

Mycobacteria, milk and Crohn's Disease

Is *Mycobacterium avium* subspecies paratuberculosis (MAP) a possible cause of Crohn's Disease?

Mycobacterium avium subspecies paratuberculosis (MAP) was discovered 100 years ago and is known to cause a chronic inflammation of the intestines, called Johne's disease, in cattle. The symptoms are very like Crohn's Disease in humans, but evidence that MAP might play a causative role in at least some cases of Crohn's Disease is conflicting. Professor John Hermon-Taylor, currently Visiting Professor at King's College, London, has used laboratory techniques to investigate tissues from the affected areas of people who have Crohn's Disease. He has reported that, in some cases, genetic material from MAP organisms can be found. However, a carefully performed study at Leeds University, which was funded by NACC, could find no evidence of MAP in the tissues of people with Crohn's Disease. Other researchers have undertaken similar research with conflicting results.

There has been considerable debate over whether the variation in results, both in finding the organism and in detecting its genetic material, is due to differing standards and techniques in the laboratory work. The development of a reliable, universally accepted test for detecting MAP infection in humans would be a major step in resolving the controversy. In the meantime, no one can say definitely whether MAP is or is not a cause of Crohn's Disease, or whether it might be relevant in just a proportion of cases.

Is there a risk of MAP in milk?

Research has shown that milk-producing cows affected by Johne's disease can pass MAP into the milk. If the animals

show physical signs of Johne's disease the milk is thrown away, but some animals can be carrying MAP without it showing. The milk from these cows would still go into the general milk supply.

All such milk is pasteurised, that is put through a heating process designed to kill bacteria and other microscopic organisms. In the late nineties there were some concerns that MAP might be surviving the pasteurisation process. Research suggested that extending the duration of pasteurisation was more effective against MAP than raising the pasteurisation temperature. As a result, some of the major dairy companies voluntarily extended the duration of pasteurisation to 25 seconds.

Since then a government-funded research study in Belfast has tested samples of both raw and pasteurised milk to see if MAP was present as a viable organism. Results, released in September 2000, showed that the organism sometimes survived pasteurisation, though it was found in only 2% of retail milk samples. Some of these samples had been processed for the longer 25 second pasteurisation time, so it became clear that a longer pasteurisation time was not sufficient to eliminate MAP entirely.

However, the presence of some MAP in pasteurised milk is not thought to be a problem for the great majority of people. This is because MAP is quite often present in people's bodies without appearing to cause any ill effects.

Is there a risk of developing Crohn's from drinking pasteurised milk?

In 2005 the Department for the Environment, Food and Rural Affairs (DEFRA) commissioned a case control study to investigate whether individuals

consuming milk and dairy products, potentially contaminated with MAP, are at a higher risk of developing Crohn's. The report of this study, published on 15th July 2005 and independently reviewed, found no association between dairy products and the risk of Crohn's Disease. Interestingly, this study even showed a weak protective effect of increased consumption of pasteurized milk. For further information visit the Drinking Water Inspectorate (DWI) website: www.dwi.gov.uk or telephone the DWI on 020 7082 8024 or contact the DEFRA helpline: 08459 335577.

However, Professor Hermon-Taylor believes that drinking pasteurised milk could be a risk for people who are susceptible to Crohn's Disease, due to the presence of MAP. He began working on an anti-MAP vaccine in 2001. NACC has funded his recent research on testing the vaccine in mice. The results showed that the vaccine was able to reduce MAP infection without harmful side effects. He now proposes to develop a vaccine suitable for use in humans.

In 2002 and again in 2009 NACC formed a panel of eminent experts to consider the available evidence, specifically looking at:

- the currently published evidence for a link between MAP and Crohn's;
- the likelihood of MAP being a cause of Crohn's disease based on current knowledge;
- what research could be undertaken to answer the question of the relationship of MAP and Crohn's definitively.

The first panel published their findings in March 2004 with the following conclusions and recommendations:

- The evidence shows MAP is present in milk and possibly water supplies.
- MAP DNA has been found in the bowels of some people with Crohn's, but it is also present in the bowels of a smaller number of people who do not have Crohn's. The significance of the presence of the DNA in terms

of being a cause of Crohn's is unknown.

- The hypothesis that Crohn's is a collection of different conditions with differing causes, either genetic or environmental, is likely to be correct. If MAP is causative, it may affect only one subset of the disease and perhaps only one genetic sub-type.
- If MAP is associated with Crohn's, it is not acting as a conventional infective agent.
- There is no proof at present that MAP causes Crohn's.
- Further research should include studies that will identify which subsets of Crohn's patients, if any, appear to have MAP as a primary cause of their disease.
- The panel welcomes the Department for Environment, Food and Rural Affairs (DEFRA)'s precautionary measures to reduce the incidence of MAP in the food chain.

The second panel published their findings in July 2009 and came to the same conclusions. They found that research following the first report has not strengthened the theory that MAP plays a primary role in Crohn's Disease. However, they felt that research should continue into MAP's effect in the gut, including interactions with other micro-organisms.

The panel also recommended:

- Assessments to check the presence or absence of MAP when Crohn's is first diagnosed and whether this is linked to how the disease develops.
- Linking the presence or absence of MAP with specific genetic markers.
- Further research:
 - to find reliable techniques to identify and study MAP in humans;
 - to study environmental factors affecting other bacteria linked to Crohn's;
 - to compare the DNA of bacterial strains found in local animals with those of people with Crohn's;

- to investigate the population where there are high levels of exposure to MAP.
- Gastroenterologists to encourage people not to give up dairy products. While welcoming the dairy food industry's measures in hygiene and pasteurisation, the panel believes that the nutritional benefits of dairy products far outweigh any concerns about MAP in milk, which remain theoretical.

For full details of both reports see 'The Report of the NACC Expert Review Group into the evidence linking *Mycobacterium paratuberculosis* (MAP) and Crohn's Disease' and '2nd Report (2009) on the evidence linking *Mycobacterium avium* subspecies *paratuberculosis* (MAP) and Crohn's Disease' on the NACC website or contact the NACC Information line for a copy.

What about UHT milk?

If you are particularly concerned about the possibility of developing Crohn's Disease, you could opt to buy UHT milk instead of pasteurised milk. There is no research to prove that UHT milk is completely free of MAP, but it is generally assumed that the much higher temperatures used to sterilise UHT milk destroys more, if not all, of the MAP.

How important is milk in my diet?

Milk is a valuable source of calcium which helps to strengthen the bones. People with Crohn's Disease are more at risk of weak bones than the general population. (See NACC's information sheet: *The Bones and IBD*)

Despite any concerns about the effectiveness of pasteurisation against MAP, many doctors feel that the nutritional benefits of milk far outweigh any risks. If you do not drink milk then calcium supplements might be needed, and it would be best to discuss this with your doctor.

What if I already have Crohn's Disease?

Whatever the cause of Crohn's Disease, it is an ongoing condition. This means it can flare up, when symptoms are more active, or go into remission, when there are few or no symptoms, at varying times.

Many researchers now believe that IBD is caused by a complex interaction of factors: the genes a person has inherited and an abnormal reaction of the immune system to intestinal bacteria, which may be triggered by something in the environment. Until more research is carried out, it is not known whether the presence of MAP might trigger a fresh relapse in people with Crohn's.

Further help

If you have any queries please call the **NACC Information Line** on **0845 130 2233** or email: nacc@nacc.org.uk

NACC-in-Contact

☎ **0845 130 3344**

**weekday afternoons 1-3.30pm
and evenings 6.30-9pm.**

A supportive listening service run by trained volunteers who have IBD or a relative with IBD.

© **NACC 2009**

Mycobacteria, milk and Crohn's Disease
Edition 4
Last review October 2009
Next review due 2012

NACC publications are research based and produced in consultation with patients, NACC medical advisers and other health or associated professionals. They are prepared as general information on a subject with suggestions on how to manage particular situations, but they are not intended to replace specific advice from your own doctor or any other professional. NACC does not endorse or recommend any products mentioned.

We hope that you have found the information helpful and relevant. We welcome any comments from readers, or suggestions for improvements. References or details of the research on which this publication is based can be obtained from NACC at the address below. Please send your comments to Helen Terry at NACC, 4 Beaumont House, St Albans, Herts AL1 5HH – or email h.terry@nacc.org.uk.

The National Association for Colitis and Crohn's Disease (NACC) is a voluntary Association, established in 1979, which has 30,000 members and 70 Groups throughout the United Kingdom.

Membership of the Association costs £12 a year. New members who are on lower incomes due to their health or employment circumstances may join at a lower rate. Additional donations to help the work of the Association are always welcomed.