

A McCARRISON SOCIETY CONFERENCE

POST-GENOME: HEALTH IMPLICATIONS FOR RESEARCH AND FOOD POLICY

19th September 2001 (Wednesday)
12.00pm - 4.30pm

The Medical Society of London (11 Chandos Street, London W1G 9EB)

Aim:

To explore the implications of the data from the Human Genome Project to Nutrition, Health and Food Policy.

Rationale:

Last century the average height rose in the UK by 0.4 inches/decade. The incidence of heart disease rose from a rarity to no 1 cause of mortality. Obesity affects an increasing proportion of the population and diabetes is rising here and dramatically in developing countries with newly acquired wealth. These changes cannot be explained by any change in the genome. That environmental and nutritional influences have affected health is evident from this dramatic change in shape size and disease pattern in one century.

The discovery of only 35,000 genes instead of the expected 150,000 means that the nutritional environment played a pivotal role in human evolution, cerebral expansion in the past and also to the wide secular and regional variation in modern disease patterns today.

Over the last fifty years, trillions of pounds and dollars have been spent on the drug/gene deterministic approach to health. With some notable exceptions, little has actually been delivered. There is still no drug to cure heart disease or cancer although many populations, live and grow old without these problems. We now have a major new problem of the escalation in mental ill-health and macular degeneration in young people.

Knowing now that the key to evolution and the behaviour of human disease is in the environment interacting with the gene and not the other way round, this meeting will be the first to explore the new direction required of post-genome research, specifically as it affects nutrition and health.

PROGRAMME

12.00 – 1.00pm Lunch & Registration

Chairperson

Professor Chris Branford-White

Head of School of Biological and Applied Sciences, University of North London, London N7 8DB

1.00pm – 1.40pm *“What the human genome project means to food, nutrition and health”*

By Professor Michael A Crawford

Institute of Brain Chemistry and Human Nutrition, University of North London, London N7 8DB

There is increasing experimental evidence to support the view that nutrition affects prenatal programming of genetic information. Our genome is only 1% different from the chimps. For 99.999% of the time following the separation from the chimps 5 million years ago, we ate wild foods and our physiology is still inescapably so adapted. Modern nutrition related disease such as heart disease, breast and colon cancer rose dramatically last century amongst specific Western food cultures. They are now being exported to developing countries. The only period last century which saw a reverse in the rise of these disease was during world War II when the Government linked food production to nutrition and health. We need to understand the principles of wild or real organic food and apply that understanding to food policy, production and education.

1.40pm - 2.25pm *“Genome evolution, blood and soil- a message from deep time”*

By Professor Edward Tuddenham

Professor of Haemostasis, Faculty of Medicine, Imperial College of Science, Technology and Medicine, Director MRC Haemostasis Research Group, Hammersmith Hospital, Du Cane Road, London W12 0NN

Blood here stands for coagulation and thrombosis, soil for the environment, deep time for the fact that the clotting system hasn't changed in 450my but our food has - drastically in the last 150 years. Genome evolution will be explained. Although the complete sequence of the human genome has now been available 'on line' since February, and those of the fruit fly and yeast went on line the previous year we have lacked a complete genome from a lower vertebrate until now. A complete puffer fish genome is to be announced imminently. With this information we can see how in broad terms the genome of the vertebrate lineage arose. Looking in great detail at one crucial system- that of blood clotting- we find that it was fully evolved at the base of the jawed vertebrate lineage, some 450,000,000 years ago. That is- the way a puffer fish clots its blood in response to injury is exactly the same as the way every vertebrate 'upwards' to man clots its blood and has done so for all those ages. Yet in the past 150 years great epidemic of blood vessel disease and thrombosis-often fatal has swept through economically advanced human populations. What has changed? Obviously not the blood clotting system. Clearly some environmental change (soil- or food production/consumption) has impacted our ancient genomic heritage in unexpected and deadly ways. The message from deep time is that systems that have worked perfectly well throughout evolution can be unbalanced when put into radically new environments, and we have been more radical in changing our diets and life styles in the past 150 years than in the previous 150,000 years. The consequences are seen in the epidemic of thrombosis, the cure must lie in returning our diet towards its premodern state.

2.25pm – 3.25pm *“Neurodevelopmental, evolutionary and epidemiological perspectives dietary deficiencies of omega-3 fatty acids in mental health”*

By Dr Joseph R Hibbeln, M.D.

Chief, Outpatient Clinic, NIAAA/ National Institutes of Health, Laboratory of Membrane Biophysics and Biochemistry, Rockville, MD 20852, USA.

There is now a body of epidemiological data on the recent rapid rise in mental ill health amongst young people which includes postpartum depression. As the data follows from country to country the previous rise in mortality from heart disease, it is likely to be similarly nutritional in origin. The most likely cause is the decline in omega 3 fatty acids in the diet operating on embryonic and fetal development. These neural and cardio protective nutrients are essential for the brain structural development, growth and function. Several studies have reported depletions of omega-3 fats among depressed patients. A cross-national comparison has revealed a significant inverse correlation between annual prevalence of major depression and fish consumption. Fish is the richest source of the long chain omega 3 fatty acids used in the brain's signalling. Experimental evidence on the Rhesus infant monkey, together with the clinical trials in depression weaves the story of violence, early nutrition and cardiovascular abnormalities together.

3.25pm – 3.45pm **“Alternative Hypothesis”**
By Colin Leakey, Ph.D. F.I.Biol.
University of Cambridge

Following the elucidation of the cause of Rous Sarcoma virus by Temin and Baltimore, it became recognised that retroviral ‘infections’ in mice were commonplace but caused no overt disease. Later retroviruses were sought and found in other organisms including other primates and man. Three different retroviruses are known in man. HIV, as is all too well known, is associated with the AIDS syndrome and conventionally said to ‘cause’ it. It can be also be associated with a lymphoma or other symptoms including dementia. HTLV1 which was earlier also described as a lymphotropic virus is relatively widespread in some human populations. In West Africa it is associated with, and also said to ‘cause’ ‘Tropical Ataxic Neuropathy’. That disease can be associated with sponginess in parts of the brain. The third such virus, Foamy Virus, occurs in E.Africa and has not been associated with any overt disease. The apparent association of the long term consumption of organic cyanide (linamarin) containing manioc or cassava was the supposed ‘cause’ of the TAN before the HTLV-1 virus association was discovered. Could the ‘stress’ of long term linamarin consumption convert the otherwise latent and harmless ‘infection’ by HTLV1 into manifest disease? Beginning with that enquiry, the conversion from latent viral infections to subsequent overt disease was questioned as being the aetiology of RNA viral diseases. SSPE (Sub-Sclerosing Pan Encephalitis) one of the better known such syndrome was considered as a model for neuropathological diseases. But there has to be an RNA infection that can become latent through conversion to pseudo genomic latent cDNA which can be subsequently converted by stress involving transcription activation and thus to virulence. The BSE/CJD complex is suggested as following this pattern, with a retroviral element though not a complete retrovirus, providing the ‘infection’ and ‘stress’ factors providing the trigger for virulence after latency. In this hypothesis there are plenty of pointers along the trail.

3.45pm – 4.10pm **Discussion**

The evidence from the human genome project along with the regional, historical or secular changes in disease pattern, indicates that last century, the shape, size and disease pattern of Western populations was changed. This change was far too fast to be explained by any change in the genome. The World Health Organisation in ranking the health of nations has Japan and Iceland at the top for longevity and appropriate birthweights. Yet the families of Japanese migrants to the USA last century, now have the same health problems as their hosts. Across Europe, there is a twenty fold difference in mortality from heart disease: the difference with China is 100 fold. Yet in Manila, heart disease is now the first cause of mortality. In Malaysia some 10-25% of school children are obese and diabetes is now the commonest cause of ill health. The Global Forum for Health in Geneva is now predicting that by the year 2020, perinatal conditions, heart disease and mental ill health will be the first three in the rank of the worldwide burdens of ill health. In its report it states (www.globalforumhealth.org):

“Global spending on health research by both the public and private sectors amounts to about US\$56 billion per year (1992 estimate). However, less than 10% of this is devoted to diseases or conditions that account for 90% of the global disease burden. The human and economic costs of such misallocation of resources are enormous.” The questions raised are

1. How can policy and food production respond to meet the challenge of 2020?
2. How can research strategy change to address the 90/10 misallocation?

4.10pm – 4.30pm **Tea and Informal discussion**

In Memoriam



Allan Drury Pepper

24th September 1920 – 31st May 2001

This conference is being held in memory of Allan Pepper who served the McCarrison Society from its foundation in 1966 and has been treasurer over the last ten years. Allan was much loved by all who knew him. A man of great integrity, total reliability and sound judgment, he was more than a friend to all of us in the Society. He will be so sadly missed. In recognition of the deep loss to his wife Joan and his family we offer this as a small testament to his pioneering spirit and love for humanity.

Acknowledgements

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the McCarrison Society and the Mother and Child Foundation.