

Nutrition and Behaviour

Nutrition and Biochemistry represent two different fields with one common element - how the body responds to various stimuli. From the common trunk of Nutrition and Biochemistry a new branch of study is being developed. This chapter will endeavour to detail the new area of how these two sciences are directly involved with what has been considered in the past a more social science, that of Behaviour.

The belief that foods digested are a direct cause of peculiar reactions can be traced back to ancient Greece. Hippocrates, himself, observed that when frequently eaten foods are avoided for four days subsequent re-exposure can cause adverse reactions. This four day rotation diet is still in use today and shall be looked at more thoroughly later in the chapter on Food Intolerances.

Some examples from history show us that physical reactions to the foods we eat are not new phenomena, in 1621, for example a book entitled, 'The anatomy of melancholy' was published in England in which milk was incriminated as a frequent cause of headaches and beans were associated with causing nightmares.

In classical fiction food has been linked with unexpected effects as well. In Charles Dickens', 'Christmas Carol' during a conversation between Jacob Marley and Scrooge the explanation as to why Marley didn't exist was based around the food that Scrooge had eaten that night. 'The vision was just caused by a slight disorder of the stomach which made his senses cheat him.' To conclude his explanation Scrooge stated that, 'there is more of gravy than the grave about what you are.'

Even though the public generally have taken on board the theory that food can alter behaviour or cause adverse reaction, the medical profession as a whole has not despite the many years of public awareness. Under the scientific method of modern medicine doctors and scientists are in the dilemma of having to wait for long, expensive, double blind studies to be carried out; which must then be proved by other equally long double blind studies which are totally independent to the first studies before they can offer the smallest recognition about a subject which the public already accepts as common knowledge.

Taking the connection between nutrition and behaviour as fact the rest of this chapter looks at the individual subjects of behaviour and food sensitivity and attempt to discover the causes behind the symptoms. Whether these causes involve the tricky subject of food addiction, the effects of the mother's diet or some kind of subconscious brain control. Past studies from a variety of subjects will be looked at in order to determine the most useful treatments currently known in the field of behavioural and nutritional research to correct the adverse effects some foods have on some people. There have been two main reviews on the literature carried out over the last few years, 'The Relationship between Nutrition and Deviant Behaviour'- Gail Bradley and Peter Bennett in 'The Criminologist' and 'Food Sensitivity and the Nervous system: Hyperactivity, Addiction and Criminal Behaviour' - Janine Robinson and Anne Ferguson in 'Nutrition Research Reviews'. Both have been used as sources of references but expanded upon into some chosen special areas of discussion.

The key observation to come out of all our work in the field of nutrition and behaviour is that not all criminal behaviour is premeditated and not all those following a career in crime would continue to do so if they were capable of appreciating the significance or the consequences of their actions. Assuming that these two events exist, the aim of this project is to consider the links between nutritional factors and criminal or deviant behaviour.

In the broadest sense, behaviour can be defined as the response of an organism to its environment. The human body is a very complex organism giving complex responses which explains why human behaviour is so poorly understood. The contributory factor which affects behaviour that is being looked at here is obviously food or more specifically diet, which includes the variety, pattern, quantity and combination of foods and beverages consumed.(Morris, 1985).

As taken from Food for Court: Diet and Criminal Behaviour -B. Gesch, 'In order to understand why diet changes can affect criminal behaviour it is necessary to re-appraise our explanations of crime. The traditional explanations of crime are either genetic; the person is born a criminal, they are genetically predisposed towards crime; or social; the criminal is a social product, they are brought up that way.' These explanations just provide excuses for the criminals, they fail to look for reasons which may cause criminal behaviour and are also definable scientifically and therefore potentially curable. The social excuses for criminal behaviour are currently the most favoured amongst the public. Social behaviour is observed with our senses but what if something untoward were to happen to an individual's senses, he would be unaware of the change due to the reliance that he has always put on those senses. It has been suggested that it is precisely in this way that diet affects people, in what can be described as a non-sensory manner. The metabolic disorders which many offenders have such as; high levels of toxic metals, mineral imbalances, blood sugar control problems and food allergies often seem to have been with the offenders since birth. Because of their ever present disorders these individuals have been at a social disadvantage throughout their lives, as such it is not surprising that by the time they reach the extra burden of adolescence they are rebelling and being classed as juvenile delinquents. Therefore the result that comes out from this thinking is that metabolic disorders and social behaviour should be treated together.

Two other theories on the causes of crime were supplied by Hirsch in 1969 who said that either :

- 1) Man is inherently good and obeys the rules, when he resorts to deviance he must be under great pressure and strain. or,
- 2) Deviance is taken for granted, what has to be explained is conformity as obeying the rules of society often restricts an individual's freedom.

Assuming that a developing child has difficulties in learning what is acceptable behaviour, then they will also fail to benefit from negative experiences and suffer a poor socialization process but what actually turns them into chronic juvenile offenders ?

Cultural anthropologists believe that man has no inborn method for working out what is right or wrong he only learns gradually via social conditioning. If he is incapable of

being conditioned or if the conditioning is of an inconsistent nature then man will not know what is right or wrong.

It has been reported by (W.Buikhuisen) that criminals experience less anticipatory fear which suggests that they have a weak Behavioural Inhibition System. This system first postulated by (Gray, 1982) is related to the concept of passive avoidance, avoiding the situations which inflict negative experiences. Obviously if the subject can not identify a negative experience or does not fear the consequences of his actions then there is very little stopping him committing an offence.

To modify behaviour it is accepted that it is necessary to alter the levels of particular neurotransmitters in the brain synapses or by influencing the interactions between transmitter molecules and their post-synaptic receptors,(Wurtman, 1983). Tryptophan and tyrosine are the two amino acids that have undergone most research into the effects of behavioural changes. Serotonin,(5-hydroxytryptamine) is started upon the route towards synthesis by the hydroxylation of tryptophan. A high carbohydrate, protein-poor meal elevates brain tryptophan and serotonin synthesis, with the opposite true for a low carbohydrate, high protein meal. Circulating tryptophan must compete with the other large, neutral amino acids,(LNAA) for transport sites into the brain. The method by which a high carbohydrate meal will increase uptake of tryptophan is by causing the secretion of insulin which lowers the plasma levels of the other LNAA apart from tryptophan, as such tryptophan is more likely to gain the transport sites. The carbohydrate rich, protein poor meal, by increasing brain serotonin levels, reduces the likelihood that the next meal will be of a similar composition. Due to the reduction in serotonin synthesis by the same reasoning will increase the subject's desire for carbohydrates as is possible in the long term dieter hoping to reduce weight.

Serotonin neurons participate in a wide range of behaviours, including sleep, feeding, locomotor activity, aggression and pain sensitivity. Low levels of 5-hydroxyindoleacetic acid in the Cerebral Spinal Fluid indicates low 5-HT. This is found in depressed and aggressive patients, an interesting question though is whether or not depression is merely inwardly focused aggression. Tyrosine is a precursor for dopamine and norepinephrine, which play roles in regulating motor activity and mood,(Kolata,1982).

Other effects apart from just dietary intake are nutrient availability in brain cells, which is influenced by the concentration of nutrients in the plasma, and by the rate of nutrient transport through the Blood-Brain barrier. At least 8 independent transport systems have been identified which cross the BB barrier and so problems in any one of these,(such as could be caused by Glucose, Amino acids, Lactate, Ketone bodies, purine compounds and choline) could affect brain nutrient levels.

It has been shown that changes in mental performance occur within an hour or so after eating, but the actual change is related to the subject's sex, age, personality and eating habits.

Hypoglycaemia

Hypoglycaemia is defined as blood glucose levels of less than 4 mmol/l,(500mg/l). There have been many claims that hypoglycaemia is a cause of psychological problems such as those in behaviour disorders. The belief is that simple sugars are absorbed faster

than complex carbohydrates so causing a greater increase in blood glucose levels, this stimulates insulin secretion leading to Functional Hypoglycaemia,(FH),(Kanarek and Marks-Kaufman, 1991). It is this type of hypoglycaemia that is blamed for emotional problems, fatigue and irritability. According to (Hippchen, 1976) persons suffering from FH are capable of stealing, rape, arson and homicide. However in more recent years it has been commonly agreed that such a simple cause and effect relationship with hypoglycaemia and crime can not be drawn as the actual occurrences of FH are much rarer than originally thought.

Hyperactivity

A commonly associated type of behaviour for the problem child, that is the over energetic, boisterous and quite often obnoxious and violent individual. This behaviour disturbance is five times more common in boys than girls. A survey (M.Rutter, 1973) actually found perhaps over 50% of children in some inner city area of London could be classified as hyperactive and/or disturbed. The most common form of hyperactivity is the 'pure' or 'hyperactivity of unknown cause'. Fortunately this tends to abate during the change from childhood to adulthood but it is not guaranteed to do so. The characteristics of hyperactivity will obviously dispose some people towards delinquency, particularly criminal acts involving violence and impulsiveness. It is exactly this sort of behaviour which can easily identify those people suffering from some sort of illness which can not merely be classified as socially derived. This is particularly so in the examples when only one sibling in a family suffers from this extreme reaction to what is usually an allergy or environmental intolerance.

Such an intolerance can be brought about because of a genetic problem such as was discussed by (Brunner, Nelen, Breakefield, Ropers and van Oost, 1993). Isolated complete Monamine oxidase A, (MAOA) deficiency had been associated with a recognizable behavioural phenotype that included disturbed regulation of impulsive aggression, arson, attempted rape and exhibitionism.

In conclusion, there are many factors which influence and affect our behaviour. Some of those related to food and crime are mentioned above, how they are related to food will be dealt with more in the next chapter. The social, environmental, psychological and physiological factors must not be forgotten as only by using the novel multidisciplinary approach can a true idea of the problem at hand really be achieved. The real 'objective is to help the individual gain better control over his life and be able to say, 'No' to temptations to commit further crime. There can be no better form of prevention then the potential offender preventing himself with the benefit of greater awareness of the contributory factors in his behaviour pattern. Once identified, those factors cannot be used as excuses if proper help and guidance has been given in the prescribed regime',(Bennett, 1989).