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# A rotten way to feed the children

**By Stephanie Northern**

The laboratory rats are agitated. Their teeth are chattering. They are nervous and cannot concentrate. Their physiological symptoms are equivalent to morphine withdrawal. But they are not on morphine. They are on sugar and they need their fix.

The rodents have been fed a diet of 25 per cent sugar. If this seems an unpleasant experiment, remember that children routinely eat breakfast cereals containing more than 40 per cent of the sweet stuff. Never mind the youngsters' teeth or waistlines, what is this sort of junk food doing to their brains?

The Government has been forced to pump £342 million into school behaviour improvement programmes. Dyslexia, hyperactivity and autism all appear to be on the increase. The World Health Organisation is predicting a 50 per cent rise in child mental disorders by 2020.

Obviously there are many factors behind these problems, but to deny the role of nutrition completely, to try to ignore it, is indefensible, says Dr Alex Richardson, senior researcher at Oxford University's physiology laboratory and co-director of the Food and Behaviour Research group. We are what we eat, the old saying goes, and what we eat has changed hugely over the past 50 years. The physical risks to children of a highly processed, highly refined diet lacking in fruit and vegetables are now acknowledged, but the damage being done to their behaviour, learning abilities and mood is not.

Nutrition can play a key role in preventing and managing many difficulties including development disorders such as hyperactivity and mental health problems such as depression. It also has a strong influence on everyday ups and downs, says FAB, a Scottish-based charity.

Take sugar. "If children slurp cans of Coke on the way to school," says Dr Richardson, it puts them on an artificial high in terms of brain function, but that instantly stimulates the release of too much insulin which causes blood-sugar levels to plummet. In a short time their brains are in a fog. They can't concentrate, they are irritable and find it hard to hold on to stable emotional reactions. They are on a blood-sugar yo-yo that is doing nothing for their brain function.

Between 1983 and 1997, children's consumption of high-sugar drinks rose by 64 per cent. In 2002, eight to 16-year-olds spent £433m on crisps, chocolate, gum and cigarettes on the way to school, a 68 per cent increase on the 1998 figure. Such junk-fuelled minds have persuaded politicians in Wales and Hull to offer free breakfasts to all their primary pupils.

"It is widely accepted that diet influences our health yet we manage to decouple that relationship when it comes to behaviour," says Bernard Gesch, also a senior researcher at the Oxford physiology lab and founder of the Natural Justice charity. He doubts that any official nutritional guidelines in the world mention behaviour. "Dietary standards are designed to stop bits dropping off you. They are not designed for optimum performance."

Gesch worries that the massive changes in children's diets have not been systematically assessed for their effects on the brain. "If you pump in very high levels of sugar the chances are that the youngster is going to get hooked on the stimulation of brain opioids. When you withdraw it the poor little child's brain is probably hurting - especially when you go past the sweetie counter in the supermarket." The brain is a greedy organ. It has phenomenal nutritional requirements. It comprises 2 per cent of body mass yet uses more than 20 per cent of available energy. It takes a third of the blood from the heart to supply it with the nutrients it needs to work. Not surprisingly, it doesn't seem to work so well without them.

In 2002 Gesch released the results of a dietary experiment conducted at Aylesbury young offenders institution. More than 200 inmates took part in a double-blind, randomised, placebo-controlled test. Anti-social behaviour fell by 25 per cent and violent incidents by 35 per cent among offenders given multi-vitamin, mineral and fatty-acid supplements that brought their intake up to official levels. There was no change in the placebo group.

"It raises the important question of what would have happened to these men if they had been nourished properly in their young lives," he says.

Last month Unicef called for action to help the two billion people worldwide estimated to suffer from a lack of essential nutrients and minerals. Shortfalls in iodine and iron stunt brain development, for example, but - as Gesch showed - can be corrected cheaply and easily with supplements or by fortifying food.

While the UK's children do not lack micronutrients on the scale of the developing world, the picture is very variable. Gesch's young offenders had access to well-balanced meals in their institution, but they made poor choices. So do children when it comes to school dinners, the Consumers' Association reported last year. It asked 246 primary and secondary pupils to keep a food diary. The youngsters filled the pages with details of crisps, chips and chocolate bars, but rarely mentioned fruit or vegetables. Their diets were high in saturated fat, sugar and salt and low in many vital nutrients such as zinc, iron, protein, calcium, folate and vitamins A and C.

Consider the role of just one of these. Nearly half of the UK's children suffer some zinc deficiency - the classic sign is white spots on the fingernails. Zinc has a role in the metabolising all that sugar youngsters consume. It is also essential for cell division and replication, and a shortage damages the senses of taste and smell. This leaves children more open to the appeal of highly spiced and flavoured, salty and sugary foods and less likely to appreciate the subtleties of fruit and veg.

The fats children eat is another major concern of FAB. Dr Richardson is currently concluding a study of the effects of fish-oil supplements on dyspraxic primary children in Durham. These supplements contain the much-publicised Omega 3 oil. This is "absolutely essential and tragically lacking in most modern diets," she says, except of course in the run-up to the summer exam season when students and parents empty the Chemists' shelves in the hope of better results.

The brain is about 65 per cent fat. Omega 3 oils are its genuine, natural polyunsaturates and are essential to its working. But they can be displaced by manmade, unnatural nasties called 'trans fatty acids' – by-products of the hydrogenation process that has allowed the food industry to use cheap solidified vegetable oils instead of expensive animal fats. (Remember when we binned our butter dishes in favour of margarine tubs.)

However, TFAs don't behave in the same way as Omega 3 oils. In brain cells, for example, saturated, hydrogenated and trans fats make the membranes far less fluid and flexible. This can affect the functioning of all cell signalling systems, says Dr Richardson. Animal studies reveal that these new fats can become incorporated into the brain's structure and alter the profile of its neurotransmitters. The nation's children are free to wander into any corner shop and buy snacks containing modified versions of oils that are essential to mental function - and that have never been tested for what they do to the brain.

"Every time children eat crisps, biscuits or cakes they are filling themselves with what are essentially toxic fats," says Dr Richardson. This has now been admitted by the US's Food and Drug Administration and the UK's Food Standards Agency. Both have got warnings out about this, but they are not shouting very loudly. There are no health benefits and many health costs to these hydrogenated fats. Yet they are all that some children and adults are eating. They are replacing the essential fats that would make their brain and body work properly with ones that are clogging up the machinery.

Such concerns are not new. Twenty years ago it was suggested that Omega 3 deficiency might contribute to hyperactive attention deficit behaviours. Subsequent research has backed up this finding, but lack of funding means it has all been small scale. Vested interests in the food and pharmaceutical industries are happy with the status quo, says Dr Richardson. "The free market has its faults. After all, it is not the burger chains that have to deal with the consequences of children eating inadequate diets."

She criticises the Government's refusal to ban food advertising for children and its lack of investment in research on the influence of nutrition. "We have an ostrich-head-in-sand attitude even when there are so many children in our schools whose behaviour and learning problems are costing the state huge amounts of money. One local authority is spending £5.5m a year on children who have been excluded. If only some of that money were reallocated into programmes to re-educate people on the importance of a decent diet."

Food and Behaviour Research:
www.fabresearch.org/

Natural Justice:
www.physiol.ox.ac.uk/natural.justice/