

16 January 2003

SU/DoH Consultation Office
Room 4.6
Admiralty Arch
The Mall
LONDON SW1A 2WH

Dear Sir/Madam

**RESPONSE TO THE NATIONAL ALCOHOL HARM REDUCTION
STRATEGY CONSULTATION DOCUMENT**

**SPECIAL ASPECT: BIOLOGICAL BASIS OF ALCOHOL-RELATED
VIOLENCE**

In addition to being a member of the Executive of the Medical Council on Alcohol and the Advisory Board of the Institute of Alcohol Studies, whose responses to the above document have already been communicated to you, and having contributed to the "Alcohol Concern" Discussion paper, I should like to submit my own special response, addressing specifically the important issue of alcohol-related violence from the scientific perspective, and, in particular, the potential role of biological and physiological factors.

There is a considerable body of evidence suggesting that biological factors may mediate, at least in part, alcohol-related violence and other forms of aggressive behaviour. In particular, the role of the brain chemical serotonin has been most extensively studied, because serotonin has been implicated in aggression, both in real-life situations and in experimental paradigms of aggressive behaviour. Similarly, evidence also exists to suggest that dysfunction of serotonin, which plays an important role in the control of our mood and impulsive behaviour, is also associated with alcohol-related violence. To complete this triangular relationship, it is also known to alcohol consumption exerts profound effects of serotonin metabolism. These interactions have led to the synthesis of "**the Serotonin Hypothesis of Alcohol-Induced Aggressive Behaviour**". I enclose, as an attachment, an unedited draft of a review article, by myself, which will appear in a special issue of the journal "*Criminal Behaviour & Mental Health*" devoted exclusively to various aspects of alcohol and crime. A special issue of "*Alcohol and Alcoholism*", of which I am Chief Editor, also devoted to this topic, appeared in January 1998 (issue no 1 of volume 33) (for access, please visit the journal website: www.alcalc@oupjournals.org).

Our previous work on the above serotonin hypothesis is referred to in both the attached paper draft and the above issue of *Alcohol and Alcoholism*, and is also known to the previous two Chairmen of the All-Part Group on Alcohol Misuse, Mr Don Touhig and Mr Kelvin Hopkins.

Briefly, we have shown that consumption of a moderate amount of alcohol (2-2.5 pints of beer, as in ordinary everyday social drinking scenes) by healthy volunteers lowers the circulating (blood) concentration of the serotonin precursor amino acid tryptophan, thereby decreasing the formation of serotonin in the brain, possibly by as much as 20-25%. This could provide a mechanism by which alcohol consumption could induce, not only depression, but also aggressive behaviour in the presence of a sufficient provocative stimulus or situation. Our hypothesis suggests that, whereas normal subjects can lose 25% of their brain serotonin after drinking alcohol, without undue behavioural consequences, we believe that susceptible individuals may undergo a greater depletion of their serotonin after drinking, which could trigger an acute episode of dysphoria (lowered mood), loss of control and aggression. It could be that brain serotonin in susceptible individuals may be at low borderline levels to start with, perhaps due to poor or inappropriate nutrition, lack of adequate exercise, or other physiological reasons, so that, when such subjects drink alcohol, the serotonin (tryptophan) depleting effect is compounded, potentiated or even simply added on, leading to a greater depletion with the consequent behavioural disturbances in the face of provocation.

This hypothesis needs to be tested in subjects known to be susceptible to aggressive behaviour following alcohol consumption, in a pilot study, which could hopefully be funded by the appropriate Governmental Department(s). If it can be shown through the necessary laboratory biochemical blood tests that susceptible subjects show this greater depletion, then such individuals could be targeted at the population level for measures designed to raise their serotonin levels, e.g. by nutritional interventions and, if necessary, serotonin medication. As well as nutritional measures, susceptible subjects could also be targeted for exercise therapy (sport), which is also known to elevate serotonin levels. It is noteworthy and of special interest in this latter context that, as stated this week by the Culture Secretary, Ms Tessa Jowell, crime and violence can be reduced by introduction of sports activities among subjects exhibiting this type of social behaviour. The observation, stated by the Minister, that crime and violence were reduced in some areas by as much as 31% (against a 56% rise in an area not receiving sports exercise) demonstrates, at the population level, a very successful experiment in support not only of this particular policy, but also of our hypothesis that exercise could help decrease crime and violence at the biochemical level. It is also noteworthy that a study from Oxford published in the middle of 2002 demonstrating a decrease in aggressive behaviour of prison inmates by intake of vitamin supplements has also used nutritional measures to modify this behaviour, and I am tempted to suggest that a potential serotonin correction may have been at the heart of this latter pilot study. Unlike this latter study, I believe that our hypothesis can be tested at the population level and its outcome is more likely to have a more general applicability.

My proposals are therefore amenable to both testing at the experimental level and also intervention at the population level from a public health perspective. A number of my clinical and psychology colleagues in Cardiff and South Wales, with expertise in forensic, pathological and psychological aspects of alcohol-related violence, will be very happy to collaborate with me in delineating the biopsychosocial basis of alcohol-related violence, and we would be very happy to perform the necessary studies in this area with the support of Government Departments.

I hope very much that you will find my proposals of interest and meritorious of your further consideration. I shall be very pleased to provide any further information and to participate in any future activities related to your Consultation Document.

Yours faithfully

Abdulla A-B Badawy
(BPharm, PhD, CBiol, FIBiol, FRCPath)
Consultant Clinical Biochemist & Head:
Biomedical Research Laboratory