Are there Similarities Between the Effects of Drugs and Syndrome E?

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ABSTRACT

The Brains that pull the Triggers. 3rd Conference on Syndrome E, Paris IAS, 10-12 May 2017 - Session 5 - Brains that Pull the Triggers: Under the Influence

In mammalian brain, most psychic outputs are controlled by a few tens of thousands of cells which modulate the billions of our cerebral neurons. This rather small network creates, depending on entering stimuli, a functional hierarchy between brain structures in order to adapt to significance of inputs. This network is essentially constituted by neurons, called modulatory, which release noradrenaline, dopamine and serotonin. Drugs, such as anti-psychotics or anti-depressants, exert their effects through this neuronal network. Similarly, drugs of abuse, i.e. psychostimulants (amphetamines, cocaine…) or opiates (morphine, heroin…), specifically activate this network and trigger addiction. When taken at moderate doses, psychostimulants induce euphoria and facilitate focalisation of attention. At higher doses they create a feeling of extreme power and annihilate fear of danger. Finally, at even higher doses, they induce not only cardiovascular disturbances but also agitation, confusion, paranoia, impulsivity and violence. These effects are mostly due to peripheral and central increased noradrenergic transmission but the euphoria induced by drugs of abuse is usually related to the release of central dopamine. Indeed, the activation by dopamine of a set of interconnected cerebral structures, namely the reward circuit, induces a feeling of well-being. Physiologically, the reward circuit can be activated by food, sex, parental care or any type of extrinsic satisfaction (money, power…).

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At this point, three important groups of data should be emphasized:

1- It was recently found, in mice, that violence and active aggression can stimulate the reward circuit and, therefore, be rewarding.

2- In human brain, images analysis have shown that extreme pleasure, such as that felt during orgasm, activates structures of the reward circuit (i.e. ventral tegmental area,ventral striatum and parts of the right parietal and frontal cortices) but also deactivates other ones (left amygdala and entorhinal cortex).

3- Finally, the deactivation of these latter structures, which alert for danger and trigger fear, also occurs in human brain following a sniff of cocaine.

Altogether, this indicates that euphoria is obtained through a combination of activation and deactivation of main structures of the reward circuit. It is likely that drugs of abuse induce an intense activation of cortical areas (frontal and parietal) which, in turn, deactivate some sub-cortical structures. Most importantly, violence and active aggression stimulate the reward circuit. However, in humans, the activation of amygdala by violent and frightening situations prevents from feeling of satisfaction, unlike what is observed with drugs of abuse. Violence and crime may nevertheless induce extreme pleasure in individuals that have been block the activation of these latter subcortical structures. Some individuals may therefore become addicted to active aggression. As game is compulsory for pathological gamblers, violence would be a source of “drug-free addiction”.

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