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Crime, punishment and a junk food diet

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AN AMERICAN study investigating the effects of omega-3 fatty acid supplements on the brain is at the cutting edge of the debate on crime and punishment. The new research, conducted by the US Government's National Institutes of Health, calls into question the very basis of criminal justice and the notion of culpability.

It suggests that individuals may not always be responsible for their aggression. Together with a study in a high-security prison for young offenders in Britain, it shows that violent behaviour may be attributable at least in part to nutritional deficiencies.

The British prison trial at Aylesbury jail showed that when young men there were fed multivitamins, minerals and essential fatty acids, the number of violent offences committed in the prison fell by 37 per cent.

Although no one is suggesting that poor diet alone can account for complex social problems, Britain's former chief inspector of prisons, Lord Ramsbotham, says he is now "absolutely convinced that there is a direct link between diet and antisocial behaviour, both that bad diet causes bad behaviour and that good diet prevents it".

The Dutch Government is conducting a large trial to see if nutritional supplements have the same effect on its prison population.

In Australia, Dr Gordon Parker of the Black Dog Institute has co-authored a scientific review of recent studies suggesting that omega-3 polyunsaturated fatty acids may be beneficial for treatment of mood disorders. The review, published in the *American Journal of Psychiatry* earlier this year, confirmed that omega-3 supplementation may benefit individuals suffering from depression, or the depressive phase of bipolar disorder.

"One of the nice things is that you can measure omega-3 levels," he says, "and if you measure [them] in people with mood disorders it is often low while omega-6 is increased."

The clinician in charge of the US study on aggression, Joseph Hibbeln, hypothesises that modern industrialised diets may be changing the very architecture and functioning of the brain. We are suffering, he believes, from widespread diseases of deficiency.

Just as vitamin C deficiency causes scurvy, deficiency in the essential fats the brain needs and the nutrients needed to metabolise those fats is causing a host of mental problems, from depression to aggression. Not all experts agree, but if he is right, the consequences are serious. The pandemic of violence in Western societies may be related to what we eat or fail to eat.

Researchers at the US National Institute on Alcohol Abuse and Alcoholism, which is part of the National Institutes of Health, had placed advertisements for aggressive alcoholics in *The Washington Post* in 2001. About 80 volunteers have since been enrolled in the double-blind study. They range from homeless people to a teacher to a former secret service agent.

Following a period of three weeks' detoxification on a locked ward, half were randomly assigned to two grams per day of the omega-3 fatty acids EPA and DHA for three months, and half to placebos of fish-flavoured corn oil.

An earlier pilot study on 30 patients with violent records found that those given omega-3 supplements had their anger reduced by one-third, measured by standard scales of hostility and irritability, regardless of whether they were relapsing and drinking again. The bigger trial is nearly complete now and Dell Wright, the nurse administering the pills, has seen startling changes in those on the omega-3 acids.

Some subjects on the trial have long histories of violence but with omega-3 fatty acids have been able for the first time to control their anger and aggression. "W" was a 120-kilogram barrel of a man with convictions for assault and battery. He improved dramatically on the acids and later told doctors that for the first time since the age of five he had gone three months without punching anyone in the head.

Parker is not sure that blanket supplementation of every individual with omega-3s will end mood disorders like depression. "I don't have many people come back to me [after taking the acids] saying 'hallelujah I'm cured' - only about 5 per cent of people say that."

This may be because supplementation can only help people whose signs are due to a deficiency in the first place. "We still need further studies to work out the right dose," he says.

Hibbeln, a psychiatrist and physician, says that over the past century most Western countries have undergone a dramatic shift in diet. The omega-3 fatty acids that are essential to the brain have been flooded out by competing omega-6 fatty acids, mainly from industrial oils such as soya, corn and sunflower. In the US, for example, soya oil accounted for only 0.02 per cent of all calories available in 1909, but by 2000 it accounted for 20 per cent. Americans have gone from eating a fraction of an ounce of soya oil a year to downing 11.3 kilograms a person a year in that period. These omega-6 fatty acids come mainly from industrial frying for takeaways, ready meals and snack foods such as crisps, chips, biscuits, ice-creams and margarine.

To test the hypothesis, Hibbeln and his colleagues have mapped the growth in consumption of omega-6 fatty acids from seed oils in 38 countries, including Australia, since the 1960s against the rise in murder rates over the same period. In all cases there is an unnerving match. Industrial societies where omega-3 consumption has remained high and omega-6 low because people eat fish, such as Japan, have low rates of murder and depression.

"The average Australian diet probably contains 15 milligrams of omega-3s [daily], whereas in Japan the average diet contains about 1000 milligrams," says Parker.

Of course, all these graphs prove is that there is a striking correlation between violence and omega-6 fatty acids in the diet. They don't prove that high omega-6 and low omega-3 fat consumption actually causes violence. Many other things have changed in the past century and been blamed for rising violence - mass media, the breakdown of the family unit and increased consumption of sugar, for example. But some of the trends you might expect to be

linked to increased violence - such as availability of firearms and alcohol, or urbanisation - do not in fact reliably predict a rise in murder across countries, says Hibbeln.

Professor John Stein, of the department of physiology at Oxford University, believes that the evidence from the British prison study and from Hibbeln's research in the US is "strong", although the mechanisms involved are still not fully understood.

Hibbeln, Stein and others have been investigating what the mechanisms of a causal relationship between diet and aggression might be. Laboratory tests at the National Institutes of Health have found that Americans have cell membranes higher in the less flexible omega-6 fatty acids than the Japanese have. The omega-6 acids appear to have displaced the elastic omega-3 fatty acids found in Japanese nerve cells.

Hibbeln's theory is that because the omega-6 fatty acids compete with the omega-3 variety for the same metabolic pathways, when omega-6 dominates in the diet, we can't convert the omega-3s to DHA and EPA, the longer chain versions we need for the brain. Then it seems the brain picks up a more rigid omega-6 fatty acid DPA instead of DHA to build the cell membranes - and they don't function as well.

These effects were also predicted in the 1970s by a leading fats expert in Britain, Professor Michael Crawford, now at London's Metropolitan University. Two decades later the first study of the effect of diet on behaviour took place in a British prison. It was conducted by Bernard Gesch, now a senior researcher at Stein's Oxford laboratory, at Aylesbury prison.

His study, a placebo-controlled double-blind randomised trial, took 231 volunteer prisoners and assigned half to a regime of multivitamin, mineral and essential fatty acid supplements and half to placebos.

The results, published in 2002, showed that those receiving the extra nutrients committed 37 per cent less serious offences involving violence, and 26 per cent less offences overall. Those on the placebos showed no change in their behaviour. Once the trial had finished the number of offences went up by the same amount.

Gesch believes we should be rethinking the whole notion of culpability. The overall rate of violent crime in Britain has risen since the 1950s, with huge rises since the 1970s. "Such large changes are hard to explain in terms of genetics or simply changes of reporting or recording crime."

In Australia, the Black Dog Institute is planning studies to determine the effect of omega-3 supplementation to curb antisocial behaviour in adolescents. "It is a plausible argument that there may be a subgroup of younger people showing antisocial behaviour as a consequence of a dietary problem," says Parker. "I think this is another area of study that will expand dramatically."

Guardian News & Media

The Black Dog Institute is recruiting volunteers for a study to determine whether omega-3 supplements are an effective treatment for major depression. See www.blackdoginstitute.org.au.

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