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# LSD

LSD or *D-lysergic acid diethylamide* is a synthetic hallucinogen derived from ergot fungus found on rye and other grains. It was discovered and first synthesized by Albert Hofmann while studying the fungus on rye. It is commonly referred to as acid and taken orally by blotters - acid soaked sheets of paper. LSD has no odor, color or smell. LSD acts almost exclusively on the serotonergic system which originates in the raphe nuclei in the midbrain and pons and affects several sensory areas of the brain through the locus coeruleus (LC). The LC is specifically responsible for wakefulness. LSD chemically resembles serotonin thus acts as a competitive exogenous ligand and binds to to active site on serotonin receptors to block or allow a flow of ions at the synapse. This creates either an excitatory effect by increasing the flow of ions into a neuron or inhibitory responses, decreasing or blocking the flow of ions into a neuron. This variance explains LSD's complex sensory effects. However, it is greatly unknown the exact mechanism by which LSD acts and whether it is an agonist, antagonist or something more complex.

The physiological and behavioral effects of LSD include everything from increased blood pressure to distorted sensory perception. The physiological effects include increased temperature and heart rate, dizziness, numbness, dry mouth, and enlarged pupils. The psychedelic effects of LSD, "trips," can last 8-12 hours. On a trip the user can experience rapid emotional swings and distortion of reality that take the user outside of the normal realm of perception. Intense perception changes increase the user's awareness to visual, auditory, sensation, and emotional inputs to the brain. Eventually one may even experience synthesia, or a mixing of sensory

perceptions such as smelling color and seeing sound. The trip can be good or bad often dependent on the user's mental state, mixing of drugs, and physical/social environment. Bad trips may include visions of blood, spiders, skulls and other anxiety provoking or death related images. The day after LSD use one will feel drained. The long-term effects of LSD use are not too well known however, up to 12 months after using LSD the user can experience flashbacks. Flashbacks are a random reliving of a certain drug experience while sober that is thought to be triggered by an auditory or visual stimulus. Flashbacks are rare, but when they start to affect daily function it is considered *hallucinogen persisting perceptual disorder* (HPPD). Other possible long term effects include disorganized thinking, mood swings, paranoia and even Schizophrenia if the user is predisposed to mental illness.

The medicinal uses of LSD are only just being researched again after heavy recreational use in the 1960's lead to a ban on research that was being performed by the US military and drug companies. LSD is a class I drug according to the Drug Enforcement Agency (DEA) and has no approved medicinal uses in America. In Czechoslovakia, LSD was used for experimental psychotherapy by Dr. Stanislav Grof. This lasted about 20 years and he observed many interesting things, however there is minimal clinical data. Research today is being done on its possible therapeutic uses of LSD to treat alzheimer's disease and its effect on other mental illness. Its use has been proven to be an effective treatment of cluster headaches in the recent research.

If a doctor were to prescribe LSD to a patient he/she will not get physically addicted due to the nature of LSD and its effect on the serotonergic system, however a psychological addiction may occur due to the mind altering nature of a it. It has no addictive quality physically since it does not affect the brain by the same mechanisms such as cocaine or heroin (aka dopamine levels

are not affected by LSD). SSRI's, a category of antidepressants minimize the effects of LSD. This means they work in similar but opposing ways on the same receptor and the addictive quality (or lack thereof) of SSRI's can be directly compared to LSD's lack of physical addictiveness. LSD treatment would cause the patient to build a tolerance to the drug, causing cross tolerance, or tolerance to other hallucinogens, which could be dangerous if the patient decided to take something like DMT. Depending on how often and for how long LSD is prescribed for its extended and frequent use may make it hard for the patient to return to reality and lead to a psychological addiction.