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Disease of Addiction

Introduction

Addiction is not an uncommon occurrence in the general population. The prevalence of addiction has been stated variously at 3-16% but is often quoted at 10%.[1] Regardless of what the real risk is, it is clear that no one specific marker can reliably identify the patient with the disease of addiction.

Basic Science of Addiction

Drugs of misuse act at local cellular and membrane sites that are within a neurochemical system that is called the Reward and Withdrawal Pathway.[2] This pathway is in the mesolimbic dopamine system, and it involves, among other structures, the ventral tegmental area, nucleus accumbens, amygdala, and prefrontal cortex of the primitive brain. Addiction is a neurobiological disease that causes disruption of this pathway. This disruption is mediated via receptor sites and neurotransmitters. Central to this reward and withdrawal pathway is the neurotransmitter dopamine, which has been shown to be relevant not only to drug reward, but to food, drink, sex and social reward.[3, 4] Disruption of this neurochemical pathway by drugs of abuse may lead to addiction. Drug withdrawal can intensify with repeated drug use and can persist during prolonged periods of drug abstinence, a symptom complex known as the protracted abstinence syndrome.[5] This sensitization of a neural process related to drug cravings, or to environmental stimuli associated with drugs (referred to as cues), leads to the progressive increase in drug-seeking behavior that characterizes addiction. Such sensitization appears to increase the attractiveness of the drug taking and that of the drug-associated stimuli.[6] Addiction is a treatable brain disease; it is a distinct medical condition.[7, 8]

Physical dependence, conversely, is a natural expected physiologic response that can occur with opioids, alcohol, benzodiazepines, corticosteroids, antidepressants, diabetic agents, cardiac medications, and many other medications used in clinical medicine. Abrupt cessation or rapid dose reduction resulting in decreasing blood level of the substance and/or administration of an antagonist to the substance can produce a withdrawal syndrome that can include, but is not limited to, nausea, vomiting, diaphoresis, diarrhea, abdominal cramps, seizures or even death.[6]

Opioids cause physical dependence and, upon abrupt discontinuation, withdrawal as a result of up-regulation of the cyclic adenosine monophosphate (cAMP) pathway at the locus coeruleus.[5] This is a normal physiologic response to this class of medications. It should be noted that most of the medications mentioned above are capable of producing physical dependence but are not associated with the disease of addiction. A heroin addict may be both addicted and physically dependent on the narcotic, while the pain patient taking opioids is physically dependent, but not addicted. Both will experience withdrawal if the drug is abruptly stopped.

Tolerance is also a natural, expected physiologic response that can occur with exposure to a certain class of drugs, especially alcohol and opioids. The key to this definition is all conditions, such as the disease, the syndrome, mental status, environment and functional activity, remain stable so that just the physiologic response to the drug can be evaluated.

Pharmacodynamic tolerance involves adaptations that occur at both the site of the drug action; e.g., receptor, ion channel, as well as in related systems more distal to the site of the drug action. For example, pharmacodynamic tolerance to opioids is evident at both the level of the opioid

receptor in the locus coeruleus (primary) and in the dopaminergic reward pathways afferent to the site of this discrete drug action (secondary).[6] Both persons addicted to heroin and chronic pain patients taking opioids can exhibit tolerance to the drug.

The American Academy of Pain Medicine, the American Pain Society, and the American Society of Addiction Medicine (Liaison Committee on Pain and Addiction (LCPA) approved the following definitions in 2001.[9]

Addiction

Addiction is a primary, chronic, neurobiologic disease, with genetic, psychosocial, and environmental factors influencing its development and manifestations. It is characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm and craving.

Physical Dependence

Physical dependence is a state of adaptation that is manifested by a drug-class-specific withdrawal syndrome that can be produced by abrupt cessation, rapid dose reduction, decreasing blood level of the drug and/or administration of an antagonist.

Tolerance

Tolerance is a state of adaptation in which exposure to a drug induces changes that result in a diminution of one or more of the drugs effects over time.

Conclusion

Healthcare professionals with an improved understanding of the disease of addiction can provide their patients appropriate care in all chronic disease including pain management.

References

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