on 12 May 2004 for BRCA carriers at the Royal Marsden Foundation NHS Trust. In his session he outlined the work of GAIC and spent time answering questions from the audience.

Professor Johns, Mr Tyler, & Mrs Foxton attended and participated in a panel discussion at the charity HEART UK's Members' Day event "The Future's Bright" on 2 December 2004 held at the Royal Society of Medicine. More details can be found at www.heartuk.org.uk

Mr Tyler attended Edinburgh University's "Citizen's Jury" on genetics and life insurance (see previous page), making a presentation to Jury members on life insurance underwriting and answering questions as an expert witness.

Mr Tyler also spoke on genetics, family history and insurance as part of two Medical Foundations training courses run by Cardiff University for trainee insurance underwriters. This has been aimed at ensuring underwriters understand the relevance of the subject, the nature of the moratorium, and the activities of GAIC before they are given underwriting authority by their companies.

GAIC Website

Minutes of GAIC meetings, presentations from public meetings, downloadable copies of this annual report, and photographs of GAIC members, can all be found on the GAIC website, which can be found here:

www.advisorybodies.doh.gov.uk/genetics/gaic/index.htm

Keeping in Touch

Tell us what you think

We are always keen to hear what you think and comments are welcomed about

- This annual report
- What GAIC has done so far
- What GAIC should do next
- Any issues around genetics and insurance

Please write to:

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Find out more

To find out more about GAIC please visit our website:
www.advisorybodies.doh.gov.uk/genetics/gaic/index.htm

This is also where details of the 2005 public meeting will be published.

Want more free copies of this annual report?

Contact the Secretariat or simply download a copy from our website.

Annex A – Membership of GAIC and Registered Interests

“GAIC’s membership is carefully balanced to ensure medical, scientific, actuarial, patient welfare, consumer affairs, and insurance industry expertise are all appropriately represented. I have every confidence that the new, and re-appointed, members of GAIC will make a valuable contribution towards evaluating the scientific, clinical and actuarial relevance of genetic tests proposed by the insurance industry in setting insurance premiums. They will also have an important role in monitoring the insurance industry’s compliance with the moratorium on the use of predisposition genetic tests in setting insurance premiums”.

Lord Hunt

Former Health Minister

Announcing in August 2002 the new membership of the reconstituted GAIC with extended terms of reference, in advance of its first meeting in September 2002.

The GAIC members are:

Prof. David J. Johns CBE (chair)

Registered interests: None.

David Johns is a professional Chartered Engineer with an extensive record of research, consultancy and related peer-reviewed publications; mainly in the fields of aeronautical/structural engineering.

In his academic career he led the foundation of the City University of Hong Kong and, until his formal retirement, the University of Bradford.

He has held, and still holds, a number of Government appointments including, as Chairman, the Prescription Pricing Authority (1998-01) and, now, the new (Strategic) Health Authority for North and East Yorkshire and Northern Lincolnshire.

Mrs Audrey Ardern-Jones

Registered Interests: None.

Audrey Ardern-Jones is the Senior Clinical Nurse Specialist in Cancer Genetics at the Royal Marsden Foundation NHS Trust. For many years Audrey has worked in both the cancer research setting and in the community. Her current practice involves caring for families with gene alterations and working with high risk families at risk of developing different types of

cancers. The family work includes counselling within the hospital clinic setting. She is a lecturer in this field and has published articles. Audrey has previously been involved with the Harper Report and the Macmillan Genetics Think Tank.

Professor D Timothy Bishop

Registered interests: None.

D Timothy Bishop is the Cancer Research UK Professor of Genetic Epidemiology at the University of Leeds. He has a background in statistics and epidemiology and his research focuses on the contributions of predisposition genes to disease within the general population. He was also a member of the original GAIC.

Mr Phil Brown

Registered interests: None.

Phil Brown is Head of Underwriting and Claims for Zurich Financial Services (UK, Life) which distributes through IFA's and strategic partnerships including a single tie of some 2500 advisers in Openwork (formerly Zurich Advice Network). He is a member of the Direct Offices Underwriting Group and Chair of the ABI Medical Affairs and Underwriting Committee. He is also a Board Trustee for Sense International, a charity concerned with deaf & blind people.

Professor Dian Donnai CBE

Registered interests: None.

Dian Donnai is Professor of Medical Genetics in the University of Manchester and Clinical Director of the Regional Genetic Service at Central Manchester University Hospitals NHS Trust. She was Advisor in Genetics to the Department of Health's Chief Medical Officer and sits on a number of National Professional and Policy bodies. She is Executive Director of NoWGEN, the recently established NorthWest Genetics Knowledge Park. She was also a member of the original GAIC.

Professor Donnai was awarded a CBE for services to genetics in the 2005 New Year's Honours.

Mrs Julie Foxton

Registered interests: Advisory board member for new pharmaceutical products in lipid lowering for AstraZeneca, Merck Sharpe & Dohme Ltd and Schering-Plough.

Julie Foxton is a qualified nurse and midwife. She has worked with a charity (HEART UK) for the last six years specialising in the care and management of people and their families with genetic raised cholesterol levels that can lead to premature death from coronary heart disease.

Professor David S. Latchman

Registered Interests: Non-Executive Director, consultant and shareholder in BioVex Ltd which is a company that develops viral vectors for gene therapy.

David S. Latchman is currently Master of Birkbeck, University of London and Professor of Genetics at Birkbeck and the Institute of Child Health, University College London. He has over twenty years research experience in Genetics and Molecular Biology and is also Chairman of the London IDEAS Genetics Knowledge Park (supported by the Department of Health and the Department of Trade and Industry).

Ms Anita Macaulay

Registered Interests: None

Anita Macaulay has a background in food science and worked as Technical Manager in the food industry for many years. Since 1992 she has been Chief Executive of the Jennifer Trust for Spinal Muscular Atrophy. Spinal Muscular Atrophy (SMA) is one of the most common autosomal recessive genetic conditions – more babies die from SMA than any other genetic disease in the UK. The Jennifer Trust offers a comprehensive range of support services and funds research both working towards a cure and also medical management research in areas such as respiratory and nutritional care. She was also a non-executive director of Warwickshire Health Authority until its dissolution in 2002. She is now a District Councillor (Conservative) for Stratford on Avon District Council and a member of the new body NOPI – Network of Public Involvement for the MRC.

Mr David Paul

Registered interests: Employee of British United Provident Association which includes among its subsidiaries BUPA Insurance Limited and BUPA Health Assurance Limited.

UK delegate to the European insurance industry body CEA (Comite Europeen de Assurance)

Faculty of Actuaries representative on Groupe Consultatif Actuariel Europeen (Europe-wide actuarial group which represents actuaries to European Commission in particular)

David Paul is Group Actuary at BUPA involved mostly in BUPA Group's insurance subsidiaries engaged in medical (and some life) insurance in UK, Ireland, Spain and globally. He chairs the Institute and Faculty of Actuaries Social Policy Board of the UK actuarial profession.

Professor Tim Reynolds

Registered interests: No direct shareholdings in biotechnology or insurance companies.

Tim Reynolds is the consultant chemical pathologist for Queen's Hospital, Burton-on-Trent. His major interests are hyperlipidemia, wound & pressure sore treatment and prevention, population screening with special emphasis on antenatal Down's syndrome screening and cardiac risk screening and associated mathematical and statistical techniques. He is a vice-chairman of the South/Mid-Staffordshire Local Research Ethics Committee, Chairman of the National Quality Assurance Advisory Panel for Clinical Chemistry and represents chemical pathology on several pathology society committees.

Mr Alan Tyler OBE

Registered Interests: Direct shareholdings in Prudential and Swiss Re

Alan Tyler spent much of his early career in life and health insurance underwriting, also gaining marketing experience in North America, Israel and Scandinavia. He then moved into product management and from there to a strategic role embracing all forms of insurance related to health and welfare protection for a leading reinsurance company, developing contacts with government departments, health professionals, voluntary and charitable organisations, employer groups, consumer groups and service providers. He is now an independent business consultant to the public and private sectors engaged in developing health and welfare benefits and services from the dual perspective of private sector risk management and public sector reform.

Professor A. David Wilkie CBE

Registered interests: Shares in insurance companies and other companies (such as banks) that own insurance companies, and part ownership of a firm (InQA) that provides actuarial software.

David Wilkie is an actuary with over 40 years experience in life assurance and consulting. He also has many academic connections, and has published a large number of papers. He is an expert in (amongst other things) the construction of mortality tables, the modelling of sickness insurance and HIV infection, and the use of computer models to do these things. He is currently Chairman of a small firm, InQA Limited, that provides actuarial software and is also an Honorary Professor and Research Consultant at Heriot-Watt University, Edinburgh. He was also a member of the original GAIC.

Mr Brian Yates

Registered interests: None

Brian Yates is Chairman of Consumers' Association – the independent, member funded researchers and publishers of **Which?**, the **Drug and Therapeutics Bulletin** and other consumer magazines. Brian, a professional Chartered Engineer, also works on the export of capital equipment to the Middle East and South Asia. He serves on GMC Fitness to Practice Panels and Immigration Appeal tribunals.

Secretariat (Department of Health officials)

Mr Daniel Gooch (Secretary)

Dr Monika Preuss

Dr Jayne Spink (To September 2004)

Dr Cathleen Schulte (From September 2004)

Mrs Margaret Straughan

The Secretariat works closely with the Department of Health officials of the HGC Secretariat to ensure there is effective and efficient communication on wider social and ethical issues related to genetic testing and insurance.

Annex B – About GAIC (Terms of Reference and Dates of Meetings)

The terms of reference of GAIC are to:

- Develop and publish criteria for the evaluation of specific genetic tests, their application to particular conditions and their reliability and relevance to particular types of insurance;
- Evaluate particular tests against those criteria and to bring to public knowledge its findings;
- Report to Health, Treasury, and Department of Trade and Industry Ministers on proposals received by GAIC from insurance providers and the subsequent level of compliance by the industry with the recommendations of GAIC;
- Provide independent wide ranging oversight of how insurers are using genetic tests, specifically to;
 - Provide independent scrutiny of compliance with the ABI Code of Practice and the terms of the 5-year moratorium agreed in 2001 on the use of genetic test results by insurance companies;
 - Consider complaints from insurance applicants about the way an insurance company has dealt with their application under the moratorium, where such complaints have not been resolved to the satisfaction of the applicant by either their insurance company in the first instance or by the ABI; and
 - Report annually to Health, Treasury, and Department of Trade and Industry Ministers on compliance by insurers with the ABI Code of Practice and the moratorium.

Dates of meetings:

Sixteenth meeting	27 January 2004
Seventeenth meeting	23 March 2004
Joint Public Meeting with HGC	13 July 2004
Eighteenth meeting	5 October 2004
Nineteenth meeting	14 December 2004

The Committee records its thanks to Mr David Paul for providing a meeting room for the January 2004 meeting, and to London IDEAS Genetics Knowledge Park and Imperial College London for providing a meeting room for the July 2004 HGC/GAIC Joint Public meeting.

Proposed future meeting dates:

Twentieth meeting	10 May 2005
Public meeting	12 July 2005
Twenty-first meeting	30 August 2005
Twenty-second meeting	8 November 2005

Annex C – The Three Criteria

As described in GAIC’s second report (available as a free download from the GAIC website), the Committee has agreed that the existing concept of using three criteria – technical, clinical and actuarial – remains a good way to examine applications for the use of predictive genetic test results in setting insurance premiums. The broad text of the three headline criteria is as follows:

- **Technical Relevance:** Does the test accurately measure the genetic information?
- **Clinical Relevance:** Does a positive result in the test have likely future adverse implications for the health of the individual?
- **Actuarial Relevance:** Does a positive result justify increased premiums?

Only when all three of these conditions are satisfied can a test be approved by GAIC for consideration by the insurance industry in setting premiums for insurance.

The fine detail of what needs to be addressed under each criteria is given in the Guidance to Applicants document, which was included as **Annex D** in GAIC’s second report.

Annex D – Abstract of Mr Guy Thomas's Presentation

This presentation on “Insurance markets & genetics – a former actuary’s view” was given at GAIC’s October 2004 meeting. Please note that the views expressed in this abstract are the author’s own, and do not necessarily reflect the view of GAIC or the Government. A copy of the slides to go with this presentation are on the GAIC website at www.advisorybodies.doh.gov.uk/genetics/gaic/meetings.htm

Most discussion of this subject seems to ignore certain elementary observations about insurance markets. The reason for this is a phenomenon I call “structural bias”, which arises because effectively unlimited actuarial and other resources have been directed towards promoting acceptance of genetic discrimination, whilst virtually no resources have been available to the people whose lives will be most affected by it. Ideas and observations which might be helpful to the insurance industry have been promoted and given currency, whilst those which might be unhelpful have been ignored or suppressed.

Variations in premiums over time and between companies

The first elementary observation which most commentators ignore is that there are very large market variations in insurance premiums for identical risks between companies and over time. These variations appear to be driven primarily by commercial factors, rather than evidence about underlying claim rates. For term life insurance, typical premium rates in the UK declined by about 30% over the five years to 2003, and then rose about 20% in the following year. For critical illness insurance, guaranteed premium rates declined around 20% over the 3 years to 2002, and then rose between 50% and 100% during 2003. At any time, the spread of the cheapest few rates in the market available from different insurers for a given life insurance risk is often up to 50% or more. In the context of this cyclical, approximate and turbulent pricing, all estimates of the alleged “costs” of adverse selection from a ban on access to genetic tests are reduced to background noise.

Risk selection customs: when in Rome...?

Another elementary observation is that there are large differences in insurers’ risk selection practices (and government regulation thereof) across different products and different countries. For example, private health insurance in Ireland has effectively no underwriting; life insurance in several European countries is unisex; in the UK gender differentiation exists in life insurance, but usually not in health insurance; and so on. These differences seem to be largely matters of custom and practice, without compelling technical rationales. The general lesson is that private insurance can work under a wide range of risk classification

schemes. Several years ago, one could already see that even if genetic tests became vastly more predictive, access to test results would not be needed to make insurance work – because there were already so many different ways of making it work.

Adverse selection is not adverse

The term “adverse selection” is a manifestation of structural bias: “adverse” actually means “adverse to the insurer”. Adverse selection means that (more) insurance tends to be bought by people who are likely to need it. From a public policy viewpoint, this is often a positive effect, at least at first order. There exists a possibility of negative second order effects (i.e. the “adverse selection spiral”), but only if adverse selection is severe.

Optimal selection

In markets where adverse selection is positive, a benevolent policymaker should set the rules to target a relatively high level of “adverse” selection. In many markets, the optimal level of “adverse” selection may be the level which maximises the “overlap” of loss events and insurance coverages – that is high enough that many higher risks are covered, but not so high that an “adverse selection spiral” develops. (Note that an insurer’s objectives may be quite different from those of a benevolent policymaker – and will often be furthered by minimising the “overlap” of loss events and insurance coverages: “insurance sold to people unlikely to need it.”)

Whether a benevolent policymaker can engineer adverse selection “high enough” is a moot point. For the adverse selection story to be true, insurance purchasing decisions need to be highly responsive to price and risk differences, that is the price and risk elasticities of demand for insurance should be significant. There has been little empirical investigation of this point (another case of structural bias?), but some recent evidence suggests that the elasticities might be rather low. This is consistent with the paradigm adopted by most financial advisers in relation to life insurance – which is about meeting the client’s protection needs at minimum cost, not maximising wealth by exploiting variations in insurance prices.

Adverse selection and large policies – the one-shot gambler?

If insurers are banned from asking about genetic tests, could customers with private knowledge of their genetic condition exploit this by taking out very large insurance policies? I think the answer is generally no, because the customer cannot make the “favourable” bet 1,000 times: he is a “one-shot gambler” who can make the bet only once. As soon as one considers plausible probabilities and premia, it becomes clear that the “favourable” bet is in fact unattractive to a person who can make the bet only once.

What should be done?

Many people experience profound unease at the notion of legitimising genetic discrimination in insurance – because of concerns about public health, or human rights principles, or the dubious history of “scientific” genetic discrimination, or other reasons. Some people might be able to suppress this unease, if there were compelling evidence that genetic discrimination is essential to the operation of insurance markets; but the fact is that there is no such evidence, despite the structural bias which favours its production and promulgation. In these circumstances, the search for “scientific” justifications of genetic discrimination repeats an old mistake, which has been made many times and in many contexts in the past 100 years.

A better policy response would be to extend and reinforce the moratorium, either by legislation or by agreement. The GAIC paradigm of “scientific” State endorsement of specific genetic tests should be reconsidered, in the light of the realities of insurance markets and pricing as outlined above. To the individual affected by a genetic condition, it must seem of very little comfort – indeed arguably rather sinister – to know that discrimination against one carries the State’s imprimatur.

Annex E – Abstract of Dr Cristina Parsons Perez's Presentation

This presentation on “the patient perspective on genetics and insurance” was given at GAIC’s December 2004 meeting on behalf of Breakthrough Breast Cancer, CancerBACUP & the Alzheimer’s Society. Please note that the views expressed in this abstract are the authors’ own, and do not necessarily reflect the view of GAIC or the Government. A copy of the slides to go with this presentation are on the GAIC website at www.advisorybodies.doh.gov.uk/genetics/gaic/meetings.htm

Breakthrough Breast Cancer, the Alzheimer’s Society and CancerBACUP participated in GAIC’s 19th meeting with the aim to actively participate in the discussion and to present the patient perspective on genetics and insurance. To further emphasise the human dimension of this issue, a patient advocate with a strong family history of breast cancer also participated in the presentation.

The access to genetic information with its profound implications on clinical outcomes, also raises wider ethical, societal and moral issues. For this reason, the bioethical considerations and the patient perspective must be considered alongside the clinical, scientific and actuarial implications of the use of genetic test results for insurance purposes.

To ensure that the patient voice is listened to and considered in this debate, Breakthrough Breast Cancer conducted a survey amongst women with a family history of breast cancer (the Breakthrough Genetics Reference Group – GRG) and women who have had breast cancer or who have a personal interest in this disease (the Breakthrough Campaigns & Advocacy Network – CAN).

The survey highlights that the potential impact on insurance premiums would deter 28% of GRG respondents from having a genetic test. The decision to take a genetic test is extremely personal but there are serious clinical and scientific implications for women (and their families and indeed the general public) who are deterred solely because of potential insurance related consequences.

Furthermore, the survey suggests that in contrast to the concerns of insurance companies, less than a third of GRG respondents would change their insurance purchasing behaviour, if they had a positive genetic test result.

Many of the respondents (61% of GRG and 54% of CAN) consider genetic information to be different to other types of information. They state that genetic information is

unalterable, out of their control, passed on to their offspring and private. People believe that the use of genetic test results is “unfair” given that they cannot control their genetic make-up; and furthermore a positive genetic test result does not necessarily mean someone will develop breast cancer. In addition, some people argue that the use of genetic information will eventually affect everyone, as more genetic predispositions are discovered. Some respondents also mentioned that the use of genetic test results would be particularly unfair towards those women with positive results who have taken preventative measures (such as bilateral prophylactic mastectomy) to reduce their risk of developing breast cancer.

The majority of the respondents disagreed with the use of genetic test results for insurance purposes (91% of GRG and 78% of CAN).

When asked what they would like to see replace the current moratorium on the use of genetic test results by insurance companies, 56% of all GRG and CAN respondents wanted legislation preventing the access by insurers to genetic test results and 35% would like to see an extension of the current moratorium. It still remains unclear what will happen to the results of genetic tests taken during the current moratorium and further clarification of this point is required.

As patient representative organisations we would like to emphasise the need for general informed debate on genetics and insurance in the public arena and want to ensure our contribution joins those of all relevant organisations for a constructive and comprehensive policy-making process.

Annex F – Report of “Insurance, Genetics & Fairness II” Joint Public Meeting

The second joint public meeting of GAIC and HGC focussed on research in the area of genetics and insurance, and attracted 87 people. The morning session had speakers on the following topics (all presentations are available on the GAIC website):

- Mr Alan Tyler – Seeking a Solution I: The Dynamics of Insurance
- Dr Paul Bennet and Professor Susan J Smith – Genetics, life insurance and financial inclusion: Findings from the University of Edinburgh ESRC Research project
- Professor Angus MacDonald – Actuarial assessment of genetic risk
- Professor Paul Fenn – Genetic information and the sustainability of pooling insurance contracts
- Mr Adam Butterworth – Risk of cancer for individuals with a family history
- Professor Patrick Morrison – Predictive testing for HD, BRCA1 & BRCA2 – Insurance issues
- Mr Alan Tyler – Seeking a Solution II: Industry research

The afternoon session was a panel discussion, details of which are given below.

Analysis of Feedback

43 feedback forms were received – an approximate 50% response for an attendance of 87 people. Delegates mostly rated the event as Excellent (40%) or Good (49%). Most delegates rated the delegate pack as Excellent (60%) or Good (35%), and the promotional flyer as Excellent (21%) or Good (51%).

79% thought the key issues in genetics and insurance research had been discussed. 70% thought that the current policy of a moratorium is about right. 95% thought that this would make a good annual event. 84% of delegates had heard of GAIC before attending the meeting, and 88% had heard of HGC. Feedback comments from attendees were:

- Inclusion of patient representative groups in the future in these events (give them plenty of notice to prepare, survey etc). Good open discussion sessions.
- I think that the questioning after each presentation may have been given a little more time, as presenters were under time and stress pressures to answer. It would be good to place discussion of these answers on the website. Otherwise, great conference!

- Very good level of debate and easy venue. Many thanks.
- Fantastic day. Very helpful and very informative.
- Clearest presentation for lay public = Andrew Butterworth. Don't understand some of the presentations. Would like to hear arguments against use of tests.
- The event was brilliantly organized, the speakers and attendants were of high quality and interesting backgrounds. Excellent!
- Specific questions like what advice do we give patients with inherited diseases were not discussed.
- Would have been useful to have a list of delegates included in the pack. Would be useful to have more information on public views on this issue.
- More views from people taking predictive genetic tests please.
- Too many speakers on behalf of insurance industry.
- [Moratorium] levels are too high. Further discussion about what should happen post moratorium [needed].
- Lecture theatre venue is better than hotel room. Have a "Genewatch" speaker next time.
- Interesting day. Good mix of speakers.
- Need political debate and more economic discussion about solidarity versus mutuality models in relation to Government pressure for individuals to finance pensions by effective self insurance. Well organised and much appreciated.
- Thank you for the invitation to attend your lecture/debate. I found it interesting, even if I could not follow the whole thing.
- Thank you for inviting us to this event. I found it very interesting although did not understand all the insurance references.
- Copies of slides are too small – illegible in places – otherwise good.

Please note that these are unedited individual comments and may not be representative of the reaction overall. The Committee is grateful for all the helpful comments received on the feedback forms, and these will be used to inform the programme for the next event.

Main points of panel discussion

Please note that the points raised in discussion do not necessarily reflect the Government view or the view of any particular organisation. Nor should they necessarily be taken to represent the majority view of the participants.

Section 1: The developing evidence base and the impact of new knowledge on health and actuarial relevance.

Modifiers of risk

It is clear that genetic testing for disease predisposition may lead to earlier diagnosis and treatment as well as potentially prompting an individual with an adverse test result to make life-style changes aimed at minimising the risk of developing particular diseases. It was stated that the actuarial tables used by insurers, because they are retrospective in nature, will inevitably lag behind the pace of introduction of new treatments and the impact of preventative measures. While actuaries make every effort to forecast accurately and will adapt past experience to be predictive, these predictions are likely to be conservative because the long term impact on insured risk is unproven and needs to be measured. Hence, developments in diagnosis, medical treatment and prevention will take time to be reflected in published statistics.

Reassurance was sought that such developments would be properly reflected in the setting of premiums both for those with a family history and adverse test results. A comparison to the treatment of familial hypercholesterolemia and modification of risk by statins was drawn, where insurers have adapted their underwriting terms to take account of the impact of such treatment.

It was also pointed out that existing policyholders benefiting from new forms of treatment having a positive impact on the insured risk, could request the insurer to review its underwriting decision to see whether improved terms could be offered.

Genetic tests for multi-factorial disease

It was thought unlikely that knowledge relating to the role of genetic predispositions to multi-factorial disease would develop over the short to medium term to such an extent that the test results would have a significant impact on insurance premium setting, because:

- The nature of interactions between genes and environmental factors in such conditions is not yet known;
- It will be difficult to gather, use and analyse genetic data pertinent to risk because definitions and etiologies of multi-factorial disorders are more diverse than for single gene disorders.

- Population studies provide an ambiguous body of evidence. It was noted that even in the case of Huntington’s Disease genetic modifiers of age of onset have recently been identified.
- Research studies tend to focus on the most affected patients and therefore may not accurately reflect the risk of any given mutation(s) in an individual.
- Data available to date is global and meta-analysis will need to allow for modifier effect. Care has to be taken when studying different populations as different populations have different risk modifiers.

This lack of evidence to justify the use of genetic predisposition tests for multi-factorial diseases was cited as good reason for maintaining the current moratorium indefinitely. However, if this material is not significant to the underwriting process, insurers will not bother with it, so it is not clear what risk there is to the consumer. It was noted that even without the moratorium a substantial body of evidence would be required to convince GAIC of the relevance of such adverse test results.

The panel concluded that genetic components of multi-factorial diseases are unlikely to become a major adjuster in terms of premiums. Age, sex, medical history, smoking, life-style and environmental factors were cited as the greatest influence on premium setting.

Section 2: A long-term policy to replace the moratorium after November 2006

Time-lines for developing a long-term policy

There was general agreement that discussions must begin soon as arrangements should be in place well in advance of the expiry date for the current agreement (November 2006). Ideally, within the next year the panel agreed that options should be developed to identify what would replace the moratorium and for how long.

The process has already started with GAIC/HGC and ABI. GAIC/HGC are committed to a report on the working of the moratorium and a review of the financial limits within the next year.

Impact on the insurance market

With respect to the possibility of extending the moratorium insurers highlighted the importance for the industry of knowing what the costing implications would be; under the moratorium the rate of information gathering is necessarily slower than if the effect of using tests could be taken into consideration. The moratorium effectively prevents the collection of insurance based data because insurers cannot identify applicants who have had adverse test results.

There had been speculation and drawing of conclusions from evidence of variable quality re the impact of denying UK insurers access to genetic test results. Very little measurable impact on overseas markets (eg Belgium) had materialised as a result of similar or more stringent moratoria – but this is partly a function of the way those countries run their insurance markets. In the UK, where the system is more competitive and underwriting is a significant factor in risk selection, standard prices are low. In other countries where the ethos is more towards a common social system and the impact of underwriting is less significant, standard prices are higher.

However, it was thought to be feasible to calculate the effect of adverse selection under an extreme model without the direct gathering of evidence from insurers/applicants. This would entail a “worst case scenario” calculation. If adverse selection occurred for all currently available tests in current practice (taking into account typical uptake) what would be the maximum effect on premiums across the board? If the impact (of anti-selection) were not substantial this would clearly argue for the continuation of the moratorium or a similar system. It should be remembered though that anti-selection is only one of the issues driving the moratorium, and other issues are also important. These include why those presenting an increased risk because of genetic susceptibility should be treated differently by insurers than those presenting similar risks from other causes, or indeed identical medical risks identified by other medical tests.

Data had been presented by Angus MacDonald which calculated the effect of the current moratorium in terms of Huntington’s disease as a 0.1% increase in premiums. Inclusion of family history in this model raised premiums by 0.4% (for HD). The extremity of the HD example was noted in that the disorder is highly penetrative and there is no cure. The model assumed extreme behaviour and that everyone can afford to buy insurance and everyone takes a test.

The likely impact of extending the model to the totality of Single Gene Disorders was quoted as increasing premium increases for mortgage-related life insurance by less than 10%. However, it would be unlikely to be 10% across the board for all insurance products, as the impact will be different on different products e.g. higher for Critical Illness than for Life. Also, adverse selection is more limited in mortgage-related situation, as the amount of insurance requested needs to relate to the size of the mortgage. Increases for life insurance policies unrelated to house purchases are likely to be greater than 10%.

Adverse selection may be balanced by “propitious” selection. The cautious higher socio-economic groups with longer life expectancy, and better general health are more like to buy insurance. However, this is already factored into insurance pricing as premium rates are primarily based on insured experience not population experience and higher socio-economic groups will only continue to purchase if they think the price is fair.

Decoupling of products

There is an increasing tendency for insurers to sell packages of insurance products, for example joint Life and Critical Illness products. It is important to note that any additional information collected for health insurance purposes will also be used in assessing the life insurance risk. Due to the complexities introduced by genetic factors it was suggested that decoupling of products and premium settings for those products would potentially advantage the customer, however, research shows increasing consumer demand for combination products, which can deliver a range of benefits to consumers including price savings due to more effective risk packaging and lower administrative costs.

Concept of Universal Insurance

The concept of universal health insurance, free at the point of delivery, as provided by the NHS was given as an example of the solidarity model. The panel was asked to speculate as to whether this model could be applied to other forms of health related insurance i.e. is it time to move to solidarity rather than mutuality in insurance provision? The following issues were raised as pertinent to this question:

- Is life (or any other kind of insurance) a social good or a luxury? In his earlier presentation Paul Bennett had shown the results from a Citizens' Jury who did not trust governments to be willing or able to provide universal insurance.
- The flip side would be that insurance would be compulsory but many people will say that they don't need/can't afford life/health insurance.
- Is there an obvious need to push towards solidarity rather than towards ever increasing number of sub-groups because eventually the low risks will not take out insurance and the high risks will want insurance? Continual fragmentation of the market could make it unsustainable.

The rationale behind the last point, and the benefits, were not clear. Life and health insurers always gear their base pricing towards low risks (the great majority taken on standard terms, not a tiny subset of the overall number of applicants that they see) to ensure that they attract as many of these as possible. Under a social insurance system, this majority would get poorer value for money and may struggle to afford insurance. Maybe it would also be worth looking at an argument which says that charging lower premiums to lower risks should act as a positive incentive to prevention and better health management, just like the credit you get on your home insurance premiums if you install approved locks/alarms and are a member of a neighbourhood watch scheme?

Section 3: Public Involvement

Concerns were raised that the decision on future policy would be purely political and the relevance of the open meeting questioned; little evidence had been gathered from people who do not want insurers to have access.

The point was made that those arguing for legislating to ban the use of genetic tests by insurers were starting from different principles in that their concerns relate to impact on a patient's decision to take a test. Proponents of such a policy were thought to believe that the benefit of doubt should go to those people and "insurers should bear the consequences".

The point was made that both HGC and GAIC value the non-industry view and do not presuppose support of the industry case. GAIC membership for example includes patient and consumer representatives.

All agreed that public input was valuable and necessary and that a future open meeting with consumer/patient emphasis would be very welcome.

Annex G – HGC/GAIC Subgroup on Future Issues for Genetics and Insurance

A subgroup of GAIC and HGC met three times in 2004. The purpose of the joint group is to provide a forum to discuss areas of genetics and insurance that may fall between the gaps in the respective parent bodies' terms of reference or expertise. The group has discussed a range of issues relevant to what should happen after the current moratorium, as well as the need to obtain more information on developments in genetics and insurance.

More details are on the webpages of the HGC's Genetic Discrimination Monitoring Group which can be found here: www.hgc.gov.uk/Client/Content.asp?ContentId=254

Annex H – Workshop on Actuarial Techniques

The purpose of the workshop was to provide a forum to discuss the necessary actuarial methodology that would enable the insurance industry, through ABI, to produce applications to GAIC that adequately address GAIC's actuarial relevance criterion. To this effect, GAIC, represented by Profs Johns, Wilkie, and Reynolds and by Mr Paul, invited a number of representatives from the insurance industry to participate in this workshop. These attendees were Ms Debbie Akers (Friends Provident), Mr Graham Austin (Munich Re), Mr Bill Baker (Swiss Re), Mr Malcolm Weir (GE Frankona Re), Mr Bob Wakerly (Norwich Union Life) and Ms Caroline Feaver (Hannover Life Re). Prof Angus Macdonald of Heriot Watt University also attended as an invited speaker.

The workshop was split into seven sessions which covered an introduction to GAIC by Mr Paul, a brief overview of the first submission of the 18 applications by ABI in December 2000 (Ms Akers), three presentations by Prof Wilkie on models and bases for life insurance, critical illness insurance, and long term care & income protection, and two presentations by Prof Macdonald on genetic epidemiology and actuarial models and the mixing of statuses: Family history and variable genetic disorders.

The workshop was well received by all participants. GAIC hopes that the workshop will help ABI put together new applications to GAIC.

As a first step, ABI is to set out a template for the actuarial methodology to be adopted for future applications.

Annex I: NHS Predictive Testing of BRCA1, BRCA2, HD, APP, and PS1 Genes

As part of its work as a technical Committee, and to inform policy making, GAIC has been gathering data on the number of predictive genetic tests done by the NHS, focusing on the BRCA1, BRCA2, HD, APP and PS1 genes. For insurance purposes it is the number of adverse (positive) tests that is of most significance whilst a moratorium on the disclosure of such results by applicants for insurance is in operation, and the Committee has attempted to establish the likely number of positive tests that have been generated each year.

Please note that the data is only a rough estimate, and some of the assumptions made to aid the calculations may need to be revised in the light of new data, which could significantly change the estimates. The Committee was principally interested in whether there were likely to have been 10s, 100s, 1000s or more positive predictive genetic test results, rather than the exact numbers.

Methods

Most of the data comes from Dr Gail Norbury (personal communications), Chair of the Clinical Molecular Genetics Society's Audit Subcommittee, and the Committee is very grateful for her willingness to share this important data, and for help with the analysis. Other sources include DH media briefings on BRCA testing volumes over 1996-1999 and a paper from Professor Peter Harper on presymptomatic testing for Huntington's disease. (Peter S Harper et al., J Med Genet 2000;37:567-571). The raw data is presented in **Table 1**.

Table 1: Total numbers of predictive and diagnostic genetic test results reported for BRCA1&2, HD, APP & PS1 genes from the NHS for 1994-2003. Note that for HD data, 1994-1997 is for predictive tests only, whilst 1999-2003 is for predictive AND diagnostic tests.

Year	BRCA1&2	HD	PS1	APP
1994		550	0	0
1995		625	0	0
1996	458	525	0	0
1997	856	550	0	0
1998	1173		0	0
1999	1740	1080	0	0
2000	1889	956	0	0
2001	2469	1010	0	0
2002	3142	1099	1	0
2003	4635	1079	Not known	Not known

Points to Note

There is effectively zero APP/PS1 testing done by the CMGS consortium (i.e. all NHS laboratories).

The BRCA-testing figures are a slight underestimate of total numbers, perhaps of around 5%, due to incomplete data. Although the BRCA figures show a steep rise, it is difficult to extrapolate to future data. This is because we do not know whether:

1. NHS laboratories are meeting current demand for BRCA-testing (in which case the curve may plateau),
2. Current figures include tests to clear existing backlogs (in which case the curve may fall as backlogs are cleared over the next few years), or
3. There are any new strategies “waiting in the wings” to promote BRCA-testing (in which case the curve may rise), or
4. Uptake of predictive genetic tests will increase as treatment options improve (in which case the curve may rise).

The percentage of predictive tests is also likely to increase as the Government’s investment into the NHS genetic services helps to set up high throughput facilities to increase mutation screening (see below) capacity, clear backlogs and enable more predictive genetic tests to be done more quickly. At some point, a “steady state” should be reached where only “new” cases will be detected. This would be expected to cause the curve to plateau.

As the new 2004 NICE guidelines are implemented, this will further restrict access to NHS BRCA-testing, which may slow the rate of increase of the total number of tests. However, the NICE guidelines also call for 100% of both genes to be screened, rather than the 60% typically done in the NHS at present, which is likely to increase the percentage of positive results. Taken together, the NICE led pressures to decrease BRCA-testing, whilst aiming to increase the percentage of positive test results, may not have much impact on the total number of positive test results.

There is an approximate doubling in the HD numbers between 1997 and 1999. This is because the 1994-98 data is an “eye-guess” from Professor Harper’s paper which only gives data for predictive NOT diagnostic tests, but the 1999-2002 data is from Dr Norbury, and is for predictive AND diagnostic tests. However, it appears that the number of predictive HD tests is relatively stable at around 500-600 a year.

The BRCA1/2 data cannot be separated out into precise numbers for BRCA1 and BRCA2, although this is not particularly important, as it does not make much difference for insurance purposes which BRCA gene has an adverse mutation, just that there is one.

With BRCA testing there is another complication in that the number of tests reported cover both predictive genetic testing AND mutation screening. Mutation screening is a long, complex, and expensive process, whereas predictive genetic testing is relatively quick, simple and cheap. Mutation screening is a diagnostic test where an individual with breast/ovarian cancer (the “index case”) has both of her BRCA genes analysed in detail, and, if an adverse mutation is found that is thought to causes the cancer, then the index case’s relatives can be offered follow-on predictive genetic testing, which just looks for the exact mutation found in the index case. If the mutation screening test does not detect any adverse mutations, then there is no need to offer predictive genetic testing to other family members. As most cancer is not due to BRCA1/2 mutations, most mutation screening tests do not lead to predictive genetic testing of other family members. Where predictive genetic testing is offered, it is usually carried out in a cascade fashion round the family, as once it is known that the mutation hasn’t been passed on it is not necessary to carry on testing other descendents.

For example, if a grandmother with cancer is the index case, and an adverse mutation is detected from the mutation screening test, her daughters are then offered predictive genetic tests. If the predicted mutation is not detected, then there is no need to offer the granddaughters predictive genetic tests. Also, as people get one of each BRCA genes from their mother and one each from their father, even if the mother “index case” has an adverse mutation screening result, any family members (daughters) who are offered predictive genetic testing will only have approximately a 50/50 chance of inheriting the damaged versions of the genes. An analysis by D. G. Evans et al. (J. Med. Genet. 2005;42;6- doi: 10.1136/jmg.2004.028514) quotes 45% for a series of UK women, with different proportions by age. See **Table 2**.

Table 2: Adapted from D. G. Evan’s data on proportion of unaffected female first degree relatives of BRCA1/2 mutation carriers testing positive for the family mutation

Age at testing	18-29	30-39	40-49	50-59	60+	Total
Proportion positive (%)	47	58	43	39	4	45

Analysis of number of positives

1. BRCA1 & BRCA2 gene testing

From additional data provided by the CMGS, the number of positive tests recorded for BRCA1 mutation screening is around 13% (4% to 25% reported from 9/13 labs). For BRCA2 mutation screening it is between 5% and 16% (data from 3/13 labs). The key point here is that for BRCA testing, most of the mutation screening results are negative (over 75% for all NHS labs, and up to 95-96% in some NHS labs), but for predictive genetic testing approximately half would be expected to be positive. Also, according to figures from Great Ormond Street Hospital (Gail Norbury – personal communication), only about 19% of BRCA test reports are for predictive genetic tests. This data can then be used to make an

estimate of the number of positive predictive tests, as shown in **Table 3**. See footnote¹ for details of the calculations.

Table 3: Estimates of numbers of positive (adverse) BRCA1&2 predictive genetic tests from 1996 to 2003

Year	BRCA1&2 – Total numbers mutation screening and predictive genetic tests	Estimate of number of predictive genetic test results	Estimate of number of POSITIVE predictive genetic test results
1996	458	87	39
1997	856	163	73
1998	1173	223	100
1999	1740	331	149
2000	1889	359	162
2001	2469	469	211
2002	3142	597	269
2003	4635	881	396

2. HD gene testing

A similar calculation can be made using the HD data. From Professor Harper's paper, 1018/2462 (41.35%) individuals had positive results, whilst from Dr Norbury's data positive results are a little less than 50%. Because the data series for 1999-2002 gives predictive AND diagnostic services, an assumption needs to be made about the split. In the absence of other data, 50% has been chosen (as 1994-1997 averaged ~560 predictive test per year, and 1999-2003 was ~1045 predictive AND diagnostic) and the high and low estimates for 1999 on are reduced by 50% accordingly. Professor Harper's data (41.35%) is then used to give the low estimate and Dr Norbury's data (50%) for the high estimate.

Note that the percentage of positive results decreases with age – from Professor Harper's paper. This is as given in **Table 4**:

¹ **BRCA1/2 calculation:** This is more straightforward than for Huntington's: Given that approximately only 19% of BRCA tests are actually predictive genetic tests, and of those approximately 45% will be positive, the estimated number of positive predictive genetic tests result is the total number of tests multiplied by 0.19, then by 0.45, which is simply the same as 0.0855 of the total number.

Table 4: Professor Harper’s data on differences in percentage of positive HD tests with age

Age	<20	20–29	30–39	40–49	50–59	60–69	70+
Proportion positive (%)	61	46	41	41	35	30	29

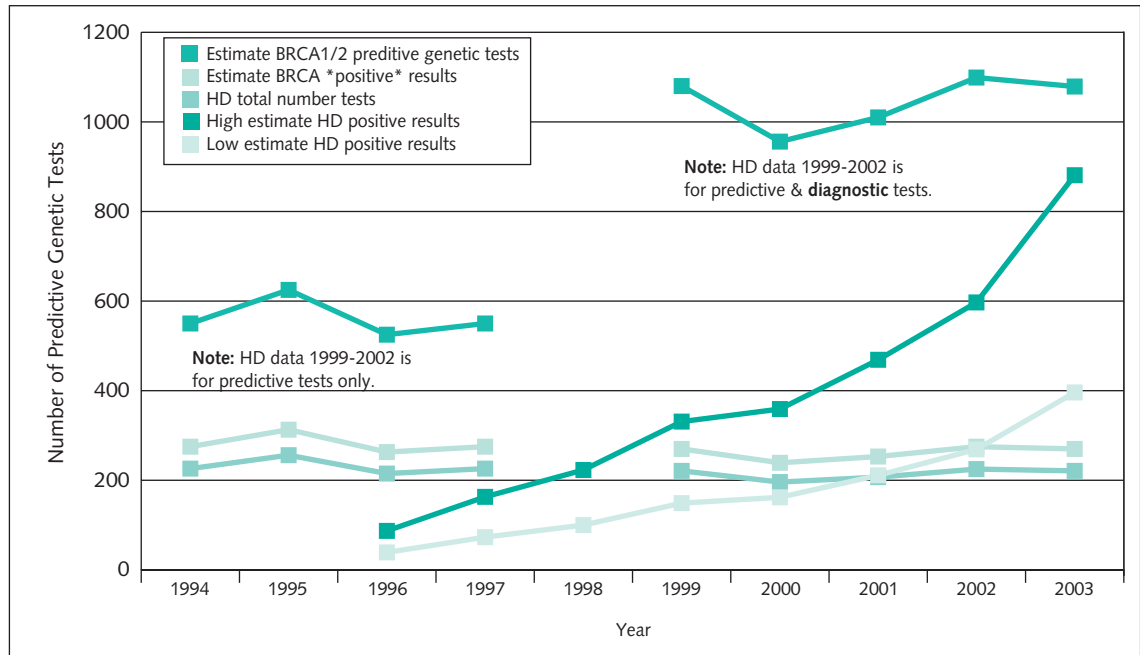
However, as the data from 1999 to 2003 does not give a breakdown by age, it is not possible to give a more accurate estimate than using the rough guess 50% and 41% coefficients given above. **Table 5**, on the next page, gives the estimates for HD testing.

Table 5: High and low estimates of numbers of positive (adverse) HD tests from 1994 to 2003

Year	HD (estimated predictive numbers in brackets for 1999–2003)	High estimate of number of positive predictive tests	Low estimate of number of positive predictive tests
1994	550	275	226
1995	625	313	256
1996	525	263	215
1997	550	275	226
1998	No data	–	–
1999	1080 (540)	270	231
2000	956 (478)	239	196
2001	1010 (505)	253	207
2002	1099 (550)	275	225
2003	1079 (540)	270	221

The data for both BRCA1&2 and HD are summarised in the following graph.

Predictive (and Positive) BRCA1&2 and HD Genetic Tests



The BRCA and HD figures in context
 HD Data 1999-02 Gail Norbury – predictive tests only
 HD Data 1999-02 Gail Norbury – predictive AND diagnostic tests

To put the figures in context, data from various official sources, and charity Internet sites, are presented here:

- **Breast cancer**
 Percentage positives:
 Since 1996, 11% of total number for estimate of number of predictive tests
 Simply 45% of 19% for estimate of number of positives

Breast cancer usually occurs in women but it can occur also in men. It is the most common cancer in women. 30% of all cancers in women occur in the breast. Each year, there are nearly 41,000 new cases and approximately 13,100 women die from this disease in the UK. The strongest risk factor for breast cancer (apart from being female) is age, approx. 80% of all breast cancers occur after the menopause. While the number of breast cancers in women aged 25-34 has increased slightly, the risk of developing the disease in this age group remains low. As mentioned above, most breast cancer is not due to genetic factors – only around 5 to 10% is thought to be due to mutations in the BRCA1 & BRCA2 genes.

- **Ovarian cancer**

UK incidence for 1999 was 6,800 cases of which 5,569 were in England, 441 in Wales, 559 in Scotland and 191 in Northern Ireland. Ninety per cent of cases and 95 per cent of deaths occur in women over the age of 45. In 2000 in the UK there were 4,431 deaths from ovarian cancer: 3,909 in England and Wales, 442 in Scotland and 100 in Northern Ireland. As with breast cancer, most ovarian cancer is not due to genetic factors.

- **Huntington's disease**

Huntington's disease is a rare condition and affects approximately 6,000 people in the UK. Professor Harper's paper has some more details, also Britain has a higher prevalence rate than that seen in Europe with an estimated 5 – 10 HD cases/100,000 of the population. There is ethnic diversity and the average European incidence is slightly lower at an estimated 3 – 5 HD cases/100,000. The lowest reported prevalence is between 0.1 – 0.5 HD cases/100,000 in Japan.

Annex J – Concordat and Moratorium on Genetics and Insurance

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Introduction

- 1 The Government and the insurance industry recognise and wish to respond to understandable concerns about the potential use of personal genetic data by insurance companies. They consider that the relationship between medical data and insurance underwriting should be proportionate and based on sound evidence. They also accept the commercial principle that, unless otherwise agreed, insurance companies should have access to all relevant information to enable them to assess and price risk fairly in the interest of all their customers.
2. They agree to:
 - (i) create a policy framework ('Concordat') for cooperation that provides that insurers' use of genetic information is transparent, fair and subject to independent oversight, building on existing voluntary codes of practice;
 - (ii) extend the existing voluntary Moratorium on insurers' use of predictive genetic test results by five years to 1 November 2011, and to review this Concordat in 2008.
3. This document provides a single high-level policy agreement on the use of genetic test results in insurance underwriting practices. It is informed by discussions between the Association of British Insurers, its member companies and the Government, the Genetics and Insurance Committee (GAIC) the

Human Genetics Commission (HGC), patient groups and other interested parties.

Background

4. Genetic testing is in its infancy and its long term implications for insurance, preventative medicine or treatment is indeterminate. The majority of genetic tests confirm diagnoses of ill health and inform treatments. Such diagnostic testing falls into the same category as other clinical technologies. The Concordat is concerned only with the far smaller number of tests used to predict future illness. Only in recent years has it become possible to design tests that examine genetic material for changes that may predict future disease. Even with such advances, very few tests can predict with any certainty when an illness might begin, or how severe it might be. There remain concerns that a minority of patients might be deterred from taking predictive genetic tests, if they fear that insurance companies may discriminate against them unfairly on the basis of the test results. The Concordat addresses those fears.
5. The Concordat preserves the principle that, unless otherwise agreed, insurance companies should have access to all relevant information to enable them to assess and price risk fairly in the interest of all their customers. So, if a customer for life insurance knows (from medical information, family history or tests) of a specific risk to his or her health, it should in all normal circumstances be disclosed. If

the risk is not disclosed, the insurance company may face more, and more costly, claims than it was able to assume in setting the price of its insurance policies. This could potentially affect the future pricing or availability of insurance cover to all.

6. The current approach works in practice because the number of policies affected by non-disclosure of predictive genetic test results is low. The moratorium allows customers who have had adverse predictive genetic test results to obtain significant levels of cover, whilst protecting the customers of individual insurers from the consequences of extremely high claims, which have not been priced for.

Purpose

7. The Concordat establishes a robust and flexible framework for cooperation between the Government and the Association of British Insurers and its members, and builds on the voluntary Code of Practice already implemented by the Association. It is designed to balance societal concerns with the need for a commercially viable, long term and fair insurance market. The Concordat sets out the policy on how predictive genetic tests may be used and creates strict arrangements for their use by:
 - requiring higher standards of evidence of increased risk than apply to other forms of medical information used by insurers;
 - subjecting the evidence to scrutiny and approval by a Government appointed independent committee;
 - creating a rigorous compliance process beyond the statutory and regulatory requirements; and

- creating an independent mechanism for handling any complaints that fall outside the jurisdiction of the Financial Ombudsman Service.

The Concordat and Moratorium protect the interests of both customers and insurers, by preserving customers' access to insurance, and insurers' right of equal access to information about risks.

Parties

8. The parties to this Concordat are the Government of the United Kingdom and Devolved Administrations ('the Government'), and the Association of British Insurers ('the ABI'). The ABI is the trade association for Britain's insurance industry. Its more than 400 member companies provide over 97% of the insurance business in the UK. The Government is represented by the Secretaries of State for Health and Trade & Industry and the Chancellor of the Exchequer.
9. Adoption of the Concordat is voluntary and is intended to be binding in honour only. It is a statement of intent and does not create legal obligations between the parties. However, some aspects, including the Moratorium, are in practice considered to be binding on all member companies of the ABI, via its Code of Practice.
10. Nothing in this Concordat should be construed as conflicting with statutory requirements or with other professional duties and obligations.

General principles

11. The parties to this Concordat agree the following principles:
 - Insurers should not treat customers who have an adverse predictive genetic test result less favourably than others without justification;
 - The technical, clinical and actuarial relevance of predictive genetic test results should be subject to independent oversight through GAIC;
 - Customers should receive clear explanations of their rights. They should have access to a free, independent service for resolving complaints;
 - Insurers and customers should have equal access to information that is material and relevant for insurance underwriting, except as provided for by the Concordat and the Moratorium on access to predictive genetic tests by insurers.

Predictive genetic tests

12. This agreement applies to predictive genetic tests, which examine the structure of chromosomes (cytogenetic tests) or detect abnormal patterns in the DNA of specific genes (molecular tests). It does not apply to non-genetic medical tests, for example blood or urine tests for cholesterol, prostate cancer, liver function or diabetes.
13. GAIC has said that it will consider applications to approve the use of predictive genetic test results by insurers for conditions that are:
 - Monogenic (single gene disorders that are inherited in a simple fashion);

- Late-onset (symptoms are delayed until adult ages); and of
- High penetrance (a high probability that those with the gene will develop the disorder).

Policy on the use of predictive and diagnostic genetic test results

14. Insurers have agreed a set of measures intended to reassure patients so that they are not deterred from taking a predictive genetic test by fear of potential insurance consequences. The measures cover:
 - the nature and detail of information sought from customers;
 - how insurers will handle information provided voluntarily by customers; and
 - the use made of that information.
15. The ABI will continue to work with GAIC, patient interest groups and industry stakeholders to examine methods of improving access to insurance for people with genetic diseases through, for example, development of standardised information about rare genetic conditions to give a common evidence base to underpin underwriting decisions.

Information sought from customers

16. Insurers agree that:
 - (i) Customers will not be asked to, nor be put under any pressure to, undergo a predictive genetic test in order to obtain insurance.

- (ii) Customers will not be asked to disclose another person's predictive test results, such as a blood relative's test.
- (iii) Customers will not be asked to disclose any predictive or diagnostic genetic test results acquired as part of clinical research.
- (iv) Customers will not be required to disclose any predictive genetic test results that are made available after their policy has started, for as long as that policy is in force.
- (v) Customers who have taken a predictive genetic test before the date of this Concordat will be treated in the same way as customers taking tests under the terms of the Concordat.
- (vi) Insurers are permitted to seek, with customers' consent, access to certain family medical history, diagnostic (but not predictive) genetic test results, and to reports from GPs in order to accurately price the additional risk from any health problems an applicant discloses.
- (vii) Customers can be asked by insurers to disclose the adverse results of predictive genetic tests approved by GAIC under specific conditions, when they apply for insurance policies over the financial limits of the moratorium.
- (viii) Insurers have stringent procedures for seeking access to relevant medical information held by a GP or other clinician, agreed between the ABI and the British Medical Association.
- (ix) Insurers will protect personal medical information in accordance with ABI Genetics Code.
- (x) Insurers will destroy medical evidence when it is no longer relevant to them.

Handling of information provided voluntarily

17. Insurers agree that:

- (i) Customers may choose to disclose predictive genetic test results that are in their favour in order to over-ride family history information. Individual insurance companies will publish information about the way they will use such test results to inform their underwriting decisions.
- (ii) Most insurance companies will take into account the result of such a voluntarily disclosed genetic test, even if it has not been approved by GAIC, provided that the result is from a reputable source.

Use of information

18. Insurers agree that:

- (i) They will not use information from predictive genetic test results to underwrite travel insurance, private medical insurance, or any other one-off or annual policy, or for long term care policies.
- (ii) The broad classes of insurance for which genetic test results may be relevant are confined to the following products:
 - life;
 - critical illness; and

- income protection.
- (iii) Where they make use of the results of GAIC approved tests to impose special terms or conditions, they will not impose unjustified exclusions from cover, or other special terms or conditions, which have the effect of preventing a policyholder from making a claim for a condition that is not related to the genetic condition identified by an approved test.
- (iv) If a predictive genetic test is disclosed by mistake, insurers will ignore it.

The Moratorium

19. The Moratorium on insurers' use of predictive tests is a key part of the overall Concordat. It makes an exception to the principle of disclosure. It allows patients who have taken a predictive genetic test to obtain significant levels of cover without disclosing the results of that test. Insurers have been prepared to bear the risks and costs of non-disclosure, which are spread across the broad pool of policyholders, because the number of policies affected by non-disclosure of predictive genetic tests is low. Accordingly the insurance industry and Government have agreed that the Moratorium should be extended.
20. The terms of the Moratorium are as follows:
- (i) Customers will not be required to disclose the results of predictive genetic tests for policies up to £500,000 of life insurance, or £300,000 for critical illness insurance, or paying annual benefits of £30,000 for income protection insurance (the 'financial limits'). More than 97% of

policies issued in 2004 were below these limits in each category.

- (ii) When the cumulative value of insurance exceeds the financial limits, insurers may seek information about, and customers must disclose, tests approved by GAIC for use for a particular insurance product, subject to the restrictions in the Concordat.
- (iii) The Moratorium will expire on 1 November 2011, unless it is explicitly renewed through the Concordat.

Compliance

21. The ABI will continue to run an annual exercise assessing the compliance of its member companies with the ABI Code of Practice and the Moratorium, the results of which are published. GAIC will continue to comment on this compliance report. Government and ABI will explore further and consult GAIC and the HGC on the detailed aspects of the compliance and complaints system, in conjunction with the revision of the ABI Code of Practice.

Code of Practice

22. The ABI will consult on and publish an updated Code of Practice ("the Code") laying down the standards that insurers should meet. Compliance with the Code is a condition of membership of the ABI. The new Code will update the detailed arrangements for the internal handling of genetic test results by nominated genetics underwriters and Chief Medical Officers within companies. It will also set strict standards for security and confidentiality of medical information.

The ABI will revise and reissue the Code from time to time.

Resolution of disputes and complaints

23. Customers have the right to ask an insurer to provide information on whether, and if so, how, a predictive test result has contributed to an underwriting decision. They have the right of appeal against an underwriting decision and a right to have a complaint heard fairly.
24. An insurer must tell a customer that they have the right to complain about a decision where a predictive test result has been disclosed and a customer believes that they have been unfairly treated. An insurer must explain the complaints process and adjudication system. It must investigate a complaint and give the customer a written decision as soon as is practicable and within the time limits set for authorised insurers by the Financial Services Authority.
25. Where a dispute is unresolved after this process, a complaint may be made:
- (i) under the terms of the Financial Ombudsman Service, if a complainant believes that they have suffered or may suffer financial loss, material distress or material inconvenience as a result of an insurer's wrongful act or omission. The service, which is available to customers once a contract is signed, is free to customers and decisions are binding on insurers and complainants, subject to the right of insurers to seek judicial review or complainants to go to Court in the normal way; or
 - (ii) to the ABI, who will look again at all the material facts and decide whether a breach of the Code, Concordat or Moratorium has occurred. The service is free to customers and is binding on insurers.
26. The ABI may refer cases to GAIC if it is unable to resolve them or if it believes that the case has wider implications concerning genetic testing. Customers may also appeal to GAIC if the ABI is unable to resolve a complaint to the customer's satisfaction about the way that an insurer has dealt with their case.
27. The Committee will adjudicate on the use and interpretation of predictive genetic tests by insurers. It may review the material evidence and may seek further information before reaching a decision. The service is free to customers and Insurers agree to be bound by decisions taken by GAIC. However, the Committee will not be able to give personal advice about insurance, or to deal with complaints about the ABI process, about firms which are not insurance companies or members of the ABI, the operation of an insurance policy, or an insurer's proper use of its commercial judgement.
28. If a customer receives a final decision from GAIC or from the ABI, with which they are not satisfied, they may ask the ABI to convene an independent tribunal under the terms of its Code of Practice. The tribunal will be authorised to fine companies and compensate customers, normally within six months. The tribunal service is free to customers and is binding on insurers.

29. In every case a customer's legal rights are unimpaired. They remain free to take court proceedings against an insurer at any time.

The Genetics and Insurance Committee (GAIC)

30. GAIC has developed and published the technical, clinical, and actuarial criteria for evaluating predictive genetic tests, their application to particular conditions and their reliability and relevance to particular types of insurance. GAIC's core duty will remain that of evaluating predictive genetic tests against those criteria and publicising its findings.
31. GAIC will provide independent, wide-ranging oversight of how insurers are using predictive genetic tests. It will continue to report to Health, Treasury, and Department of Trade and Industry Ministers on proposals it receives from insurance providers and the subsequent level of compliance by the industry. GAIC will publish an annual report containing details of tests reviewed and of insurers' compliance with the Concordat, Moratorium and ABI Code of Practice.
32. GAIC will liaise with the clinical genetics community, patient groups and experts in insurance and actuarial sciences. GAIC will monitor and publish trends on the nature and volume of NHS predictive genetic testing for late-onset, high penetrance single gene conditions, such as Huntington's Disease. It will also work with HGC to provide a horizon-scanning capability for potential future developments relevant to genetics and insurance.

The Human Genetics Commission

33. HGC will continue to advise Ministers on the ethical, legal and social implications of wider developments in genetics and their implications for healthcare and the adequacy of the regulatory framework that applies to human genetics. It will work closely with GAIC where these considerations relate to genetics and insurance.

Duration and review

34. The Concordat comes into effect on 14 March 2005. It may be updated in the light of experience, research findings and developments in genetic technology, and clinical practice.
35. The Moratorium on insurers' use of predictive genetic tests dating from 1 November 2001 will be extended by an extra five years until 1 November 2011.
36. There will be a review of the operation of this Concordat and Moratorium in 2008.



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