



R. G. Jamall

King's Fund Forum

CONSENSUS AND CONTROVERSY IN MEDICINE

Blood Cholesterol Measurement in the Prevention of Coronary Heart Disease

PROGRAMME AND ABSTRACTS

The sixth in a series of consensus development conferences

June 26, 27 and 28, 1989

REGENTS COLLEGE, INNER CIRCLE

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GENERAL INFORMATION

Conference sessions will take place in the Tuke's Hall, Regents College.

Telephone

During the conference, messages can be left for those attending on 01-486 0141.

Catering arrangements (in Herringham Hall)

26 June - Coffee, lunch and tea

27 June - Coffee and lunch

28 June - Tea

Microphones

Speakers from the floor are asked to use the aisle microphones and to identify themselves by name and affiliation.

Consensus statement

The final statement will be sent to all participants after the conference.

AGENDA

26 June 1989

08.30 Registration

Section I : Diet, Blood Cholesterol, and Heart Disease

- | | | |
|-------|---|---|
| 09.00 | Introduction | Dr Robert Maxwell,
Secretary, King's Fund |
| 09.15 | Blood cholesterol, diet and coronary heart disease: what are the links? | Professor Michael Marmot,
Head, Department Community
Medicine, University
College Hospital |
| 09.35 | Interventions:
does the evidence
justify action? | Mr Richard Peto, Head,
Cancer Studies Group,
Oxford |
| 09.55 | Discussion | |
| 10.15 | The population and high risk approaches to reducing heart disease | Professor Gerry Shaper,
Department of Clinical
Epidemiology & General
Practice, Royal Free
Hospital |
| 10.45 | Coffee | |

Section II : Dilemmas

- | | | |
|-------|--|--|
| 11.05 | The ethics of risk assessment | Dr Ranaan Gillon, Editor,
Journal of Medical Ethics |
| 11.25 | Psychological aspects of screening and risk assessment | Dr Marie Johnston, Senior
Lecturer, Department of
Psychology, Royal Free
Hospital |
| 11.45 | Cholesterol measurement: in whose interest? | Mr Geoffrey Cannon,
Secretary, The Guild of
Writers |
| 12.05 | Discussion | |

Section III : Approaches to prevention

- | | | |
|------------------------------|--|--|
| 12.30 | Why measure blood cholesterol levels: lessons from the USA? | Professor John Catford,
Director, Heartbeat Wales |
| 12.50 | Discussion | |
| 13.10 | Lunch | |
| 14.15 | Heartbeat Wales: A case study | Ms Helen Howson
Nutritionist, Heartbeat
Wales |
| 14.30 | Look after your heart | Dr Jackie Chambers,
Director, Public Health,
Health Education Authority |
| 14.45 | The contribution of national policy | Mr Christopher Robbins,
Food and Health Planner,
London |
| 15.05 | Discussion | |
| <i>Break</i>
<i>15.25</i> | 15.40 Monitoring risk assessment: experience from primary care | Dr Godfrey Fowler, Clinical
Reader in General Practice,
University of Oxford |
| <i>15.45</i> | 16.00 Drug treatment - risks and benefits for individuals | Dr John Betteridge, Reader
in Medicine, The Rayne
Institute, University
College |
| <i>16.05</i> | <i>Discussion</i> | |
| 16.20 | PANEL DISCUSSION | |
| | Professor Michael Oliver, | Professor of Cardiology |
| | Ms Kathy Elliott, | District Health Education
Officer |
| | Dr Tim Lang, | London Food Commission |
| | Ms Sibi Ramharry, | District Nutritionist |
| | Mr Michael O'Connor | Director, Coronary
Prevention Group |
| 17.00 | Tea and adjourn | |

Dr Richard Wray

Tuesday 27 June 1989

Section IV: Cholesterol measurement in practice

Hartger
Cenr Cardiology

- | | | |
|-------|--|---|
| 09.00 | Can blood cholesterol be measured accurately and reliably? | Professor Anthony Winder
Department of Chemical
Pathology, Royal Free
Hospital |
| 09.20 | The economics of blood cholesterol measurement | Mr Robert Anderson,
Economic Adviser,
Department of Health |
| 09.40 | Discussion | |
| 10.00 | Lessons from Goodhearted Glasgow | Ms Patricia Birkett,
Project Manager,
Goodhearted Glasgow |
| 10.20 | Measuring blood cholesterol at work | Ms Margaret Jones, Nursing
Officer, The Health
Promotion Authority for
Wales |
| 10.40 | Discussion | |
| 11.00 | Coffee | |
| 11.25 | The management and organisational challenges | Dr Ken Grant, District
General Manager, City and
Hackney Health Authority |
| 11.50 | OPEN SESSION | |
| 12.30 | Lunch and adjourn | |

Wednesday 28 June 1989

Final Session

- | | | |
|-------|--|--|
| 12.30 | The draft consensus statement will be available to the audience | |
| 13.00 | Presentation of consensus statement and discussion with audience | |
| 14.45 | Close of conference | |
| | Tea | |
| 16.00 | The final consensus statement will be made available | |

PANEL MEMBERS:

Dr Maurice Hayes BA, LLD, [Chair], Ombudsman for Northern Ireland, is an Honorary Professor at the University of Ulster, and Honorary Senior Fellow at Queen's University. He is a member of the Standing Advisory Commission for Human Rights. His early career was in education (Head of English, Downpatrick Grammar School 1955-72). He was Chairman of the Northern Ireland Community Relations Commission 1959-72 and Adviser to the Chair of the Northern Ireland Constitutional Convention 1975-76. He joined the Civil Service in 1981 as Head of personnel for Northern Ireland and in 1983 took up post as Permanent Secretary at Department of Health and Social Services until 1987 when he took up his present post.

Mildred Blaxter is a medical sociologist whose research has principally been in the fields of disability, lay concepts of health, and social inequality in health. During recent years she has been engaged on the national survey of 'Health and Lifestyles', and is the author of a book with that title which is to be published late 1989. At present she is a Research Fellow at the University of East Anglia, and Coordinator of the Programme of Behavioural Research on AIDs of the Economic and Social Council.

Martin John Buxton who is currently Senior Research Fellow in Health Economics and Director other the Health Economics Research group at Brunel University, has researched on the economics of the health care industry and on health service policy for over fifteen years. After working in universities and independent research institutes, he was employed as an Economics Adviser at the Department of Health and Social Security in London from 1978-1980. He has been involved in a number of major projects including evaluation of costs and benefits of heart transplant programmes, screening programmes for breast cancer and for diabetic retinopathy. He has written widely on evaluation of health technology.

Philippa Champion has worked mainly in the NHS, including sixteen years as a manager of Dietetic Services. Her research since 1983 includes a major organisational study of food purchasing in the NHS with the Cranfield Institute of Technology and a study of food health policy in the UK. She was a member of the National Advisory Panel for NHS Food Contracts. She now works freelance in the fields of Health and Social Policy.

Professor Desmond Julian MD FRCP, is currently Consultant Medical Director, British Heart Foundation. Emeritus Professor of Cardiology, University of Newcastle upon Tyne, immediate past President of the British Cardiac Society, Editor of the European Heart Journal and the author of several books on cardiology. His main research interests include coronary disease, Myocardial infarction, Arrhythmias, unstable angina, thrombolytic therapy and secondary prevention.

Shirley Goodwin BSc, SRN, NDNCert, RHV, is General Secretary of the Health Visitors' Association. She worked as a health visitor in West London for twelve years, during which time her professional interests and activities including breastfeeding, writing for the nursing press, dealing with stress, working with voluntary and community groups and serving as a member of the Health Education Council. She was elected Honorary Secretary to the Health Visitors' Association in 1979 and served until 1983, when she left health visiting practice to work for the HVA full-time.

Professor James McEwen MBChB, FFCM, is Professor of Public Health, and Head of Department of Community Medicine, University of Glasgow. He has acted as consultant to the WHO since 1977, is Vice Chairman to the Cancer Education Coordinating Group, Member of Council for the Section of Community Medicine of the Royal Society of Medicine and a member of the Working Group on Ageing of the Church of England Board for Social Responsibility. His research interests and publications include: Health education services and training - Health promotion in the workplace. Planning provision and evaluation of health services. Development and application of new measures of perceived health.

Tara Kumar Mukherjee FLIA, is President of the Confederation of Indian Organisations and a member of the Council of Management of the Coronary Prevention Group. He was previously Area Manager of the Guardian Royal Exchange and is current Managing Director of Owl Financial Services Ltd.

Peter Smith is Professor of Tropical epidemiology and Head of the Tropical Epidemiology Unit in the Department of Epidemiology and Population Sciences at the London School of Hygiene and Tropical Medicine. He studied mathematics and statistics at City University, London and, shortly after graduating in 1963, specialised in medical statistics. His research experience up until 1979 was mainly on the epidemiology of cancer, based at Units in London, Edinburgh, Boston and Oxford. In 1970 he went to work in Uganda for two years, which stimulated an interest in tropical diseases and this has been his major field of research since he joined the London School of Hygiene and Tropical medicine in 1979.

Dr Lesley Southgate, is Senior Lecturer in General Practice and Primary Care, in the joint Departments between the Medical Colleges of St Bartholomew's and the London Hospitals. Her major research interest is within womens health, particularly in relation to sexually transmitted diseases. She is also conducting research into drinking problems in young male GPs. She is a member of ACT (Anticipatory Care Teams, working for prevention of aschemic heart disease) and takes a particular interest in the ethical dilemmas arising within prevention.

Jill Stern has been Chair of Ealing, Hammersmith and Hounslow FPC since April 1985. Previously she was Vice-Chair of Ealing CHC. Her dissertation in postgraduate work was in church history and by profession she was a teacher.

Barbara Young is General Manager, Parkside Health Authority. Her early career was spent at the South Eastern Regional Hospital Board, Edinburgh where she gained experience in public relations and the workings of a Regional Authority. She has held several posts as District Administrator/Manager and in 1982 was one of only three women District Administrators in the Country. She is Secretary to the Special Trustees of St Mary's Hospitals, an active member of the Institute of Health Services Management, first woman president (1987-88) of the IHSM, member of the King's Fund Institute Advisory Committee, Member of the Steering Group of the Inner London Health Authorities Group, and member of the Editorial Advisory Panel of the King's Fund College Association Journal.

SPEAKERS:

Robert Anderson has held academic posts at the Universities of St Andrews and York. In 1975 he joined the Government Economic Service. For the past four years he has served in the Department of Health as an Economic Adviser working on a range of issues including prevention.

Dr John Betteridge, Reader in Medicine, University College.

Patricia M Birkett has been the Project Manager for Goodhearted Glasgow, the Greater Glasgow Health Board Cardiovascular Disease Prevention Programme, since 1985. She was the Sector Administrator for Community Health Services in the Northern District of Greater Glasgow Health Board 1974-1984, and Administrator, Woodside Health Centre 1972-1974.

Mr Geoffrey Cannon is the Secretary of the Guild of Food Writers. He was co-author: 'The Food Scandal' (1985), author: 'The Politics of Food' (1987, 1988). He is a member of the Nutrition Society and was a regular broadcaster/advisor to the BBC Food and Health Campaign during 1985-86, and consultant to the Health Education Council (1983-84). He has had major features published on food, nutrition, health and fitness in most of the quality national newspapers. He gave the Cantor Lecture on British Food Policy at the Royal Society of Arts in 1988. He is a member of the Canterbury Conference on Prevention of Heart Disease.

Professor John Catford is Director of the Welsh Heart Programme (Heartbeat Wales) and heads an interdisciplinary team responsible for planning, implementing and evaluating the community-based programme. He also holds the chair of Health Education and Health Promotion at the University of Wales College of Medicine, known as the Institute of Health Promotion. He has become increasingly involved in postgraduate education, including a MSc in Health Promotion and Health Education and annual international summer school.

Dr Jackie Chambers is currently Director of the Public Health Division of the Health Education Authority and has been working with the Look After Your Heart Programme for 18 months. Her previous experience was as a District Medical Officer in the North Birmingham Health Authority and as a specialist in community Medicine at the West Midland Regional Health Authority.

Ms Kathy Elliott, District Health Education Officer, City and Hackney Health Authority.

Dr Godfrey Fowler BM, FRCGP, DCH, DRCOG has been a general practitioner in Oxford for thirty years. He is a member of a Primary Health Care Team caring for about 10,000 patients and is University Reader in General practice (and a Professorial Fellow of Balliol College) and Honorary Director of a new Imperial Cancer Research Fund General Practice Research Group at Oxford. He is especially interested in preventive medicine, has written widely on this subject and is co-author of two books. He was one of the initiators of the Oxford Prevention of Heart Attack and Stroke Project which has provided a model for cardiovascular risk factor screening in primary care. He is a member of the Royal College of Physicians' Working Party on the Present Status of Preventive Medicine and of the Coronary Prevention Group Scientific and Medical Advisory Committee.

Dr Ranaan Gillon, Editor, Journal of Medical Ethics.

Dr Ken Grant, District General Manager, City and Hackney Health Authority.

Helen Howson has a post graduate degree in Nutrition at Queen Elizabeth College, London. She taught in a Secondary School in Wales before joining the Health Promotion Unit in South Glamorgan. She then joined Heartbeat Wales as a Nutritionist and was responsible for the development of the nutrition strategy. Her remit now includes a responsibility to oversee the strategy for industry and commerce.

Dr Marie Johnston, Senior Lecturer, Department of Psychology, Royal Free Hospital.

Margaret Jones is the Nursing Officer responsible for the 'Well Welsh Heart Health Screening in the Workplace - one of the programmes of Heartbeat Wales and the Welsh Health Promotion Authority. She is a member of the forward planning team of the health Protection Programme of the Authority. This programme seeks the development of initiatives in the Workplace and the Community to develop CPR training and high risk reduction. She is a Registered General Nurse and has worked in an Accident and Emergency Unit, a Spinal Injuries Unit and an Emergency Admissions Unit. In the past she has worked for the Inland Revenue and carried out Eye Screening throughout the principality.

Dr Tim Lang, Director, The London Food Commission.

Professor Michael Marmot, Head of Department of Community Medicine, University College Hospital.

Mr Michael O'Connor, Director, Coronary Prevention Group.

Professor Michael Oliver, Professor of Cardiology, University of Edinburgh.

Mr Richard Peto is head of the Cancer Studies Group, Clinical Trials Service Unit at the Radcliffe Infirmary, Oxford.

Ms Sibi Ramharry, District Nutritionist and Dietetic Manager, Riverside Health Authority.

Professor A G Shaper is Head of the Department of Clinical Epidemiology and General Practice at the Royal Free Hospital School of Medicine. He is a member of the WHO Expert Advisory Panel for Cardiovascular Disease and was the Chairman of the Joint Working Party of the Royal College of Physicians of London and the British Cardiac Society which produced the 1976 report on 'The Prevention of Coronary Heart Disease'. Previously WHO Professor of Cardiovascular Disease at Makerere University Medical School, Kampala, Uganda and a member of the MRC Social Medicine Research Unit, London. He is Director of the British Regional Heart Study, a British Heart Foundation Research Group.

Professor Anthony Winder, Department of Chemical Pathology, Royal Free Hospital..

PLANNING COMMITTEE

Professor John Catford, Director, Heartbeat, Wales

Mr J Graham, Principal Medical Officer, Department of Health

Professor, Sir Raymond Hoffenberg, President, Royal College of Physicians

Professor Desmond Julian, President, British Heart Foundation

Dr D L H Patterson, Consultant Physician and Cardiologist, Whittington Hospital

Mr Christopher Robbins, Food and Health Planner, London

Professor A G Shaper, Department of Epidemiology and General Practice, Royal Free Hospital

Dr Geoff Watts, Presenter, Medicine Now, BBC Radio

Professor Allan Williams, Department of Economics, University of York

King's Fund Secretariat

Dr Bobbie Jacobson, Conference Coordinator

Dr Jackie Spiby, Director - King's Fund Fora Programme

Miss Pat Tawn, King's Fund Fora Secretary

ABSTRACTS

Robert Anderson
Economic Advisor, Department of Health

THE ECONOMICS OF CHOLESTEROL MEASUREMENT

Cholesterol as a risk factor

The relationship between cholesterol and CHD is continuous and holds at low as well as high levels. So it is possible to benefit people whose initial level of cholesterol is below average. Accordingly, it is worth considering a programme which tests everyone and matches the form of treatment and counselling to the individual's degree of risk. The effects of reduced cholesterol on the death rate appear quickly, a useful feature when economic analysis progressively discounts benefits which follow intervention after a time lag.

The proposed programme

This paper focuses on a programme based on the recommendations of the European Atherosclerosis Society and other bodies. The proposal is that GPs take the opportunity to test the cholesterol of patients in the course of an ordinary consultation. After initial testing, different levels of advice and re-testing rates over a number of years would be given for different initial cholesterol levels. In the analysis below the pattern of advice sessions is based on current good practice in lipid clinics. The economic evaluation illustrates the effect of a reduction in CHD mortality of 30%. A reduction of cholesterol levels on this scale is well within reach. Implementation of the COMA recommendations on diet is expected to lead to a 12% reduction in cholesterol. In addition, some places have attained the lower levels already: cholesterol levels in Stanford are currently 8% below the average for England. Some of the high cholesterol levels will be resistant to dietary change and according to clinical criteria require drug therapy. The group treated with drugs is expected to achieve a 20% reduction in cholesterol with a corresponding reduction in mortality.

This paper draws on a background paper prepared for the Standing Medical Committee Working Party on Cholesterol Testing. I am grateful to the Chairman, Sir Eric Stroud, for allowing me to use the material. I am also grateful to the Secretary, Dr Jeffrey Graham, for guiding me through the evidence presented by members of the Working Party.

Need for a yardstick

Pressure on NHS resources are greater than ever, so it is important to ensure that any new programme should give value for money. A possible yardstick is (discounted) cost per QALY. It is not clear what cost per QALY the NHS is achieving at the margin, so there is no guidance on the pass-mark we should expect. Cost per QALY performance can only be compared with a handful of other interventions, which together account for a small proportion of NHS expenditure, but it may nevertheless provide a useful pointer.

Selection issues: Different groups of patients

Questions arise as to which groups would best repay follow-up testing and treatment after the initial test. There exist a number of possible conflicting criteria. These include the mortality rates specific to age, gender and initial cholesterol level. But the criteria would also include potential gain in life expectancy in these different groups and the cost of treatment needed to achieve a given reduction in cholesterol.

Cost of programme

The costs of the programme relate to testing, counselling and drug therapy. The cost of GP time is variously estimated at £25 to £45 per hour, practice nurse about £6 per hour, cost of a single laboratory test 53p (after establishment of a network of lipid-testing laboratories) plus about £2 for staff time in the surgery for drawing the sample and posting it. The costings below allow £9 per hour for counselling time on the assumption that a practice nurse takes on much of the burden. But sensitivity testing illustrates the effect if GPs take on a higher proportion of the counselling.

Drug therapy dominates programme cost. Expenditure on this scale would add about 10% to the pharmaceutical budget. However, the estimate of drug expenditure is based on treatment rates for the highly selected group of patients seen in lipid clinics. Rates in general practice are uncertain but could be much lower and the drugs bill could be £100m or even lower.

Effects on the average GP

It is also of interest to show the effect of the programme on the average GP with a list of 2100:

Number of patients in target group - 672

Blood samples drawn per week - 4 to 5

Total counselling time per week - about 90 minutes

Number of patients on drug therapy - 33

The programme should not therefore impose undue additional workload on general practice, even if, as in the above illustration, there is complete compliance.

Benefits of the programme

Approximately 50,000 deaths from CHD occur in the 40-69 age group every year. The group receiving drug therapy experience four times the average death rate. A 30% reduction in mortality in the group receiving counselling only and a 60% reduction in the group receiving drug therapy would yield an annual saving of 18,000 lives. Taking account of the average age at death, applying life expectancy and discounting at 5% the gain in discounted life-years per life saved works out at about 12. It is also believed that the programme would result in a similar reduction in non-fatal heart attack. Williams [1] estimates that each non-fatal heart attack results in a loss of 6 discounted QALYs: life expectancy is reduced by 10 years and the quality of life is reduced by 0.1 of a QALY per year of survival in those who have suffered a heart attack.

This programme would lead to gain of over 300,000 discounted QALYs. Dividing this figure into the cost of the programme gives a cost per QALY of just over £800. This figure compares favourably with other health service interventions for which a cost per QALY has been calculated.

Selection issues

Analysing the programme by age and gender shows that the cost per QALY is lower among men than among women, inevitably because of their higher mortality rates. This may suggest a higher starting age for a programme among women.

Cost per QALY £

Men 550

Women 1600

Great differences also divide those requiring drug therapy from those who do not:

Cost per QALY £

Baseline	800
Counselling only	
Group	140
Group receiving	
Drug therapy	4000

Looking at lower ages with their much lower mortality rates confirms that diminishing returns would result from extending the programme to young adults:

Cost per QALY £

25-39 34,000

[1] Williams, A. Screening for risk of coronary heart disease: Is it a wise use of resources? In: Screening for Risk of Coronary Heart Disease, ed M. Olver, M. Ashley-Miller and D. Wood, John Wiley & Sons Ltd, 1986

This assessment has followed a number of simplifications which would have to be taken into account in a full assessment. For example, the calculation of benefits in the 235-39 age group is confined to reductions in coronary events within that age group. However, it is likely that a programme in this age group would slow the build-up of atheroma and lower the mortality rates in middle age after reversion to a traditional diet. A programme below 40 would look more attractive on these assumptions.

There are also inevitably a number of omissions. For example:

- Something ought strictly to be allowed for savings in the cost of hospital treatment through a reduction in heart attacks, certainly the non-fatal cases and also a proportion of the fatal cases which may be hospital deaths. Using data on the cost per day in the hospitals treating CHD, the cost of the average in-patient stay works out at about £1000. In these circumstances, a saving of at least £18m should be set on the benefit side.
- Some allowance should be made for the costs of professional education to equip GPs and practice nurses to give patients advice, and for the cost of referrals of difficult cases to lipid clinics.

Conclusions

An opportunistic cholesterol testing programme based in primary care appears to be a good use for health service resources in selected groups with high mortality rates. However, cost per QALY is much higher for the high risk group whose condition require drug therapy.

Dr John Betteridge
Reading in Medicine, University College

DRUG TREATMENT: RISKS AND BENEFITS FOR INDIVIDUALS

Available drugs for the treatment of hyperlipoprotein

A list of the drugs currently licensed and marketed in the UK is provided. It is useful to consider hypolipidaemic agents under three main headings:

1. Drugs which lower plasma cholesterol alone
2. Drugs which lower plasma cholesterol and triglyceride
3. Drugs which lower plasma triglyceride alone.

Drugs which lower plasma cholesterol alone

Anion-exchange resins

Cholestyramine and colestipol are basic anion-exchange resins. The resins remain unabsorbed after oral administration and bind to bile salts in the intestine preventing their reabsorption. In response cholesterol in the liver is used up to make more bile salt which it acquires from the blood in the form of low density lipoprotein (LDL) cholesterol. In compliant patients the resins lead to a 25-30% reduction in LDL cholesterol with often a slight increase in HDL.

Compliance can be a problem with the resins as they are tiresome to take and produce bloating, flatulence and constipation. These side effects can be overcome in many patients by starting therapy in low dosage. The gritty texture is ameliorated by pre-mixing the resins in fluid and refrigerating overnight.

Probucol

This drug is structurally unrelated to the other lipid-lowering drugs. It produces moderate reductions in plasma cholesterol (15%) and its maximal effect may take up to 3 months to occur. The drug accumulates in fatty tissue and may persist in the body for many months after the last dose.

Probucol has been regarded as a second or third line agent for the treatment of hypercholesterolaemia because it lowers high density lipoprotein (HDL) as well as LDL. Probucol has antioxidant effects which appears to provide the remedial LDL cholesterol.

Drugs which lower plasma cholesterol and triglyceride
Fibric Acid Derivatives

The more recently introduced fibrates, bezafibrate and gemfibrozil, and most recently fenofibrate, are effective and well tolerated and are less likely to provoke gall stone formation than clofibrate - the first drug of this type. The exact mode of action of the fibrates is yet to be determined.

Available Drugs for Hyperlipidaemia:

	<u>Dosage</u>	<u>* Cost per 100</u>	<u>Average Monthly cost (30 days)</u>
<u>Drugs which lower cholesterol alone</u>			
<u>Anion exchange resins</u>			
Cholestyramine	4 g sachet. 1-8/day	£42	£50 (4 sachet/day)
Clestipol	5 g sachet. 1-6/day	£57	£51 (3 sachet/day)
Probucol	250 mg tablets 4/day	£11	£13
<u>Drugs which lower cholesterol and triglyceride</u>			
<u>Fibrates</u>			
Clofibrate	500mg capsules 2-3/day	£4	£4 (3 capsules/day)
Gemfibrozil	300mg capsules 4-5/day	£24	£29 (4 capsules/day)
Bezafibrate	200mg tablets 3/day	£11	£10 (3 tablets/day)
	400mg tablet (mono) 1/day	£31	£9 (1/day)
Fenofibrate	100mg capsules 3/day	£24	£21 (3 capsules/day)
<u>Nicotinic Acid and Derivatives</u>			
†Nicotinic Acid	100mg tablets	£1	--
Nicofuranose	250mg tablets	£8	£22 (9 tablets/day)
Acipimox	250mg capsule	£40	£36 (3 tablets/day)
<u>HMG CoA Reductase inhibitors</u>			
Simvastatin	10mg tablets	£65	
	20mg tablets	£111	£53 (30mg/day)
<u>Drugs which lower triglyceride alone</u>			
Maxepa			
-(Omega-3 marine triglyceride)	1g capsule	£14	£42 (10 capsules/day)
	liquid	£21 (150 ml)	£42 (10 ml/day)

* approximate as drugs sold in differing quantities.

† For effective dosage larger strength tablets necessary - not generally available.

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The fibrate drugs are particularly useful when both blood cholesterol and triglyceride are raised. A potential further benefit of fibrate therapy is the increase in plasma HDL cholesterol produced by these drugs. Apart from minor gastrointestinal symptoms, side effects are rare. The long term safety of fibrates has been questioned because of the findings of the WHO primary prevention trial of cholesterol-lowering in the late 1970s which used clofibrate: the mortality rate from non-cardiac causes was increased due to an increased incidence of cancers and the complications of gall bladder removal. In the case of gemfibrozil, the long term safety data is so far encouraging.

Nicotinic acid derivatives

The lipid-lowering activity of nicotinic acid has been recognised for over 30 years. Nicotinic Acid lowers plasma cholesterol and triglyceride and increases HDL cholesterol. The mechanism of action of nicotinic acid is not fully understood. Nicotinic acid is poorly tolerated because of flushing and gastrointestinal symptoms; these can be overcome to a certain extent by starting the drug in low dosage. The drug may also exacerbate gout and liver disease. Two better tolerated nicotinic acid derivatives are available in the UK - nicofuranose and acipimox - but are less effective.

HMG-CoA Reductase Inhibitors

This new class of lipid-lowering agents is a major advance in the treatment of hyperlipidaemia. These compounds inhibit the enzyme HMG-CoA reductase which inhibits cholesterol synthesis. The net effect is a decrease in plasma LDL cholesterol concentrations. These drugs will also reduce triglyceride. HDL concentrations increase slightly.

These drugs are generally highly effective in lowering LDL cholesterol and compliance is aided by once daily dosage. Preliminary safety data is encouraging with few adverse effects. However, some side effects have been observed.

Simvastatin - the first of the HMG CoA reductase inhibitors - has recently been introduced to the UK. It has a licence for the treatment of severe hypercholesterolaemia ($> 7.8 \text{ mmol/l}$) which is unresponsive to diet therapy.

Drugs which lower plasma triglyceride alone

Maxepa (omega-3 fatty acids) has a licence for the treatment of severe hypertriglyceridaemia. It does not reduce cholesterol levels and in fact LDL cholesterol may rise during Maxepa therapy. There are documented adverse effects on thrombotic factors and it is likely that the future of these agents will be limited in the cholesterol field.

Benefits and risks of drug therapy

Three major clinical trials have been undertaken to assess the impact of drug treatment of plasma lipid levels on coronary heart disease (CHD) incidence: the WHO cooperative trials of clofibrate; the Lipid Research Clinics Coronary Primary Prevention Trial, and the Helsinki Heart Study.

Benefits

WHO cooperative trials of clofibrate

This included 15,745 healthy men aged 30-59 years. Those in the upper third of the cholesterol distribution were randomly allocated to clofibrate treatment and the others to olive oil placebo.

With regard to cholesterol reduction and CHD the major findings of this study can be summarised as follows: a 9% reduction in plasma cholesterol was achieved in the clofibrate-treated group compared to placebo; there was a significant reduction (20%) in major CHD events in the clofibrate group; this difference was due to cholesterol-lowering; those men with the greatest cholesterol reduction and three with other CHD risk factors showed the greatest reduction in CHD; there was no difference in fatal CHD between the treated and placebo groups.

The Lipid Research Clinics Coronary Primary Prevention Trial

In this multicentre double-blind study 3806 asymptomatic men with hypercholesterolaemia ($> 6.9 \text{ mmol/l}$) following diet therapy were randomly allocated to placebo or cholestyramine. The average treatment was 7.4 years. The results showed an average reduction of 13.4% in plasma cholesterol and 20.3% in LDL cholesterol; this reduction in cholesterol was associated with a 24% reduction in fatal CHD and a 19% reduction in non-fatal heart attacks.

The Helsinki Heart Study

This primary prevention, double-blind trial was performed in 4081 men (aged 40-55 years) with a non-HDL cholesterol ($> 5.2 \text{ mmol/l}$). All the men received cholesterol-lowering dietary advice and were encouraged to give up cigarette smoking and take exercise. Half the men were randomly allocated to gemfibrozil and half to placebo. The results showed: the drug treated group showed an 8% reduction in total cholesterol; a 9% reduction in LDL cholesterol and a 11% increase in HDL cholesterol; there was a 34% reduction in major coronary end points (disease outcomes).

Risks

An important feature of these three trials is that overall mortality was not reduced in any of them. This is surprising in view of the reduction in CHD deaths in two of them. Statisticians point out that the trials did not have statistical power to provide conclusive results on overall mortality. The WHO trial was of particular concern in that there was an increase in all-cases (overall) mortality in the clofibrate-treated groups. This was due to a variety of causes with no particular disease (except for gallstones) predominant. There was no relationship between cholesterol reduction and excess mortality. It is likely that these effects are associated with the drug clofibrate, chosen for the study. No such adverse effects were seen in the Helsinki and LRC study although there was a non-significant tendency towards excess gallstones in the Helsinki trial. However there was an excess (not statistically significant) of suicide and violent death in both these trials. This has led to much speculation about possible relationships with cholesterol-lowering.

Drug therapy and possible regression of atheroma

A recent study of drug treatment of blood lipids provides the first evidence of atheroma regression. In the Cholesterol-Lowering Atherosclerosis Study (CLAS) 162 non-smoking men (aged 50-59 years) who had had previous coronary bypass graft surgery were randomly allocated to a combination of colestipol and nicotinic acid or placebo. Over a 2-year period there was a 43% reduction in LDL cholesterol and a 37% increase in HDL cholesterol in the treated group. This was associated with a significant reduction in the average number of atheroma lesions in both native arteries and grafts.

Which individuals are candidates for drug therapy?

Nutritional counselling is the cornerstone of treatment of all hyperlipidaemias. Drug therapy should not be considered until appropriate, prolonged (at least 3 months) dietary therapy has failed to achieve acceptable lipid levels. Furthermore therapy for hyperlipidaemia should be seen in the context of modification of smoking habits, hypertension and other risk factors for CHD.

Careful consideration should always be given to the risk/benefits ratio of drug therapy for patients on an individual basis. Severe hyperlipidaemias characterised by a high risk of CHD such as familial hypercholesterolaemias often require drugs as an adequate dietary response is uncommon. With the more common polygenic hyperlipidaemias an adequate response to diet is much more common and the decision to use drugs is not straightforward. A strong family history of CHD, symptomatic vascular disease, young age, male sex and coexistent hypertension or diabetes mellitus shifts the balance towards drug therapy.

It is difficult to be precise about the actual levels of cholesterol/triglyceride that require drug therapy as these should not be taken in isolation. Expert recommendations from the British Cardia Society, the National Cholesterol Education Programme expert panel and the European Atherosclerosis Society differ.

Implications of drug treatment

It is likely that a health centre of 10,000 patients will contain 20 individuals with familial hypercholesterolaemia and 25 individuals with other familial hyperlipidaemias. These individuals will often need drug therapy. The remaining individuals with the common (polygenic) form of hyperlipidaemia and there will be approximately 200 further subjects with cholesterol (> 7.5 mmol/l) in this group will generally respond to dietary measures alone. Most patients with familial hypercholesterolaemia will require combined drug therapy as will a proportion (difficult to be specific) of those with polygenic or common hyperlipidaemia.

Where should most prescribing take place?

In my opinion individuals who may require drug therapy should be referred to a lipid clinic. Current awareness of appropriate drug therapy is low in general practice. This should change over the following 5-7 years (say) as family practitioners learn more about hyperlipidaemia and its treatment. The analogy with hypertension is strong. Anti-hypertensive drug therapy in the majority of cases is now instigated in general practice, whereas a decade ago therapy was started in the hypertension clinic.

GOOD HEARTED GLASGOW- THE GREATER GLASGOW HEALTH BOARD CARDIOVASCULAR DISEASE PREVENTION PROGRAMME - Ms Patricia Birkett, Project Manager, Goodhearted, Glasgow

The Good Hearted Glasgow Campaign is funded by the Health Board; estimated cost, £8 million over 10 years. It was launched in May 1986 under the direction of Dr L A G Davidson, Community Medicine Specialist. A small project team has been established, which works in close co-operation with other health board departments, particularly Community Nursing and Health Education.

1. REASONS FOR CAMPAIGN

- (a) Scotland has highest mortality rate in the world for coronary heart disease (CHD).
- (b) Glasgow has a standardised mortality rate for CHD in men of 110, compared to 100 for Scotland as a whole.
- (c) Stroke and CHD account for 45% of all deaths in Glasgow.

2. AIM

To reduce the incidence and effects of coronary heart disease and stroke in Glasgow by 10% over the next decade by multiple risk factor intervention.

3. OBJECTIVES

- (a) To achieve behavioural changes in the population leading to modification of risk factors.
- (b) To reduce the consumption of fat in the Glasgow diet by 25% from the present levels.
- (c) To reduce the number of people who smoke (currently 48%).
- (d) To identify, help, advise, and support individuals at special risk within the population.

4. METHODS

- (a) A community-based education campaign directed at specific at-risk groups by:
 - (i) Providing nutritional advice based on the NACNE* and COMA+ reports.
 - (ii) Reinforcing the existing anti-smoking campaign (Glasgow 2000).

* NACNE - National Advisory Committee on Nutritional Education.

+ COMA - Report of the Committee on Medical Aspects of Food Policy.

Methods (continued)

- (b) Screening all men and women between the ages of 20 and 50, for coronary risk factors, via the primary care system.
- (c) A population-based, mass-media, education campaign was planned but this has never been funded.

5. THE SCREENING PROGRAMME

The Greater Glasgow Health Board have made extra resources available to make screening possible:

Micro-computers and appropriate software, to record screening information; health visitor and treatment room nurse sessions to carry out screening; and funding to cope with the analysis of blood cholesterol specimens and to provide extra staffing at hospital risk factor clinics.

Patients aged between 20 and 50 receive an invitation to be screened, from their GP or a receptionist. A blood sample may be taken at the time of booking the appointment, so that the result will be available at the screening session. In a minority of centres, the blood sample is obtained during the screening session. The patient is then informed of the result, and any necessary follow-up procedures, in a letter generated by the microcomputer. The first method is preferred, as it enables specific dietary advice to be given during the screening session and GP or review appointments may be arranged before the patient leaves.

At the screening interview a full medical and lifestyle history is taken by a health visitor, using a structured questionnaire on the micro-computer. Height, weight and blood pressure are measured.

A summary of risk factors is then printed in two forms - one for the medical record, the other for the patient. Advice and literature are given as appropriate.

A manual of recommended practice has been prepared, which provides guidance on the appropriate action levels and management for each risk factor. High risk individuals receive follow-up* from health visitor, dietitian, GP or hospital clinic, as necessary.

- * - Flowcharts showing action levels for follow-up of Blood Pressure/Cholesterol are attached.

6. CHOLESTEROL LEVEL IN PATIENT EDUCATION

Measuring cholesterol in a population in which the average cholesterol level is high, was considered to be worth doing.

Special attention is given to the management of other risk factors, in those who have elevated levels of blood cholesterol.

The result acts as a focal point for health education. It was thought that there would be a greater likelihood of people responding to advice when specific risk factors were highlighted and it could be demonstrated, via the micro-computer, that total risk could be reduced by reducing individual risk factors. The inclusion of a cholesterol measurement appears to make a significant contribution to the acceptance of dietary advice.

7. MEASUREMENT OF CHOLESTEROL

Specimens are transported daily to a central laboratory for analysis. Cholesterol results and all other data are archived on a mini computer system installed in the laboratory for this purpose. There are currently approximately 4000,000 people in the target group. The data being collected will be of great scientific value and it will allow trends in levels of blood pressure, cholesterol and body weight to be monitored. The estimated cost of each test, including transport, staff time and depreciation of equipment, is £00.30.

8. SCREENING PROGRAMME STATISTICS

Screening began in three pilot centres in 1986. 44% of the population currently have access to the programme on 36 sites i.e.: 10 health centres containing approximately 60 practices, and 26 surgeries, with a total of 275 GPs.

23,182 blood samples have been analysed and 18,146 people had been fully screened at 30/4/89.

9. EVALUATION

(a) Baseline Survey

A baseline survey of knowledge about and attitudes to cardiovascular risk factors was conducted during the summer of 1986. It is intended to repeat the survey in 1991.

(b) Process

- (i) Monitoring of risk factor levels in random samples.
- (ii) Follow-up of groups of different risk factor levels.
- (iii) Specific sampling projects.

(c) Outcome

- (i) M O N I C A Project
- (ii) Hospital SMR and Mortality Data

10. STAFF TRAINING

Three development officers are employed on the Project. They are all qualified health visitors with additional relevant qualifications or interests. They are responsible for the formal and informal induction and training of all types of staff involved with the Screening Programme. Together with colleagues from the Health Education Department they provide guidance on the management of patients found to be at risk.

A series of half-day seminars on specific risk factors are held. "Risk Reduction" and "The Micro-computer System" are each the subject of a half day workshop and individual tuition is provided in-between workshops if needed. As health visitors are skilled councillors and already have an awareness of the risk factors for coronary heart disease, a half day session has been found to be sufficient to enable them to update their knowledge and to ensure that they provide advice in accordance with the guidelines in the Manual of Procedures.

11. PROBLEMS

The Screening Programme has been an outstanding success in some surgeries and small health centres, but success or failure depends mainly on the willingness of GPs to issue personal invitations to patients.

In large health centres doctors have failed to recruit patients opportunistically, to a satisfactory level. As a consequence, there has been a re-appraisal of the Campaign and proposals for re-structuring it, within the Health Promotion policy for the Board, have been prepared. Remedial action is to be taken on the following problems:

(a) Funding

Just as the Campaign was about to be launched, the Greater Glasgow Health Board was found to have a major funding problem, which resulted in the severe restriction of the funds available for publicity and screening. It had been estimated that approximately £750,000 would be required each year, a total cost of £8m, for the ten-year period of the Campaign. Actual funding to date has been approximately 55% of planned expenditure.

(b) Lack of Commitment by GPs

- (i) The low profile of the Campaign as a whole, due to lack of general publicity.
- (ii) Rumours that the Programme was to be discontinued, due to lack of funds, not countered by the Board.

(c) Poor Response By Patients

- (i) Inability to advertise screening, except in individual surgeries and health centres, as only 44% of the population have access.
- (ii) The lack of concern for their own health by people living in areas of deprivation. (Unemployment, damp housing, etc. having higher priority).
- (iii) Lack of health education staff to generate interest in the Community.

(d) Restricted Access to Screening Sessions

- (i) Timing of sessions is too inflexible.
The working population needs access to the Programme, in a convenient location, and at lunchtime or in the early evening.
- (ii) Frequent cancellation of sessions because of shortages of nursing staff, due to vacancies remaining unfilled, sickness and maternity leave.
- (iii) A shortage of suitable accommodation in many surgeries and health centres.

Geoffrey Cannon
Secretary, The Guild of Writers

CHOLESTEROL MEASUREMENT: IN WHOSE INTEREST

The higher the level of blood cholesterol, in an individual or a population, the greater the chance of suffering and dying from a heart attack or other cardiovascular disease. The lower the level of blood cholesterol, the smaller the chance of cardiovascular disease. These propositions are now proved beyond reasonable doubt (1).

So it would seem to follow that measurement of blood cholesterol, when used as a means to identify those with a high level of blood cholesterol, preliminary to lowering it by appropriate means, should benefit personal and public health. This is a view taken in the USA, where the public is encouraged to 'know your cholesterol' (2).

So should the Department of Health give blood cholesterol screening a high priority, as a means to identify those evidently most likely to suffer from a healthy lifestyle and, if considered necessary, prescribe drugs that have the effect of lowering blood cholesterol?

Occasional screening

If you and I want to 'know your cholesterol' we are entitled to this knowledge, the more so if we are prepared to pay for it. If knowledge of blood cholesterol level (which should be one aspect of regular blood profiles, administered by a competent professional) [prompts anybody to a healthy lifestyle, this is good for general and also cardiovascular health.

Regular blood profiles, including measurement of blood lipids and their fractions, can be an effective encouragement to increased health and fitness, on a sustained programme that encourages participants to a healthy lifestyle including plenty of whole fresh food and regular physical activity, no smoking and little or no alcohol, for the rest of their lives (3).

A small minority of the population, nevertheless probably amounting to many thousands in the UK, have an inborn error of cholesterol metabolism; in these cases very high blood cholesterol levels are not a marker but an aspect of heart disease. Physicians should seek to diagnose these cases by questioning and examination followed by blood profile.

If we change our lifestyle to one approximating to that of populations where cardiovascular disease is uncommon, our blood profile, including blood cholesterol level, is likely to move towards that of such people. So will other markers of health that any citizen can freely monitor, such as weight, waist, pulse, appetite, energy and mood (4).

Mass screening

So occasional blood cholesterol screening, on demand, as a means to encourage fitness and health, and when hypercholesterolaemia is suggested, is in the interest of such individuals. But this Forum is considering whether to recommend mass national blood cholesterol screening in the UK, and should have the following points in mind:

1. In Western countries, most people who suffer and die from a heart attack or other cardiovascular diseases, have blood cholesterol levels within or below an average Western range. This is because typical Western lifestyle increases everybody's chance of suffering from symptomatic cardiovascular diseases (1) (5) (6).
2. Most expert reports published in Western and Westernised countries since the mid-1960s that take a view, recommend that everybody will do well to enjoy a healthy lifestyle, in order to prevent cardiovascular and other epidemic Western diseases. Few such report make specific recommendations only for those at 'high risk' (6).
3. Drugs that lower blood cholesterol have been shown in trials to reduce numbers of deaths from heart attacks. But they do not reduce the total number of deaths. indeed, they evidently increase deaths from other epidemic Western diseases. Such drugs are expensive, and have disagreeable and debilitating adverse effects (7) (8).
4. In the USA the value of a healthy lifestyle in prevention of cardiovascular and other epidemic diseases is endorsed by government, effectively publicised, and well understood by physicians and the public (9) (10). None of this so in the UK. Lacking encouragement, resources and knowledge, doctors are liable to rely on drugs (8).
5. In the USA blood cholesterol screening is taken by physicians as an opportunity to recommend a healthy lifestyle to everybody (2). If in the UK everybody within or below an average Western range of blood cholesterol were given no advice, or told they were not at significant risk of heart disease, they would be misled.
6. In the USA physicians and their patients may have the time and the money for mass blood cholesterol screening used as an opportunity for general health education. In the UK with an NHS funded by the taxpayer, a more rational approach is generally agreed vigorous health promotion programme, put into practice in the community (11).
7. Pressure on the Department of Health to set up a national blood cholesterol screening programme is organised by the drug industry. For industry the ideal drug is one prescribed regularly for many years. The cost to the taxpayer of drugs to lower blood cholesterol, boosted by mass screening, could exceed £1000 million a year (8).

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WHY MEASURE BLOOD CHOLESTEROL LEVELS : LESSONS FROM THE USA

'Measurement' is the key word in this conference. It is a much broader concept than 'screening'. Screening usually implies the detection of covert disease. Raised cholesterol is not a disease - this is where some of the confusion and difficulty comes from - often it is discussed as though it were. Raised cholesterol is a poor proxy for the presence of coronary heart disease. What we are talking about is the assessment of the presence of a risk factor for the principal cause of premature death in Britain today and a major cause of illness and misery.

On epidemiological grounds, raised cholesterol is just the same as smoking and overweight as risk factors. We measure weight. We ask about smoking status but now we commonly measure using a carbon monoxide ecologizer. No one would say that smoking or overweight was a disease. Because of the danger of labelling people as suffering from a disease, I prefer not to use the term 'screening' with regard to cholesterol. The use of the word 'screening' also tends to limit discussion to an initial investigation, when in fact cholesterol measurement goes far beyond merely 'detection'.

The following seven advantages can be put forward in favour of cholesterol measurement:

1. High Risk Individuals

To detect those individuals who have not adequately responded to the population-based dietary interventions, and in so doing offer targeted help.

Even if there are well resourced population-based approaches, a number of individuals will still have high blood cholesterol levels. These people remain at considerable risk, particularly if other risk factors are present (i.e. smoking, raised blood pressure). Even full compliance with the dietary recommendations of the DHSS committee on Medical Aspects of Food Policy (COMA) may only be expected to lower cholesterol by about 10%.

General dietary intervention may fail for two reasons: (i) lack of individual focus and interest; (ii) genetic predisposition which results in diet-resistance hypercholesterolaemia.

Identification of such individuals can then lead on to specific action, i.e.

- (i) targeted dietary intervention using skilled professionals (e.g. dieticians, specially trained nurses, etc.) which could achieve a 20-25% reduction in cholesterol.

- (ii) drug treatment for those with very high levels who do not respond to a good trial of diet. Up to 1% of people have diet-resistant hypercholesterolaemia. They can only be helped through drug treatment. This includes Familial Hypercholesterolaemia with a prevalence of approximately 0.2% (1/500). (For more than 20 years we have been screening neonates for phenylketonuria with an incidence of 1/10,000 and more recently congenital hypothyroidism with an incidence of 1/4,000. F.H. is considerably more prevalent than this).

2. High Risk Families

To identify those with familial (inherited) hypercholesterolaemia so that help can be offered to relatives, particularly offspring.

Familial hypercholesterolaemia requires urgent management. Drug treatment is often required since it seldom responds adequately to diet. Population-based approaches are unlikely to have a great impact on these individuals. Early detection through cholesterol measurement could not only help that individual but also could help to identify relatives who may escape detection for some time.

3. At Risk Individuals

To provide personal motivation to individuals to either maintain or adopt a healthier diet.

Cholesterol measurement can contribute to this through:

- raising personal awareness
- providing short-term goals
- providing a method of feedback

Eating is a complex behaviour. It is difficult to change people's eating habits. Merely 'telling people' what to do is normally unsuccessful.

For these complex behaviours we need to draw on the skills of behavioural science. One important framework which is very pertinent to dietary change - is Social Learning Theory as described by Albert Bandura of Stanford. Personal motivation can be aided or supported if:

- (i) the individual identifies that change is needed - nothing is more impressive than seeing your own cholesterol result appear in front of you within 2-3 minutes of blood having been taken, and then being explained what the ideal should be;
- (ii) a short term goal can be developed - e.g. "let's try and get your cholesterol down by 1 mmol/L over the next 6 months which could achieve 25% reduction of your risk of a heart attack";
- (iii) a method of feedback can be provided. "Nothing breeds success like success". Cholesterol measurement can be easily repeated at relatively low cost.

On theoretical grounds cholesterol measurement is therefore likely to be helpful in motivating people to change their diet, particularly those at moderate risk where diet alone is needed. Maintenance support and encouragement can also be given to those who are succeeding at keeping their cholesterol down.

Support for the efficacy of cholesterol measurement can be found in other areas of health promotion where there is longer experience such as:

- (i) overweight - where measurement is fairly easy. Individual or group 'weigh-ins' are a common feature of management;
- (ii) physical inactivity - where fitness testing can provide motivation and improve fitness levels, and
- (iii) smoking - where carbon monoxide ecologizers are now providing the same sort of stimulus for smoking cessation that cholesterol analysis could in the future provide for dietary change.

Use of personal feedback is a common feature in the management of chronic disease where patient compliance and motivation is important. Examples include self-testing of urine and blood sugar (in diabetics) and peak flow (in asthmatics). Increasingly those with hypertension are being encouraged to measure their own blood pressure with an electronic sphygmomanometer to monitor progress.

The effect of screening, education, and referral programs on blood cholesterol levels of population samples is being studied in several research programs in the USA. In these few studies, individuals with elevated levels of blood cholesterol who complied with referral advice had significantly lower cholesterol levels on follow-up, and this effect remains after taking into account the statistical phenomenon of regression to the mean. Those who seek medical advice largely receive appropriate treatment. Populations who receive general education on cholesterol following measurement, in community health promotion programs, also show a modest lowering of blood cholesterol levels at follow-up. This lowering appears to occur throughout the entire population range of cholesterol values and is not limited to individuals with high blood cholesterol levels. These early results suggest that public screening, counselling, and referral can lead to lower cholesterol in those who have elevated levels and to a reduction in cholesterol in populations.

4 Education for Health

To provide a vehicle for effective health education on cardiovascular risk reduction and healthy nutrition.

Cholesterol measurement is a specific activity for which time has to be set aside by both practitioner and client. It provides an opportunity for one-to-one counselling as well as a teaching aid.

There is a wealth of experience in contemporary science teaching of the value of practical investigation in learning. With regard to health education experience in a comparable field - asking students to measure their own blood pressure, record their pulse and respiration is an excellent way of stimulating interest and attention in understanding how the cardiorespiratory system works.

5. Momentum for Change

To "fuel" the population approach to coronary heart disease prevention by encouraging change agents.

Identification of people at very high risk is likely to result in a small but extremely motivated group of individuals who will be pressing for wider improvements in nutrition to help themselves and their families. Greater activity at local level with community groups and voluntary organisations is likely to accelerate behaviour change within populations. This is because of the way that innovations diffuse within populations.

All the major demonstration programmes for coronary heart disease prevention throughout the world have combined high risk strategies with the population approach. Those commenced within the last five years have included cholesterol measurement. A wealth of experience is now emerging from this, principally from the USA and this will be discussed later.

6. Personal Needs

To promote self control, personal responsibility and to allay unwarranted anxiety which might occur as a result of the population approach.

Our experience in Heartbeat Wales is that as people become more aware of diet and health issues, they become more knowledgeable about the role of cholesterol in the development of CHD. It is not therefore surprising that the natural wish is to know what their own level is. Informed people are inquisitive. Surely this is something we would wish to encourage - that sense of responsibility, control, knowing ones body.

7. Evaluation

To monitor trends in cholesterol levels within individuals and the total population so as to assess the need for further action.

This has important benefits for the individual and the nation. for the individual a baseline can be set.

On a national level, measurement (for surveillance) is clearly necessary to assess the effectiveness of intervention programmes - both high risk and population. The UK as a whole has been criticised for not having serial measurements of coronary risk factors including cholesterol. This is unlike many other countries (including Wales!) where monitoring is underway.

LESSONS FROM THE USA

The development of cholesterol measurement as a tool in CHD prevention has a complex history in the USA. cholesterol was commonly measured as part of the early research, and researchers commonly observed that in those subjects with raised cholesterol, personalised information on their own levels seemed to be a trigger for lifestyle change.

1. Demonstration Projects

During the early 1980s, three major research and demonstration community intervention projects were set up in Stanford, Minnesota and Pawtucket, Rhode Island. In the Minnesota Heart Health Programme blood cholesterol was measured along with other risk factors as a mechanism for both high risk detection and motivation for lifestyle change. In Pawtucket low cost community outreach teams were supported in which finger prick cholesterol tests were carried out. The Stanford study now includes cholesterol testing based on the experience of the other two programmes.

To date the three demonstration programmes have not yet published or completed their final follow-up studies, but preliminary results indicate impressive risk factor changes including blood cholesterol reductions. Evaluation of the Pawtucket "Know Your Cholesterol Campaign" resulted in 60% of the population tested responding favourably with an average reduction of 0.8 mmol after 2 months.

Similar experience from the other two demonstration projects, together with the findings of others studies, indicated that cholesterol measurement could provide a vital educational and motivational tool for dietary change and risk reduction.

2. Consensus Conference

In January 1984, the Lipid Research Clinics Coronary Prevention Trial provided what was considered the long-sought, definitive evidence that lowering blood cholesterol reduces the risk of coronary heart disease.

In December 1984, the US National Institution of Health convened a Consensus Development Conference on 'Lowering Blood Cholesterol to Prevent Heart Disease'. The Conference resulted in broad guidelines for health professionals and the public regarding cholesterol levels that should be treated, goals for treatment, and the use of diet and drugs to lower blood cholesterol. In addition the Conference voiced support for the National Heart Lung and Blood Institute to develop a National Cholesterol Education Programme (NCEP) which was launched in November 1985.

Several of its objectives referred to the need to measure cholesterol in individuals.

3. National Cholesterol Education Programme

The NCEP focuses on four programme areas:

Professional and Patient Education

The NCEP directs educational efforts to physicians, other health care professionals and people with elevated blood cholesterol levels about the risk associated with elevated cholesterol levels and how to reduce them through diet and drugs. A special physician's kit on high blood cholesterol has been developed and sent to 150,00 doctors.

Public Education

Through radio, television, and print materials, the NCEP works to increase the general public's awareness about the importance of having their blood cholesterol levels checked, knowing what their cholesterol levels are, and taking steps to lower elevated levels.

Worksite Programmes

The NCEP develops guidelines and materials for use in designing and implementing cholesterol education programmes at the worksite.

School-Based Education

NCEP will work to increase cholesterol awareness among primary and secondary school students by supporting efforts to incorporate cholesterol and nutrition information into school health curricula and school health promotion programmes.

4. Collaboration and Partnership

At the heart of the NCEP is its Coordinating Committee of more than 20 member organisations representing medical associations, federal agencies, voluntary health organisations, and community programmes involved in health and cholesterol education.

An important Coordinating Committee activity is sponsorship of four expert panels to develop guidelines for health care professionals. These panels cover adult treatment; laboratory standardisation; population-based work; and the treatment of children and adolescents.

5. Impact to Date

Although the programme has not been running at an advanced stage until the last two years, there appears to have been some major changes in surveillance coverage and health care contacts. Opportunistic screening by physicians has increased nine-fold since 1982. Between 1987 and 1988 the number of medical visits for hypercholesterolaemia doubled. Drug prescribing for hypercholesterolaemic agents has also increased markedly.

There has also been considerable activity outside doctors surgeries. Supermarkets are now offering finger prick testing all over the country. In the North East USA special initiatives have been mounted by Stop and Shop, and Shaws, and in the Southern USA by Winn Dixie. A growing area is pharmacies which already offer blood pressure measurement. Occupational programmes are also developing fast and major companies like Ford are providing industrial sponsorship.

Population surveys show a marked increase in coverage, from about one-third in 1983 to approximately two-thirds of American adults having had a cholesterol measurement and approximately one-quarter knowing their number in 1989.

6. Implications for the UK

Should the UK embark on a programme of large-scale cholesterol measurement. A number of lessons can be learnt from the USA experience:

- i) Those groups who are less likely to be reached by opportunistic screening include men, younger and middle-aged adults, those with low income or basic education.
- ii) Accuracy and precision of measurement is vital to avoid misclassification.
- iii) Cholesterol measurement should not be undertaken in isolation to assessment of other risk factors.

- iv) Those carrying out testing and counselling should be well trained.
- v) Testing should be carried out in a conducive environment which is accessible.
- vi) In situations where charging may be made (either to individuals, employers etc.) costs should be kept as low as possible to maximise uptake.
- vii Active referral and follow-up programmes are essential. This includes good documentaiton, letters and phone calls.
- viii) Common agreement about protocols for follow-up and referral will help to avoid management difficulties between carers and to minimise client concern.

CONCLUSIONS

Complementary strategies are required for effective coronary heart disease prevention - a total population approach supported by high risk programmes. Cholesterol measurement is fundamental to the latter but is also an extremely useful aid to the former.

Dr Jackie Chambers
Director, Public Health, Health Education Authority

LOOK AFTER YOUR HEART

The LOOK AFTER YOUR HEART CAMPAIGN is a five-year public education programme funded jointly by the Department of Health and the Health Education Authority.

It aims to contribute to a reduction in the incidence of premature death from coronary heart disease in England by

- * increasing public awareness and understanding of the major risk factors leading to coronary heart disease;
- * encouraging and enabling people to adopt a healthier lifestyle.

Priority is given to middle aged adults between the ages of 35 and 65 years in social groups C2DE, and communities with the highest rates of heart disease.

Reduction of smoking and excess alcohol consumption, and the promotion of healthy eating and physical activity form a major part of the "lifestyle education" provided by the programme.

At national level, activities include working with the mass media, including TV advertising, the commercial sector, the catering sector, the workplace, and supporting community initiatives and primary health care.

The current budget allocated to the national programme is £4 million. The amount invested by District Health Authorities and Local Authorities on the prevention of heart disease, particularly on nutrition education or supporting the introduction of local food policies is not known.

The primary question I shall try to address in this presentation is, "Can you bring about changes in the dietary behaviour of a national without testing their blood for cholesterol levels?"

All that I can hope to do in the time allotted is to shed some light on those aspects of which we have some experience, and in particular, our experiences of nutrition education within the LAYH programme, and leave it to other speakers to comment on some of the other factors that are needed to bring about wholesale dietary change.

I hope to demonstrate that many people in England are beginning to understand what constitutes a 'healthy diet'; have begun to understand the relationship between dietary intake of fats and the risk of heart disease; but are not yet able to select those foods which are likely, on a population basis, to lower cholesterol levels. We therefore have a tremendous but not insurmountable challenge ahead of us in re-educating our palates and those of our children. In the face of such a challenge, cholesterol testing may at the best contribute a little to this process of re-education, or at worst may be an expensive and irrelevant gimmick which we cannot and should not afford.

CONFUSION AND CONCERNS

These results are taken from three research studies of people's knowledge, attitudes and behaviour, funded by the LAYH programme. They show that

Knowledge of Personal Risk and Risk Factors

- * Around 50% of adults believe their personal risk of CHD to be below average.
- * More people believe 'being overweight' is a more important risk factor for heart disease than avoiding fatty foods'.
- * 17% of people in the manual groups (C2DE) believe that you can cut down the risk of heart disease by avoiding foods with additives.

Knowledge of Fats and Foods

An NOP survey of 806 men and women undertaken before "Less Fat Fortnight" showed the following:

- * 70% of people, unprompted, were unable to name the different types of dietary fat.
- * However 55% of people, after prompting, said that eating 'less saturated fat' could improve their health.
- * The main areas of confusion are:
 - choice of actual foods (only about half know whether certain foods contained mainly saturated or unsaturated fats);
 - role of dietary cholesterol
- * 41% of people said they would reduce their blood cholesterol by cutting down on foods containing cholesterol.
 - the role of additives

This slide illustrates some of the achievements of the LAYH programme.

DIETARY CHANGES

There are some encouraging signs of (self reported) changes in nutrition behaviour - For example:

- * 51% of people reported grilling food more often instead of frying whilst
- * 33% had cut down/stopped eating fried food.

Thanks possibly to that 'champion against the chip' the Rt Hon Mrs Edwina Currie

- * 31% of people report eating less chips than last year and 7% have cut them out completely.
- * About 1 in every 4 respondents claimed to be eating more fresh fruit and vegetables compared with a year ago.

These self reported changes in nutrition are broadly consistent with those reported in the National Food Survey. So despite the confusion that exists in the public's mind about what's good or not good for you to eat, important changes in the nations diet are occurring - changes which should (if all our assumptions are correct) be of benefit in reducing the average levels of blood cholesterol experienced in this country.

These changes are occurring without the wholesale introduction of a cholesterol screening programme and without any well planned and supported approach to nutrition education. Furthermore most people understand the concept of 'fat blocks you arteries' and 'its dangerous for their heart'. From a health education point to view adding the concept of "blood cholesterol" or "know your number" may be unnecessary and cause further confusion.

If it is possible though education and other strategies to reduce the prevalence of cigarette smoking by 13% over 15 years, (without resorting to carbon monoxide breath analysers) then I would submit it is possible to achieve significant dietary changes within a nation without cholesterol testing.

Dr K A M Grant
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CHOLESTEROL SCREENING THE MANAGEMENT AND ORGANISATIONAL CHALLENGES

1. INTRODUCTION

I would raise three questions about cholesterol screening programmes:

[a] Why are we considering introducing another screening programme when we know that there are considerable problems with the two other national screening programmes that have recently been introduced [breast and cervical cancer]?

[b] What steps will be taken to ensure that this is not just a labelling process and if they are, how much will intervention cost?

[c] Even if both screening and intervention were effective, are they a priority over other demands on a cash limited budget?

2. EXISTING SCREENING PROGRAMMES

Two major call/recall screening programmes for breast and cervical cancer have had to be introduced by Health Authorities at the instigation of the Department of Health over the last three years. DHAs were instructed to introduce cervical cancer screening and breast cancer screening regardless as to whether or not this was seen as a local priority. Finance was made available for the latter but not the former.

Both programmes required considerable management time often from under-serviced and overstretched community medicine departments. No attempt was made to evaluate the cervical cancer screening programme before introducing the breast cancer screening programme. At the time of the introduction of the breast cancer screening programme, the uptake of the call and recall scheme was 16% for cervical cancer screening in City and Hackney District. There were various reasons for this, including the problems of a mobile population. Nonetheless there was no hard data as to why women were not turning up. The management support to this scheme - particularly in getting prompt results out - is considerable and costly. [Approximately £50,000 per annum]. Less than two deaths per annum - for cervical cancer - under the age of 65 take place in City and Hackney.

The costs did not take into account the considerable effort that had to go into the counselling and treatment of those patients who had either pre-malignant or indeed malignant disease. There has been a major rise in demand and in waiting lists for colposcopy and considerable distress is obviously caused to the women concerned.

This appears to have been done with the introduction of breast cancer screening, whereby quality control measures and proper follow-up appears to have been instituted as part of the screening process.

However, a general point about all screening programmes is that the effort seems to go into the technical part of the detection of the disease in the early stage, with little regard to the enormous work that would have to go into dealing with those who are found to be positive. One must remember that unlike the curative health service, where people come to you with a problem, in screening one is going out finding people who, up that point, did not know there was anything wrong with them - and telling them there is.

With regard to cholesterol screening, the questions which I would ask as a manager are:

- what is the cost of a screening programme going to be in terms of a Health Authority?

- what percentage of the population will require some form of intervention and have we the resources to meet that intervention?

Using the data published by Professor Tunstall-Pedoe, it would appear that we will be detecting a significant proportion of 'at risk' population as requiring intervention, either in terms of counselling, or much more worrying, in terms of cholesterol-lowering drugs. We do not, at the present point, have the resources to deal with this, without shifting them from other areas.

Even if we do know that we have the tools, both for effective screening and for effective intervention, how do I assess their priorities against other similar ones? Will this be distorted by commercial pressure from drug companies anxious to promote what could be the biggest money spinner since the contraceptive pill and H2 Antagonists [drugs to treat duodenal ulcers]?

HEARTBEAT WALES - A Case Study - Helen Howson, Senior Health Promotion Advisor

Background to Heartbeat Wales

The Welsh Heart Programme is a major national demonstration project to promote good health amongst the three million population in Wales. It is particularly concerned with reducing the risks of cardiovascular disease throughout the whole of the Principality, i.e. encouraging non-smoking, healthy nutrition, regular exercise, stress management, health screening and first aid for heart attacks. The long term aim of the Programme is to develop and evaluate as a pilot venture a regional strategy that will contribute to a sustained reduction in coronary heart disease incidence, morbidity and mortality in the general population of Wales, and in particular those under the age of 65.

The Programme was publicly launched on St. David's Day, 1 March 1985 for an initial five year period. Initially, core funding was provided by the Health Education Council and the Welsh Office and the project was administered through the University of Wales College of Medicine. These responsibilities have now been passed to the recently established Health Promotion Authority for Wales. Considerable additional support is also provided by statutory, commercial and voluntary agencies as well as the general public in Wales.

Evaluation of the effectiveness and efficiency of the Programme is quasi-experimental. Clear objectives and measurable targets have been set. The outcome of the various interventions will be compared between the nine Health Authorities in Wales and with changes in a reference area outside Wales. Multiple evaluative methods will also be used to study the process of the programme implementation.

The interdisciplinary team directing the Programme is currently developing and implementing with relevant agencies in Wales, a wide range of strategies which comprise contrasting programmes in each of the nine health authorities. A multi-risk factor approach is being adopted which emphasises the positive benefits of a healthy lifestyle. Strong emphasis is given to community participation and partnership (1).

The Nutrition Programme

One of the major features of the Programme has been the nutrition strategy. From the outset it was recognised that to facilitate dietary change at a household level there was a need, not only to raise levels of understanding, but also to work closely with the food industry. The issues of supply and demand needed to be addressed so that the constituents of healthy diets were available and easily identifiable within localities.

Examples of the types of activities that comprise a total population approach to healthy eating include:

(i) Improved Food Labelling and Availability

We have supported the development of healthy nutrition through both food labelling and increased availability in close liaison with the major retailer in Wales, Tesco. In this we were able to encourage the adoption of a simple labelling scheme, as well as product modification. This also led to a wide variety of other activities including nutrition training for staff, health fayres, 'heart healthy' menu options for both staff and customers, 'healthy food' price incentives, and other joint promotions to the public.

(ii) Low Fat Alternatives

We have been able to work closely with the meat industry and the MLC in the production and promotion of leaner carcasses and meat cuts available at local butchers. This has involved collaboration on carcass grading and the establishment of training courses for butchers. The Lean Choice Scheme was developed to promote leaner cuts to the consumer and also included inbuilt price incentives where of the 6 Lean Cuts, 4 had to be 'economy' cuts. This has since been adopted on a UK basis and in Wales has been extended to include an 'Award Scheme' with additional criteria. Through liaison with Unigate we were also able to promote the uptake of 'low fat' milks at doorstep delivery as well as providing further advice on healthy eating to the public. This also led to Unigate supporting schools curriculum activities enhancing the promotion aimed at parents.

(iii) Catering

Another major development has been our work with caterers in encouraging them to adopt healthier preparation and cooking methods. Support training workshops and promotional/educational materials enabled us to encourage caterers at all levels from major industrial settings to smaller scale establishments to provide the 'healthy' choices. This was supported by the Heartwise Menu Scheme which highlighted the healthy dish of the day. The Heartbeat Award developed in conjunction with environmental health officers, provided the additional incentive and an acknowledgement for such efforts taken by caterers. This has been run successfully in 28 districts throughout Wales, and through its criteria it ensures the availability of healthy options, as well as no smoking facilities and high standards of hygiene.

Close liaison with school meals organisers throughout the Principality also enabled us to develop "Guidelines for Healthy School Meals in Wales", which was the first regional attempt at co-ordinating food provision for children. This involved menu and recipe analysis, staff training and a review of purchasing specifications. This, along with supportive curriculum projects, competitions and a campaign to look at "Healthy school meals in the year 2000", provided additional reinforcement to our messages.

(iv) School Education

In conjunction with ten primary schools in Pembrokeshire, we have piloted a 'Nutrition Education Curriculum' package for 9-11 year olds. This has been designed to supplement the 'My Body' health education

project by considering healthy eating in an interesting and fun way.

(v) Public Education

Our close contact with the media has enabled us to utilise them to encourage the promotion of healthy eating. Our first television series 'Don't Break Your Heart' ran for six weeks and presented an overall picture of heart disease and the associated risk factors. A series of ten programmes addressing healthy eating specifically followed this, entitled 'When the Chips are Down'. The most recent six week series on diet, 'The BBC Diet Programme' achieved viewing figures for Wales of 350,000. It also achieved appreciation figures higher than the 'soap' Eastenders, and was later networked to the rest of the UK on two separate occasions.

(vi) Community Action

Our involvement with voluntary and community groups has included a number of events including a 'healthy cookery' competition for W.I.s, along with their involvement in nationally and locally organised events such as shows and cookery demonstrations. Our close liaison with these agencies allows us to utilise their networks to support the promotion of a variety of initiatives.

(vii) Primary Care

Involving the primary care team in the on-going promotion of healthy eating has been essential in both reinforcing our messages and in ensuring consistent information. We have developed a nutrition manual for primary care workers and are establishing training days for its dissemination.

(viii) The Lose Weight Wales Campaign

In November 1987 we received initial feedback from our clinical survey results (2) which showed that 50% of the population were overweight or obese. This was well above the U.K. average. The development of the 'Lose Weight Wales Campaign' presented us with a 'new face' for promoting general nutrition messages.

It was launched through 'The BBC Diet Programme' and was supported by a comprehensive package of resource materials. The Healthy Eating Guide to Losing Weight was designed primarily for individuals wishing to lose weight. For those wishing to join with others, a booklet entitled 'Organising Your Own Slimming Group' was developed, along with a 'Lose Weight and Look After Yourself' adapted course. This involved the course redesign and retraining of tutors in the field and has subsequently led to over 50 classes being established. The viewing figures and information on resources sent out included over 12,000 BBC Diet Books and 10,000 individual packs over a 3 month period.

It appears for a number of reasons, that this campaign has been particularly successful in gaining the interest of the public. However, long term effects on Body Mass Index will of course be a crucial issue to the final outcome of the programme.

Evaluation

Three years after the Programme was launched, a follow-up questionnaire survey of 1,000 adults in 1988 showed that over a third (39%) of all adults reported having consciously changed their diet to a healthier one. Twenty six percent had successfully lost more than 5lbs. in weight in the last year and 20% reported increasing their level of exercise by at least 60 minutes per week. The changes were observed in both sexes, all ages and social groups, and throughout the whole of Wales.

Such reported behavioural changes on a mass scale are encouraging, and if maintained are likely to result in important health gains for Wales. The major follow-up survey in 1990 will detail and validate the progress achieved. An interim survey has also been undertaken during the summer of 1988 to assess reported changes by age, sex, social class, geographical area and the reference area. The findings will be available early in 1989.

We have also identified significant changes in general purchasing patterns towards healthier products. Unlike the rest of the UK, household consumption of carcass meat has not fallen in Wales and in fact increased between 1980 and 1986. This may be attributable to 'Heartbeat Wales' unique stance in supporting the eating of leaner meat. At a time when milk consumption was falling markedly in the UK, in Wales consumption remained constant between 1980 and 1986. However, purchases of low fat milk rose from a zero base to the highest proportion of all regions of the UK. (3)

In 1980 Wales had the highest consumption of visible fats of any region of the UK. In 1986 however, there was a welcome reduction in saturated fats in Wales - particularly butter which was halved. Consumption is now at the level of the South East. There are other clear improvements including a reduction in consumption of packet sugar by a fifth and a doubling of wholemeal bread purchases, with some increase in total bread sales.

Between 1980 and 1986 the P:S ratio in Wales was the lowest of British standard regions at 0.22. By 1986 it had increased by more than 50% to 0.34. In 1980 Wales had one of the highest percentages of energy derived from fat. However, the percentage fell in Wales from 42.8 to 42.3 during 1980 - 1986, unlike the rest of Britain where it increased (4).

These early findings suggest that dietary patterns are changing for the better and that the 'Heartbeat Wales' programme has probably had an effect over and above the general trend in the UK to healthier living.

Some observations

In addressing the weight problem the slight shift away from a purely population strategy after 3 years, towards a high risk one, was a natural progression and one which was seen to be necessary. Our experience is that a combined approach of person-based incentive coupled with a total population strategy is likely to be the most effective. Under the Lost Weight logo this included general public promotion through the media, promotion of 'low fat' milks and 'lean meat', use of retail outlets and pharmacies to provide 'weigh-in' and further 'information centres' for the public, as well as the involvement of the primary health care team and voluntary networks.

The Way Forward

We have established through our contacts with the general public and through our liaison with industry that there is an increasing demand for 'personal health profiles'. This was clearly illustrated in a recent series of health information events which we undertook in conjunction with Boots the major retail pharmacist in Wales. In the evaluation of those who had 'health checks' 58% mentioned blood cholesterol and 16% fitness would be welcome.

We consider cholesterol measures provide useful 'indicators' and 'motivators' to change dietary habits and with additional elements built in can provide a key opportunity to maintain a healthier lifestyle. We are considering how best to meet this challenge in the next stage of the Heartbeat Wales Programme.

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PSYCHOLOGICAL ASPECTS OF SCREENING AND RISK ASSESSMENT

While little evidence concerning psychological factors in blood cholesterol screening is available, the issue can be informed by data from four key areas in other forms of screening:

1. understanding risks and screening
2. decisions about participation in screening
3. distress and labelling effects associated with a 'positive' screening outcome
4. changing behaviour (diet and/or medication) following screening

Understanding risks and screening

Estimates of risk are known to be distorted both by personal experience and by selective publicity. Thus people overestimate the risk of death by murder or car accident and underestimate the risks of asthma and diabetes. Doctors are also liable to such biases and are likely to exaggerate risks associated with diseases given recent prominence in medical literature. In addition, healthy people are known to underestimate their risks of a wide range of diseases.

Screening for disease or risk factors involves not only the estimation of the likelihood of disease, but that probability combined with the results of a screening test with associated false positives and false negatives plus uncertainty about the possible benefits of action taken by positives. Gross errors are made in such estimates. In particular, we are likely to exaggerate the preponderance of false negatives when a test is undertaken in a population where the true ratio of positives to negatives is low.

Decisions about participation

Many factors influence participation in screening programmes. People are much more likely to undertake the required action if they know what is required, they are prompted to act and it is easy. Knowledge about the screening test and its availability has been shown to be predictive of uptake of screening in pregnancy [4]. The importance of making the action easy was demonstrated in another study where, regardless of their stated motivation, the main determinant of whether people took preventive action was whether they had or had not been given a map showing how to get to the medical centre.

The uptake of a new programme will be influenced by its presentation and the fear engendered as this will influence the level of threat perceived and motivate the person to take action. However threat by itself is insufficient.

People will be greatly influenced by important others in their social group; intention to be screened is not only influenced by the individual's own views of the value of participating, but also by their perception of the value that others place on their participation. A new screening (or dietary) programme directed at the general public is likely initially to attract only those few who are influenced by mass media rather than the many who are influenced by personal communication. As more people participate, one expects the uptake to increase exponentially as the social diffusion process occurs.

Distress and labelling effects

There is ample evidence of distress associated with screening, even in those found to be negative. Pre-screening expectations and the communication of results can influence this process. Thus older women were less distressed than younger women when found to be positive on a screening test for Down's syndrome. Patients told their result was negative have been found to be less distressed than those told to assume a negative result if they do not hear otherwise. Where screening is a two stage process, false positives at the first stage can experience considerable distress and this distress may not be alleviated on learning that their true result is negative.

In risk factor screening such as high blood pressure or blood cholesterol, labelling those at risk may result in increased symptoms and psychological distress as well as reduced income and social functioning, although the research is not conclusive. There may be some conflict between raising the level of threat to motivate changes in behaviour and creating unnecessary distress. Lefebvre makes suggestions about counselling individuals found to have high blood cholesterol levels.

Changing behaviour following screening

For cholesterol screening, recommended behaviour changes are likely to be 1) obtaining further assessment of blood cholesterol levels, 2) reducing dietary fat and increasing fibre, 3) medication and, 4) reduction of other risk factors (e.g. smoking, salt intake). Adherence to such service is notoriously poor. It is improved by giving the advice in simple language without overloading the recipient and by defining specific rather than general targets.

A survey in the USA suggests that doctors are unlikely to provide the relevant counselling following blood cholesterol screening. They implemented treatment at unacceptably high levels, felt incapable of giving advice successfully at high levels, felt incapable of giving advice successfully and did not believe that diet would be effective. Individuals seeing a physician following advice given at screening frequently did not have their blood cholesterol rechecked and even those with quite high levels were advised to 'do nothing' and 'not to worry'. Thus for counselling to be effective it will probably have to be done by counsellors trained specifically about behavioural change and blood cholesterol reduction.

A public survey in the USA found that 70% thought that reducing fat consumption would have a large effect on their risk of developing CHD. Thus more of the general public than doctors thought the dietary changes to be effective. These American results may not be applicable in the UK where there has been less progress in CHD reduction and dietary change has been less rapid.

Evidence from other screening programmes suggests the importance of 'positives' in understanding the nature of the risk. Patients with essential hypertension who believed the condition was acute and temporary were more likely to stop taking anti-hypertensive medication, and as a result had higher blood pressure, than those who believed the condition to be chronic and persisted in taking the prescribed drugs. For planned dietary change, reliable knowledge of the cholesterol content of various foodstuffs is essential, but cannot be assumed. Previous work showing misunderstanding of which products contain aspirin remind us that even the intentionally compliant patient can fail. Information from well-controlled studies of dieting for health reasons should guide new programmes.

Dietary programmes targetted at the total population are likely to facilitate the efforts of screened high risk individuals as information in the population at large, shifts in social norms and encouragement of desirable diet, facilitate the personal influence process that affects most behaviour change.

Conclusions

For a screening programme to be successful the targetted population must engage in the screening programme and, for those identified to be positive, risks must be reduced. In any identified to be positive, risk status must be reduced. In any screening programme, there will be difficulty for doctors and patients alike in fully understanding the risks and probabilities involved. Guidelines for screening need to take account of this. In order to achieve maximum uptake of screening and to achieve the behaviour change necessary for risk factor reductions education and admonition are not enough. While they influence people's beliefs about what they should do, many other factors play at least as important a role in determining what people actually do. Mass media information can increase knowledge, but individual beliefs require more individually tailored approaches and are more likely to be influenced in personal exchanges either with a doctor or with one's friends and acquaintances.

Mr Michael O'Connor
Director
THE CORONARY PREVENTION GROUP [CPG]

The Coronary Prevention Group believes that cholesterol testing has a role to play as part of a comprehensive risk assessment for coronary heart disease [CHD]. Two conditions must be fulfilled:

[1] cholesterol levels should not be seen in isolation from other risk factors such as smoking and hypertension;

[2] cholesterol tests should only be carried out where advice and counselling services are available to interpret the results and to give people the help they may need to take corrective action if they are identified as being at high risk. Care should be taken with those whose cholesterol levels are not regarded as high so that they are not led to believe that they have no risk of heart disease.

At the present time CPG believes the resources available in primary health care are insufficient to provide an adequate service to support cholesterol testing for the whole population. CPG therefore recommends the following approach to risk assessment.

Stage 1:

Simple non invasive risk factor assessments such as recording smoking behaviour, blood pressure and family history of CHD. Appropriate advice on healthy lifestyles should be provided.

Stage 2:

Cholesterol measurement for those at high risk of CHD, i.e. those with a family history of premature CHD, those with diabetes, those under the age of 50 with xanthomas, xanthelasma or corneal arcus, those under treatment for hypertension or those with recognised CHD. Everyone with a raised level of blood cholesterol should be given detailed advice about diet and exercise. Only people with a persistent and markedly raised level of serum cholesterol should be considered for drug treatment.

Stage 3:

If primary care teams, having established stages 1 and 2, wish to extend testing to other members of their practice, priority should be given to those with other risk factors for CHD.

The development of risk assessment as a preventative measure will be greatly enhanced by other developments. Firstly, adequate resourcing and training of primary health care teams. Secondly, comprehensive health education in schools and the workplace. Thirdly, proactive measures by Government to restrict promotion of unhealthy lifestyles, such as smoking, and to provide people with the information they need to make healthy choices, such as comprehensive nutrition labelling for food.

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THE POPULATION AND HIGH RISK APPROACHES TO REDUCING
CORONARY HEART DISEASE

1. Cholesterol measurement

The only reason for measuring serum total cholesterol [TC] is its role as a risk factor for atherosclerosis and coronary heart disease [CHD]. It is the method currently used for detecting familial hypercholesterolaemia [FH] present in 1 in 500 of the population, but it is a very poor screening tool for this purpose as many FH subjects have TC levels in the upper range of the population distribution. At present, a very detailed family history is probably the best screening tool for FH.

2. Criteria for screening

Screening is the routine search for unsuspected disease or for the factors considered to be causally associated with the development of the disease [risk factors]. The critical levels of a risk factor [cut-off points] at which action is indicated are difficult to determine and the whole concept of rigid cut-off points for risk factors may be inappropriate. In opportunistic screening the doctor looks for abnormalities in a patient who has attended for other reasons. In systematic screening, subjects often without problems, are invited so that the medical team can look for abnormalities. Both screening systems generate expectations and demands and entail costs as well as benefits. Guidelines have been drawn up by WHO to provide criteria which should be satisfied before screening is introduced. The following points briefly relate these criteria to the issue of screening for TC levels.

2.1

A raised TC level is a necessary but may not be a sufficient cause of CHD. Raised TC levels do not necessarily carry a major risk of CHD in the absence of other risk factors and there is no situation in which a TC level should be regarded with urgency. The average levels in the UK are sufficiently high to regard the whole population as having some risk of CHD.

2.2

If individual diagnosis and treatment is regarded as necessary, then present facilities are wholly inadequate.

2.3

The biological variation in TC level in an individual is considerable and laboratory measurements over time also involve considerable error. In a disease with a long latent period, the concepts of false positives and false negatives are inappropriate when applied to risk factors.

2.4

There is no agreed policy on whom to treat as a patient despite the recommendations from many bodies providing rigid and confusing guidelines.

2.5

The costs of a continuing population screening process involving detection, full diagnosis and management would involve a major proportion of the current medical care budget and for an uncertain outcome.

3. Population and high risk approaches to CHD

The population strategy rests on the high prevalence of modifiable risk factors for CHD, e.g. in middle-aged men, 80% have TC levels above the biologically optimum level [5.2 mmol/l], 80% have cigarette smoking experience incurring a 2-3 fold risk of CHD, 40% have significantly high systolic blood pressure, over 50% are overweight or obese and most are relatively inactive in leisure time. The high-risk strategy focusses attention on those at highest risk, but with varying definitions of high risk. In either strategy no distinctions should be made between primary and secondary prevention as the standard risk factors continue to operate on risk in the presence of pre-existing CHD. This is particularly true for TC. Population and high risk strategies are complementary; an inadequate population strategy would allow a continuing flow of subjects into high risk categories. High risk subjects may benefit proportionately more from intervention than those at lower risk and their proper management could greatly reduce the burden of heart attacks in the population.

4. Blood cholesterol and the risk of CHD

The ability of risk factors to identify those at highest risk of heart attack can be compared by looking at the relative risk [ratio of incidence in the top fifth of the distribution to incidence in the bottom fifth] and the yield [percentage of all heart attacks occurring in the top fifth of the distribution]. The table shows the results for middle-aged British men over a 5-year follow-up after screening using a scoring system for the different risk factors involved.

Factor	Relative Risk	Cases in top fifth [%]
Age	4.7	34
Total cholesterol	3.1	31
Systolic BP	3.0	36
Diastolic BP	3.1	34
Body mass index	1.8	28
'Smoking years'	5.1	38

Full score	53	59
Intermediate	25	58
Basic [GP]	18	54

Table: Relative risk and yield of heart attack cases in 5 years in middle-aged British men, for risk factors and for a combined factor score.

Clearly TC does not even have as high a relative risk or yield of heart attacks as asking a middle-aged man how old he is! A combination of risk factors [score] gives a better indication of risk of CHD than any single risk factor. The full score includes both an ECG and TC, the intermediate score has TC but no ECG and the basic [GP] score has neither ECG nor TC [smoking years, systolic blood pressure, doctor diagnosis of CHD or diabetes, current angina, parental death from heart trouble] and can be done in a primary care setting. The men in the top fifth of the score distribution [full intermediate or basic] have a 1 in 10 chance of having a heart attack in the 5 years following screening, which is 5 times higher than all other men.

Some important issues emerge from the use of this scoring system. With basic [GP] score, the high TC levels [top fifth of the distribution: > 7.2 mmol/l] are equally distributed throughout all the fifths of the risk score. Thus 80% of men with high TC are not at high risk of heart attack. With the intermediate score [including TC], 60% of men with high TC are not at high risk of heart attack. The risk of heart attack increases with increasing TC levels but the levels are so high in all risk groups that it is the other risk factors combined that dominate and determine the rates of heart attack. Measurement of TC in men who have been identified as high risk by the GP score might seem reasonable, but all men in this risk category should aim at TC levels below 5.2 mmol/l and therefore they all need professional dietary advice and possibly TC monitoring. While this is 'appropriate medical care' in the light of our present knowledge, the costs are daunting.

5. Recommendations in the USA and Europe

The United States [1988] have recommended a programme which seeks to identify 'individuals at high risk who will benefit from intensive intervention'. The report clearly interprets high risk as a high TC level rather than a high risk of CHD. All adults are to have their TC measured every 5 years. Those above 6.2 mmol/l [the average in UK middle-aged men] are to undergo a complex lipoprotein analysis on two or three occasions and those remaining [with high LDL-cholesterol levels] will have a clinical evaluation for overall risk for CHD - relying heavily on the clinical judgment of the physician. Everyone becomes a patient and the programme is a licence for lipid laboratories and the pharmaceutical industry. The European Atherosclerosis Society, the British Hyperlipidaemia Association and the Coronary Prevention Group have all adopted the same basic philosophy, although the CPG does call for a staged introduction of universal TC measurement.

6. Conclusions

The average TC level in the UK - in men and women, in all social classes and in every town studied - is high by international or biologically optimal standards. It is mainly determined by diet and provides the necessary susceptibility for CHD. A screening programme for TC levels does not satisfy the basis WHO criteria for a screening programme and simpler methods for identifying those at high risk of CHD are preferable. The population levels of TC should be regarded as a public health problem and not on an individual patient based approach. This calls for a genuine population strategy, which recognises the CHD epidemic as a social and political issue and not just as a medical problem.

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CAN BLOOD CHOLESTEROL BE MEASURED ACCURATELY AND RELIABLY?

The most harmful fat-transporting component in blood is low-density Lipoprotein, LDL. This transports around 75% of the cholesterol in blood: total cholesterol is thus a close measure of LDL and cholesterol only is usually determined as a first step in looking at Blood fat risk status. (Other fractions e.g. High Density Lipoprotein HDL are of interest but not at the first stage. Triglycerides may also indicate cardiovascular risk, but patients are often overweight and improved on simple diet advice). Cholesterol can be determined for whole blood, plasma (blood + anticoagulant, often EDTA) or serum (from clotted blood). Different methods are required for whole blood and serum/plasma requires separation from blood, which is awkward outside laboratories, but similar results arise. Laboratory problems contribute to variation in results obtained, but other factors have a greater influence. Some known factors include:

1. Age and sex Levels in Uk males increase with age up to about age 42 years, remaining steady until age 70+ years when survivors show a slight fall. Females show a steady age-related increase with higher levels than males from about age 50 years and a fall age 70+. Childhood levels are lower, do not closely correlate with their levels as adults, or those of their parents.
2. Genetic/racial Some environmentally independent effect.
3. Seasonal Rise of at least 1 mmol/L in winter common - about 15%.
4. Pregnancy Steady increase throughout - about 20%.
5. Menstrual cycle Mid-cycle increase.
6. Diurnal variation reported in some but not all surveys.
7. True intra-individual variation of 5% over several days reported for adults, underlying cause uncertain.
8. General medical state Acute disturbances e.g. trauma, surgery, viral infection, leukaemia, and large bowel tumours cause fall. Many disorders cause increase, e.g. hypothyroidism, diabetes, kidney/liver impairment.
9. Some drugs may be given for unrelated problems e.g. some Beta blockers given for blood pressure or angina can give 10% increase.
10. Dietary state Very few individuals show effect of food on total cholesterol: triglyceride levels show variable increases.
11. Sampling conditions - how the sample is collected and stored.

Use of tourniquet - levels too low if squeeze and dilute sample:
levels too high if delay sampling - spot dries.

Anticoagulant - EDTA (which otherwise protects lipids well) causes fluid to leave cells diluting serum/plasma. 5% fall in cholesterol reported.

Thus laboratory performance is only a part of the problem, but there are plainly areas in which performance could be improved. Poor performance can follow problems with accuracy, precision or both. Accuracy represents how far the result is from the 'true' value (someone has of course to set that value), precision represents consistency of performance. A laboratory may have an apparently reasonable performance, as the average result over a years say is good, but results giving that average could be all over the place, with poor precision. Another laboratory may consistently score a little low, with very tightly grouped results and good precision. Both are important, but results with good precision can be corrected to accurate values, those with poor precision cannot.

Extensive data on cholesterol, mainly from the USA, plainly shows that accuracy is the problem, not precision which is good. Differences seen may be slightly influenced by method and machine choices, but the standards used to set - calibrate - the assays seem to be crucial. Over 95% of UK labs now use an enzyme method, although minor variations in the later reactions do arise; method choices are thus markedly restricted. The UK Steering Committee on External Quality Assessment for General Clinical Chemistry (Chairman Professor Donald Moss; I am a Member) is actively reviewing performance: test samples are to be issued to labs shortly.

An accreditation scheme for laboratories is also under review. Thus laboratories could not undertake e.g. lipid work unless they performed to an acceptable standard: what standard? Laboratory performance assessed from circulated reference samples of known cholesterol level can be expressed as a coefficient of variation, (CV) and a range can be calculated within which any measured difference should be regarded as within the limits of laboratory variation and not a true difference. A diagram is attached showing such limits at various levels of performance. A CV of 3% is desirable, half of US labs with special experience of lipid work do not achieve 5%. A recent UK-GP survey of Reflotron (office-type machine) data checked) gave a CV of 5.5%: cholesterol levels of 5.5 and 6.8 mmol/l could not therefore be reliably distinguished.

Apparent variation in recorded cholesterol levels is in part real, in part laboratory-based, but overall means that any cholesterol action limits must be rather loosely interpreted. Action limits allowing for measured levels of variation can be used - thus at a CV around 2.5% a level of 6.5 mmol/l (one proposed UK action limit) is actually 6.2-6.8 mmol/l. thus no high value is missed of patients presenting at 6.2 and above are reviewed. CVs also improve if duplicate or triplicate measurements are done, with extra work and expense.

Logistic considerations

Action limits applied may be elastic considering variables such as age, sex; at an action limit of 6.5 mmol/l which as above may adjust to say 6.2 mmol/l, around 50% of all adults below 65 years at presentation will require early retesting. Assuming opportunistic screening through GPs, screening of 95%+ of the age group will take

around 5 years. Patients repeating at over 6.5 will be advised, repeat testing in 3-4 months: of this group of about 30% perhaps one half will require further short-term follow-up and possible drug treatment will be an option in 5-10% of all patients, numbers depending on the application of any age limits. Broadly therefore, tests required over five years are 2.5-3 times list size, some follow up testing inevitably being done at special Lipid clinics. The equipment and chemistry for GP office testing is adequate, problems are the skills, experience and quality control of the operator: performance must be continuously monitored. The cost of GP testing in time and reagents is high, but advantages include screening for and attempted control of other risk factors - essential, and the immediacy of the result which can be potent in patient motivation. Centralised testing of samples at accredited, cost - and performance - effective major centres is an option, and probably cheap although proper costing of sample transport and data return is required. Optimally any such centres should be directly involved, offering Lipid Clinic support and extensive clinical and laboratory back-up with access to specialist procedures e.g. to confirm genetic involvement. The current UK lack of trained medical, laboratory and particularly dietetic staff is crucial;; testing is all very well but what is to be done to advise and treat those who are then found to have unfavourable risk profiles? As a Lipid Clinic specialist formerly directing the largest UK clinic and with a major reference laboratory all supported on research funds, I am clear that screening cannot deliver major benefits without further major logistic support.

A perceived alternative to population screening is the 'high risk' approach, with increased individual benefits and a much reduced workload. The National Lipid Screening Project, NLSP, in which I was involved (see: Mann JI et al Brit Med J 1988; 296:1706, attached) clearly showed that general screening is the only effective way to find individuals at risk: some do present through case-finding but many more do not. In the UK, coronary heart disease is strongly and inversely related to social class. General screening is not so biased: voluntary screening over-recruits social class 1 and 2, the 'worried well' who are less prone to premature cardiovascular disease.

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MONITORING RISK ASSESSMENT: EXPERIENCE FROM PRIMARY CARE

The potential of general practice

Primary care is uniquely placed to implement health promotion and preventive medicine policies because:

- * it has extensive access to the population; virtually everyone is registered with a GP.
- * each person has an identifiable doctor (a GP).
- * each doctor has a registered list of patients, and hence each practice an identifiable 'community'.
- * contact is extensive. About two thirds of men and three quarters of women consult at least once a year; virtually all do so at least once every five years. The average person consults four or five times a year and each day about three quarters of a million consult.
- * those in lower socioeconomic groups (and at highest risk) consult at least as frequently as others.
- * many contacts provide opportunity for health promotion and disease prevention, as well as illness-management.
- * patients who consult expect advice.
- * GPs are regarded as credible and trusted sources of advice.
- * advice is one-to-one and face-to-face.
- * anxiety and fear of disease may motivate behaviour change.
- * there is evidence of the efficacy of advice.
- * risk assessment and management can be combined
- * anticipatory care, curing and caring can be combined.
- * a team approach can be adopted.

The potential achievement gap

But there are obstacles which inhibit, frustrate and undermine the potential of general practice for health promotion and preventive medicine. These include:

- * the demand-orientated philosophy of medical care
- * medical education which ranks health promotion and preventive medicine low and medical salvage (acute care) high.
- * poor communication, including failure to elicit patients own health perceptions and beliefs.
- * the time constraints of 5-10 minute consultations.
- * poor organisation and management.
- * failure to adopt a team approach.

Bridging the potential-achievement gap

Realisation of the potential of general practice for health promotion and preventive medicine depends on overcoming some of these obstacles. Requirement for this includes:

- * willingness of doctors and other primary care team members to take initiatives and raise prevention issues in the context of patient-initiated illness-interviews.
- * recognition of the essential unity of prevention, curing and caring. Prevention is 'anticipatory care'.
- * improved communication skills, especially for an educational role.
- * adequate time.
- * improved organisation and management which encourage a better coordinated, systematic approach.
- * teamwork, especially involving practice nurses.

Cardiovascular disease risk assessment in primary care

This should be complementary to general health education for all and should include:

- * eliciting and recording family history of cardiovascular disease, especially coronary heart disease (CHD) at an early age.
- * eliciting and recording any personal history of CHD.
- * enquiry about smoking habits and advice and help to stop smoking.
- * recording weight and height, enquiry about diet and about alcohol consumption, followed by advice as appropriate.

- * measurement and recording of blood pressure. Where appropriate, information and advice about the contribution of obesity, alcohol and lack of exercise to high blood pressure. Persistently raised blood pressure needs careful assessment and appropriate management - both non-pharmacological and drug treatment.

The place of blood cholesterol measurement in risk assessment in primary care

This is a contentious issue. While the contribution of high cholesterol levels to risk of CHD is important, there is a danger that it may be perceived and managed in isolation from other risk factors. Moreover, a 'high risk' detection strategy must acknowledge that the majority of the UK adult population has cholesterol levels above that desirable.

As a screening procedure, a random total cholesterol measurement (on a 'none-fasting' blood sample) is adequate but:

- * must be part of a coherent strategy for risk factor detection and management.
- * must be done appropriately and reliably.
- * implies the availability of back-up management facilities, including detailed and sound dietary advice and the advice of an expert lipidologist for those found to have very high levels.
- * must be followed by appropriate advice for and management of those found to have levels warranting specific action.
- * must not create unnecessary anxiety.

As part of a coherent risk factor assessment strategy, priority for such measurement should be confined to those:

- * with a personal history of CHD
- * with a family history of CHD in a first degree relative under 55 years, or of hyperlipidaemia.
- * at substantially increased risk because of other risk factors e.g. those with hypertension or diabetes.

A model for risk factor assessment in primary care

The Oxford Prevention of Heart Attack and Stroke Project has provided a model which has been widely adopted nationally. It depends on using patient-initiated contacts with general practice to recruit patients for risk factor assessment by a practice nurse.

Patients in a defined age group (generally 35-64 years) are invited by practice receptionists to make appointments for nurse 'health checks' ('human MOTs') when they come to see a doctor for any reason. The nurse conducts an assessment of cardiovascular risk (as indicated above). Assessment and management (including referral to the doctor) follow protocols, and information is recorded on special risk factor cards. Nurses are trained by a nurse 'Facilitator' who can stimulate, initiate, supervise and monitor such activity in a number of group practices.

Nurses are employed by practices. Facilitators are generally employed by Health Authorities (though some by Family Practitioner Committees) and there are now about eighty such posts nationally.

Research has shown that this type of programme ('opportunistic screening') results in a higher proportion of patients being screened than opportunistic 'case-finding' by doctors in consultation.

Further research (a 'randomised controlled trial') is currently evaluating the effect of such a programme on risk factor levels.

The impact of risk factor assessment on the average practice

There are about 8,000 patients in the average group practice, about 3,000 of whom will be in the 35-64 (or 30-59) year age group. About 1,000 will be cigarette smokers, 750 will have a cholesterol level above 6.5 mmol/l and at least 150 a level of blood pressure requiring drug treatment. The work load of not only assessment but management and monitoring of those with such risks should not be underestimated.

The implications of the NHS Review and new GP Contract

Although these emphasise the importance of prevention, their implementation is likely to inhibit prevention and health promotion. Further limitation of resources, the 'GP budget' proposals and financial pressure to increase 'list' size will adversely influence risk assessment and management.

Margaret Jones,
Nursing Officer, 'Well Welsh',
Heart Health Screening in the Workplace, Heartbeat Wales,
Health Promotion Authority for Wales.

Why the Workplace?

The workplace can be an important setting for coronary heart disease prevention. Approximately one third of the population are in employment, and normally form small groups which spend around eight hours a day together.

Support for lifestyle change and risk reduction exists at various levels:

- social: close working and personal relationships may exist to help behaviour change
- organisational: structures may exist to support an organisational health promotion strategy
- environmental: Health and Safety legislation may provide a minimum framework for developing health promotion.

With regard to access to an at risk population it could be argued that the workplace has a number of advantages over primary care: (i) The screening opportunity involves little cost in terms of time or money to the individual, (ii) it may be incorporated into existing occupational health practices, (iii) advice and information can be easily provided, (iv) monitoring is facilitated, and (v) environmental and organisational support can be provided.

As a setting for cholesterol assessment the workplace can provide an on the spot result for the individual, involving few NHS/primary care time and resources. Results can be fed back to the G.P. with the individual's consent. Dietary advice to the individual can be supported by healthier meal choices and information at point of sale in staff restaurants, canteens and vending machines. Follow up cholesterol measures can be easily arranged. Discussion and social support by peer groups can support uptake and behaviour change.

Nevertheless there are disadvantages with the workplace as a setting for risk assessment in general, and in particular for cholesterol:

- (i) - lack of adequate follow up of medical intervention is required
- (ii) - confidentiality
- (iii) - lack of access to the whole family
- (iv) - lack of consensus between the initial screening protocol and protocol of G.P. re. follow-up

Experience of "Well Welsh"

The 'Well Welsh' Project was set up as a joint pilot project with Heartbeat Wales and the College of Medicine in Cardiff, (Well Med).

The objective is to provide a self-financing and comprehensive Cardiovascular risk assessment and Counselling service for employees at all levels in a wide range of industries. The service is offered by nursing sisters who have received training in lifestyle assessment, counselling and laboratory procedures.

The project has been energetically supported by the Welsh T.U.C. and C.B.I., and employers are now increasingly taking the initiative of their own accord. If the cost, currently £550 per day, is acceptable 'Well Welsh' undertakes to screen 25 clients per day for 45 minutes each.

The mobile unit was donated by Tesco Stores Plc, originally being a Tesco delivery trailer. Conversion costs etc. were undertaken by the way of grants and staff employed on the Manpower Services Commission Scheme.

To cover costs a nominal charge was made to commerce and industry basically on a self financing basis. Net income/loss was split 50/50. The pilot project operated for 2 years. With the relaxing of income generation initiatives under the present Government, the programme has now been taken over in its entirety by the Health Promotion Authority for Wales which assumed responsibility for Heartbeat Wales in April, 1987. It is planned to make a small excess of income over expenditure for future years for the further benefit of health promotion needs in Wales.

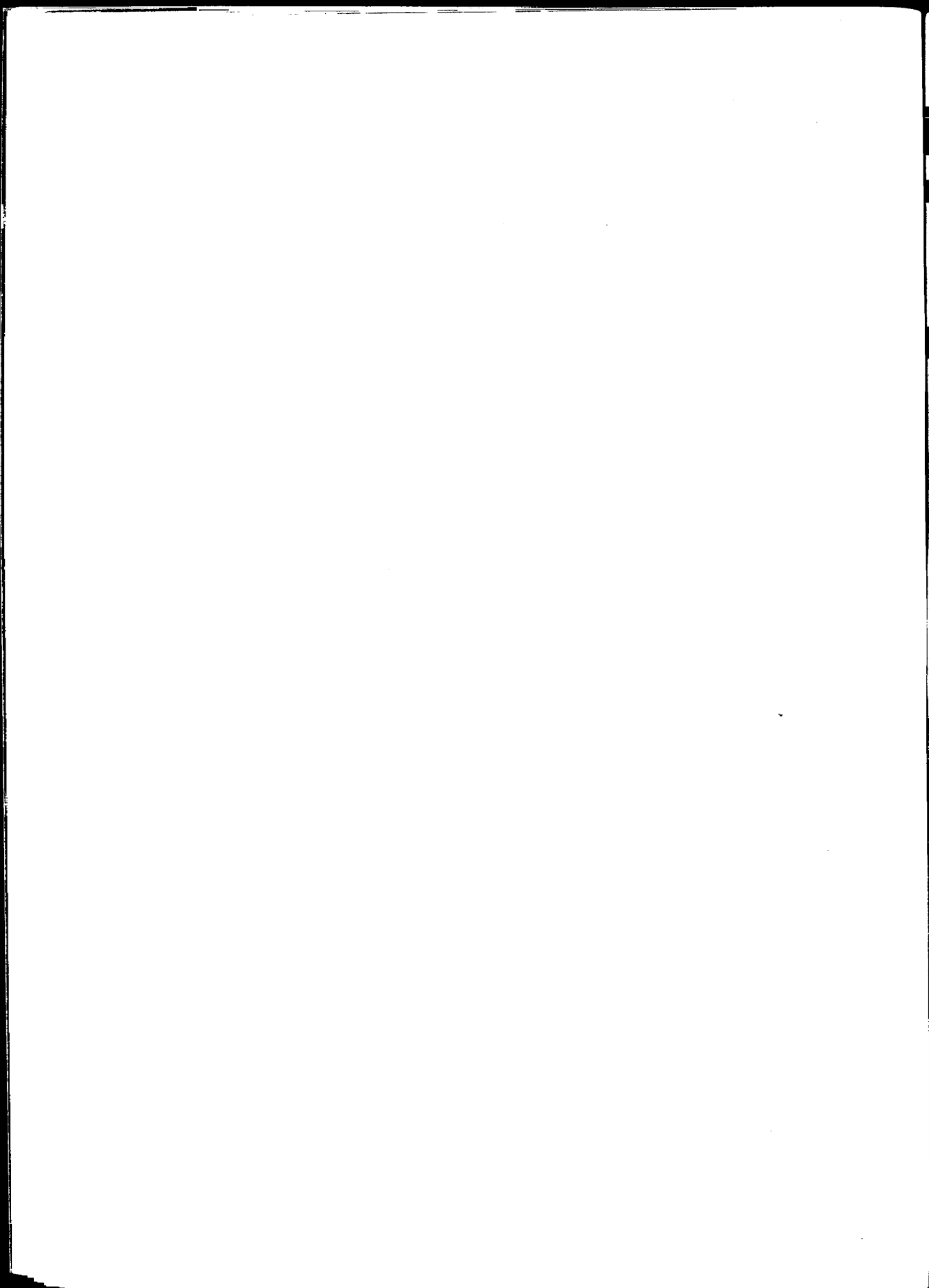
During the last 2 years 'Well Welsh' has screened and counselled over 5,000 people. However, in their belief that cholesterol testing should not be performed in isolation, a comprehensive cardiovascular risk assessment is offered.

Preparation for the programme includes site inspection for trailer needs, delivery of lifestyle questionnaires, agreement on appointment times and the setting up of clinic by the nurse counsellors.

A few weeks prior to the screening and counselling session the Clients are given questionnaires to complete, we have found through experience that this is the most successful way.

The 'Well Welsh' examination consists of:-

- | | |
|-------------------|--|
| assessment of :- | * Personal medical and family history |
| | * Eating, drinking, smoking, exercise habits |
| | * Stress levels |
| measurement of :- | * Body weight and height |
| | * Carbon monoxide in expired air |



- * Blood cholesterol
- * Blood sugar
- * Blood pressure
- * Cardio-respiratory fitness

advice on:-

- * What the important health risks are
- * Ways to improve health
- * Whether further help is needed

Cholesterol testing is by means of a Boehringer Reflotron Machine which analyses whole blood from a finger-prick, giving results within 2 - 4 minutes. The agreed accuracy level of $\pm 10\%$ is achieved by attention to user procedure by the manufacturer, daily use of check-strips and regular Quality Control by the Medical Biochemistry Department of the University of Wales.

Action levels are those as recommended by the European Atherosclerosis Society. For non-fasting total serum cholesterol the thresholds are as follows:-

<u>STATUS</u>	<u>LEVELS</u>	<u>ACTION RECOMMENDED</u>
'Satisfactory'	<5.2	General lifestyles and nutrition advice
'Moderate risk'	5.2 - 6.4	Calorie reduction, low fat diet, increase exercise
'High risk'	6.5 - 7.8	As above and possibly lipid lowering drugs if diet is unsuccessful
'Very high risk'	>7.8	Referral to lipid clinic

Thus, anyone with a level of 6.5 or over is advised to see their G.P. within the next 2-3 weeks.

All results from the examination and the action recommended are confidential to each individual, however if the Establishment has an Occupational Doctor/Nurse a copy will be sent if the Client gives written permission. Similarly, a copy is sent to the G.P. This consent is rarely withheld.

An intermediate report in March 1989 on 'Well Welsh' screening revealed the following with regard to cholesterol levels in a working population of 4,590. - 4 -

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1941. It is a message of the President to the Congress, and it is a message of the President to the Congress.

2. The second part of the document is a letter from the President of the United States to the Congress, dated January 1, 1941. It is a message of the President to the Congress, and it is a message of the President to the Congress.

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LEVELS
MMOL/L

<5.2	'Satisfactory'	55.88%
5.2 - 6.4	'Moderate Risk'	31.20%
6.5 - 7.8	'High Risk'	11.00%
>7.8	'Very high risk'	1.79%
	'Not taken'	0.13%

Thus, approximately 12 -13 % of Clients seen were recommended to visit their G.P. for a repeat cholesterol. The Director of the Programme also writes to the G.P. concerned.

Problems - Those of initial organisation have been overcome. No negative response has been forthcoming from G.P's. Two important areas give rise for concern.

- (i) We sometimes have to deal with enquiries from individuals and from Occupational Health Nurses, who are worried because G.P's have not responded to high cholesterol levels.
- (ii) Follow ups, ideally 3-6 months later, are often constrained by employers' budgets - particularly if the second screening falls in the same financial year as the first.

There has been a positive response to 'Well Welsh' from employees. A very high uptake of 90-95% even amongst manual workers, is the norm. Young adults feel that it provides a great opportunity for assessment and counselling which they would not normally find provided by the G.P.

Our Workplace Co-ordinator reports that where 'Well Welsh' has been involved more changes occur and more interest is shown at a Social/Organisational/Environmental level than in organisations who have not the service.

'Follow-up' action is given the utmost importance. We can offer advice on:-

- (a) Nutrition - ie Canteen improvements
- (b) No smoking and alcohol Policies
- (c) L.A.Y. Classes both general and specific, so that the areas

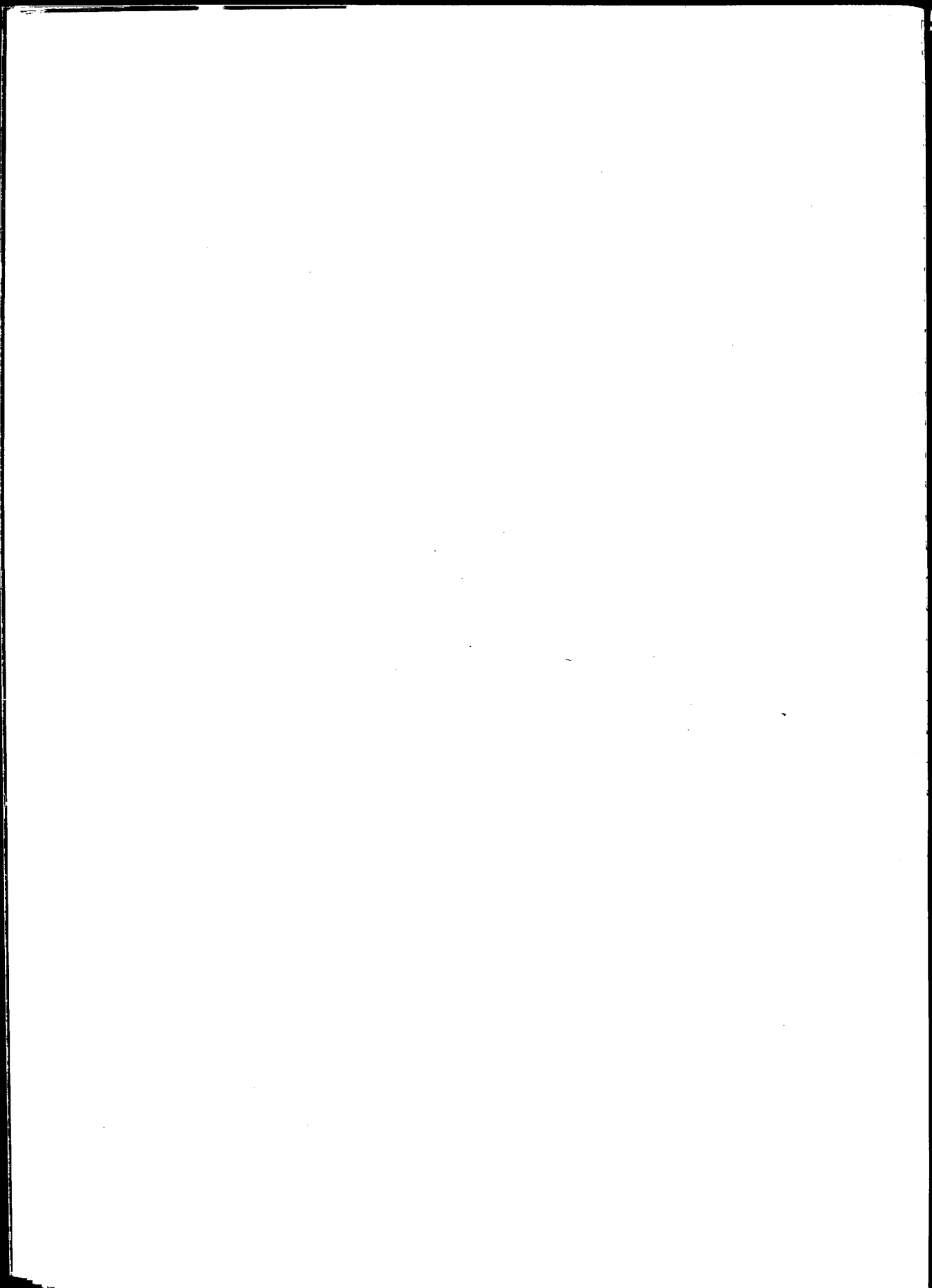
such as obesity and stress etc. can be considered.

There is also an increased uptake of these support services where 'Well Welsh' has been involved.

One final observation is that the enquiries from the general public about cholesterol levels have increased considerably over the past 6 months in Wales although Heartbeat Wales has not publically been advertising measurement on a mass scale.

It has now become evident that people in Wales, not unreasonably, want to know their own cholesterol levels.

Margaret Jones
May 1989



Michael Marmot
Department of Medicine
University College and Middlesex School Medicine

BLOOD CHOLESTEROL DIET AND CORONARY HEART DISEASE

INTRODUCTION

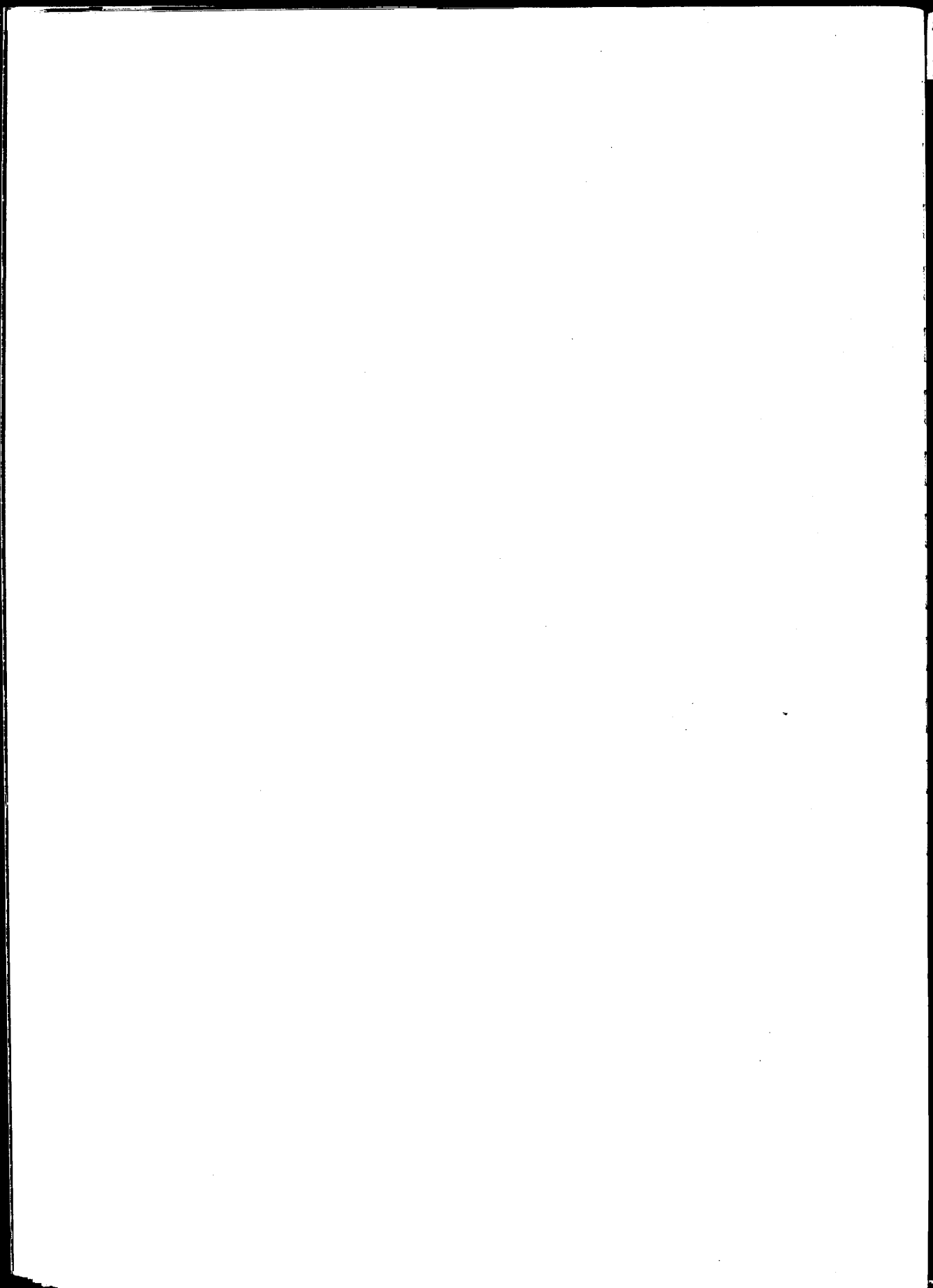
I could argue two cases. One, quite coherent, the elements of which would be correct, lays out the well-established case linking dietary fat, blood cholesterol and coronary heart disease (CHD). The second, with evidence to back it up, would a) cast doubt on the tightness of this link, and b) argue that, to the extent that it is established, it is not useful because changing dietary fat would have no impact on all-cause overall mortality.

Each of these lines is taken by interest groups: those committed to prevention tend to take one line. Those less in favour of prevention and/or with particular commercial interests, predictably, tend towards the 'it is complicated' line. The fact of debate and dissent should not worry us. The point is to make a judgement. My judgement accords with COMA on the central role played by the amount and type of fat consumed, and the level of total plasma cholesterol.

THE UK PICTURE IN INTERNATIONAL CONTEXT

CHD is the major cause of death in Western countries. A comparison of the countries of the UK with other countries is instructive. Since the 1960s, striking declines in CHD mortality have occurred in countries with high CHD rates such as Finland, USA, Canada, Australia and New Zealand; in countries with intermediate rates such as Belgium and Israel; and in countries with low rates such as France and Japan. This has left Scotland and Northern Ireland with the highest rates in the world, with England and Wales not far behind. Such decline as has occurred here began late -- 1978 compared with mid '60s in USA -- and does not begin to match the 40+% decline in the USA.

It is likely that this change in mortality reflects a change in the rate of occurrence of the disease (incidence) not simply a change in survival. It suggests that rates can change rapidly and that, in principle, prevention is possible.



DIET, PLASMA CHOLESTEROL, AND CHD

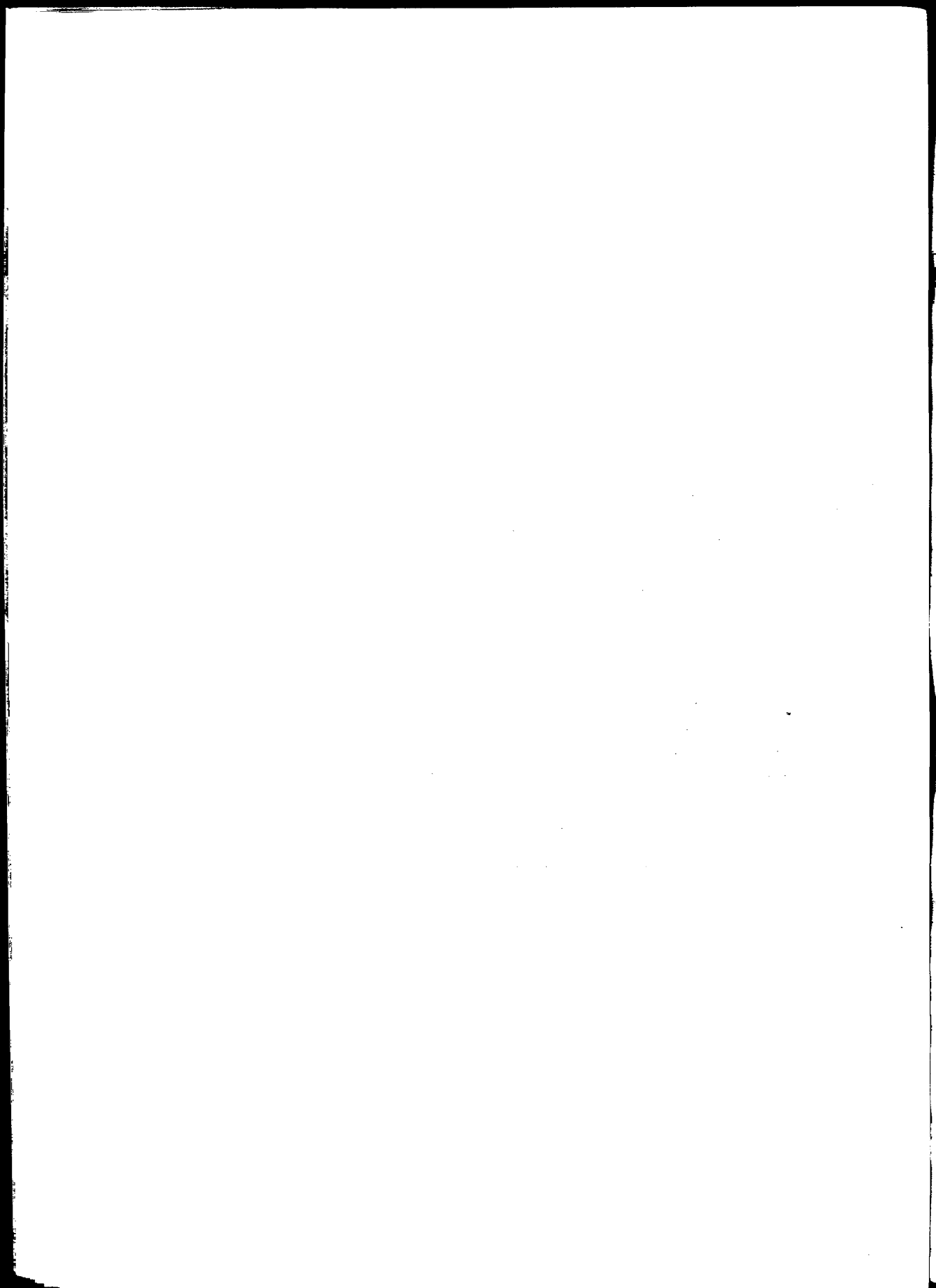
Plasma Cholesterol and CHD

Levels of plasma total cholesterol predict the future occurrence of CHD. The relationship is strong, consistent, graded, and independent of other factors. Within a population, the relationship holds throughout the range of plasma cholesterol, with no detectable threshold. The largest study of this issue, 361,662 white men aged 35-57, screened for the American MRFIT study, shows that 48% of CHD deaths are attributable to having plasma cholesterol higher than the deaths are attributable to having a plasma cholesterol higher than the bottom 10% of the distribution. Given the shape of the distribution, more of these attributable deaths come from the 'moderate' range of plasma cholesterol than from the high end of the distribution.

It is more or less the case that CHD does not assume epidemic proportions in the population unless average plasma cholesterol levels are high. The Seven Countries study shows that the CHD rates of a population are proportional to the mean level of plasma cholesterol of that population. There is close agreement between the slope of the relationship between CHD and plasma cholesterol determined from studies comparing individuals within populations and studies comparing averages of populations.

Diet, and plasma cholesterol

Carefully controlled dietary experiments show that plasma cholesterol levels are influenced by the amount of saturated fat and of polyunsaturated fat in the diet. The key formula has the term 2S-P: twice the amount of saturates less the amount of polyunsaturates in the diet change serum cholesterol to a predictable and quantifiable extent. This is more or less beyond disagreement. There has been less agreement on the effect of dietary cholesterol on serum cholesterol studies, show an effect of dietary cholesterol on serum cholesterol independent of the amount of fatty acids consumed. Recently attention has turned to monounsaturates -- found most noticeably in olive oil and consumed in low coronary populations of Southern Europe. It is not yet clear whether substituting monos for saturates has a greater cholesterol-lowering effect than replacing saturates with carbohydrates. It is possible that monounsaturates do not lead to the same elevation of plasma triglycerides as does a diet with an increased carbohydrate content.



Diet and CHD

dietary fat clearly influences plasma cholesterol levels. Plasma cholesterol levels are clearly related to CHD risk. It seems entirely reasonable to propose that dietary fat influences CHD risk. There is ample experimental, and pathological evidence to support this proposition. As with the data on plasma cholesterol and CHD, comparison of populations shows that where average intakes of fat are high, CHD rates are high. It has proved more difficult to nail down this relationship in individuals within populations, perhaps owing in large part to the inaccuracy of dietary assessments. Although more recently, studies have shown this relationship in individuals.

The conclusion of COMA and most expert committees is that the amount and type of fat in the diet does have a powerful causal role in affecting the rate of CHD. Two points should be borne in mind: dietary plasma cholesterol; and components of the diet other than the fat content may influence CHD risk. Diet-plasma-cholesterol-CHD is likely to be an important part of the story but not the whole story of diet and cardiovascular disease.

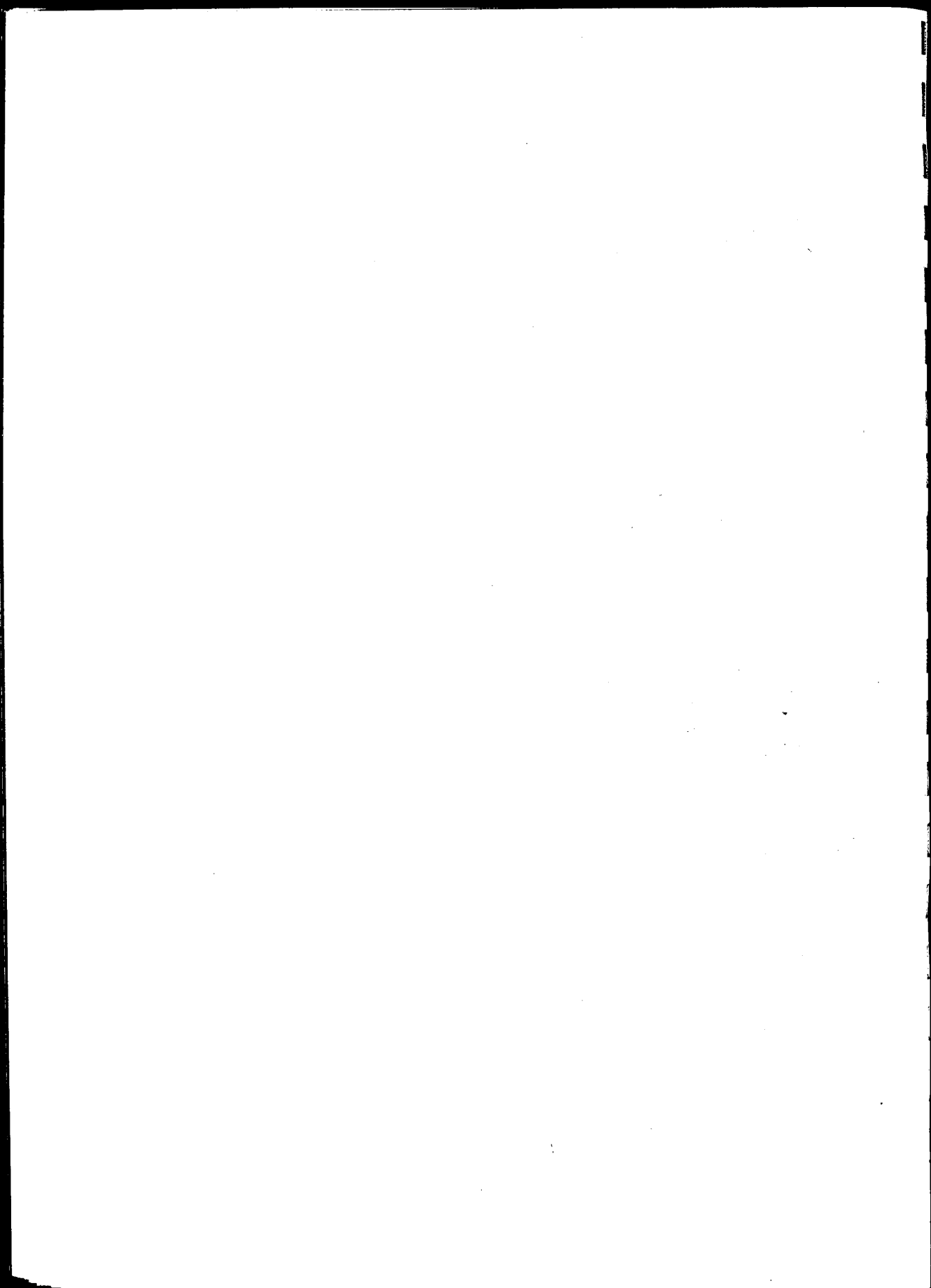
THE MULTIFACTORIAL NATURE OF CHD RISK

Nor is risk a simple matter of lipid levels. High plasma cholesterol does not equate with high risk. One must take into account level of blood pressure, smoking, physical inactivity. These make independent contributions to predicting risk.

There are two reasons for establishing 'risk factors': investigating aetiology and picking out individuals at high risk for some form of intervention. With regard to the first purpose, our ability to predict subsequent onset of CHD is remarkably good. Those in the top tertile of serum cholesterol and blood pressure and smoking have a greater than 9-fold increase in risk compared to those in the lowest tertiles, over the subsequent 6 years in the MRFIT screenees. A relationship so strong that it argues powerfully for causation. There will however be substantial misclassification in using these three risk factors to pick out high risk individual. Shaper and colleagues will present their scoring system designed to improve the classification of high risk.

EXPLAINING INTERNATIONAL TRENDS

For a variety of reasons it is difficult to determine exact cause and effect between change in risk factors and change in disease for the two main reasons of change in methods over time and the fact that several potential candidates may change simultaneously. Nevertheless, there have been attempts. In the USA, initial reports that there had been a drop in mean plasma cholesterol were difficult



Christopher Robbins
Food and Health Planner, London

THE CONTRIBUTION OF NATIONAL POLICY

The most influential area of national policy affecting population cholesterol levels is that affecting the composition of the food supply and the consumer's ability (and freedom) to make low risk food choices if desired. This area is the responsibility of the Ministry of Agriculture Fisheries and Food (MAFF).

The UK's food supply policy is long standing and has both wide and strong influence on the food supply. Unlike any other industry apart from defence, the food industry has its own government department in MAFF. The quality and combinations of crops or animals grown on British farms are largely determined by the combinations of price supports, grants and subsidies, backed by grading regulations, all of which are initiated and implemented by the MAFF. The food manufacturers and processors are influenced in their use of additives, the composition of many products and the limited ingredient information they must declare to consumers.

Past policy has been the dominant influence on food consumption in the UK and has overseen the relentless deterioration (from the cholesterol risk factor perspective) in the national diet beginning in the 1950s. The proportion of calories from fat in 1986 was the highest ever recorded in the UK with 53.5% of the total fat coming from animal sources. This is explained as being a result of having policy objectives dedicated to the value and volume of production, the profitability of the industry, and stable markets without due attention to the health consequences. In fact, health objectives are not contained in present UK food supply policy, nor that of the EEC which is having a growing influence on UK policy and, consequently, on the UK diet.

It is both desirable and feasible to introduce health objectives into UK national food supply policy, creating a National Food and Health Policy. This could add health objectives to production and market decisions thereby potentially reducing the negative policy consequences for dietary health and actively increasing the health status of the food supply. The seven major areas where action can be taken are: production supports, production quality, food composition, food prices, information about foods, catering, and education.

All of the major policy instruments, together with enabling legislation and powers, necessary to incorporate health objectives into policy are already in place in the UK. The department of Health has made repeated recommendations to correct the national diet to reduce heart disease. There are also several authoritative reports from health professional and similar organisations recommending dietary change for other health reasons. The public are receptive to healthier behaviour and evidence of their interest in better eating comes as healthier support from some manufacturers and retailers. To be effective in supporting a healthy food supply, national policy needs to remove the historic negative influences on health and be more proactive by incorporating health into all national policies affecting food.

Interdependence among countries means that there should be more attention to harmonisation of food quality standards and greater cooperation and sharing of experience on the formulation of Food Health Policies aimed at secure and healthy food supplies. While blood cholesterol remains a significant risk factor in CHD in the UK, for populations and individuals, it is counterproductive having national food supply policies which fail to take account of opportunities to reduce the risk. It is unacceptable if national policies increase or maintain high risk factor levels through inadequate consideration of the effects of policy on health.

Note the US decline in CHD from 1967 onwards

IS-Pi
good
indicator

How important is the PS:S ratio? (Polyunsaturate to saturate)

3 1= 1=

Blood pressure, smoking & cholesterol are the 3 relevant risk factors

Peto Cholesterol is in Britain as important a cause of excess deaths as middle age men smoking ($\frac{33}{100}$ in each case)

"Plants are easier to catch than animals are" - hence a natural human diet is plant-based.

"There's no such thing as a normal Englishman"

16% less cholesterol = $\frac{1}{2}$ less CHD deaths

"About half the benefit of reduced cholesterol seems to show within 2 years (from the RCTs)

Shaper For middle-aged men cholesterol level should be below 5mm per litre. 80% are above this level.

Jonsson Although 80% of people believed they would be helped by diet change, only 23% intended to take action.
A paradox - if people are frightened they take notice - if they are unduly frightened, they switch off a self-defence.

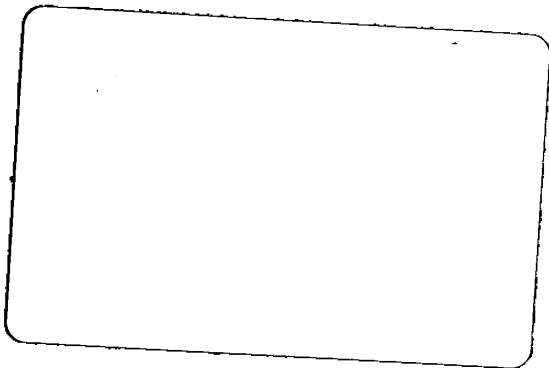
M. Thurn "You can't throw a habit out of the window, you have to wash it down to their one step at a time"

"Even if you are on the right track you will get new ones if you just sit there."

King's Fund



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