University of Idaho

Psychedelics / Hallucinogens

Psychology 472

Pharmacology of Psychoactive Drugs

Listen to the audio lecture while viewing these slides

1

Psychedelic Drugs

- Many Types
- Broken out by the type of NT it affects
  - Anticholinergic
  - Catecholamine-like
  - Serotonin-like
  - Psychedelic Anesthetics

Pharmacokinetics

- Most taken orally
- Some smoked (e.g., PCP, DMT)
- Taken by circulatory system to receptor sites
- Metabolized by the liver
  - Some material can remain for a long time
  - Most drugs are metabolized in 6-8 hours

Pharmacodynamics

- Site of action depends on the drug

Anticholinergic

- Scopolamine
- Is an acetylcholine (ACH) antagonist
- Blocks ACH from binding on its receptors
- Is widely distributed in plants
  - Atropa Belladonna (deadly nightshade)
  - Datura Stramonium (Jamestown weed, stinkweed, Jimsonweed, Thorn Apple)
  - Mandrogona Officunarum (Mandrake)
- Acts on both the PNS and CNS

PNS

- Causes
  - Dry mouth
  - Dry skin
  - Increased body temperature
  - Blurred vision
  - Tachycardia
  - Hypertension
  - others

CNS Effects

- Depends on the dose

Low Dosages

- Drowsiness
- Mild Euphoria
- Amnesia
- Fatigue
- Delirium
- Dreamless Sleep
- Others
- Generally clouds consciousness and produces amnesia

Moderate Doses

- Get more restlessness
- Excitement
- Hallucinations
- Euphoria
- Disorientation
- Others

High Doses

- Develops into a Psychotic State
  - Delirium
  - Mental Confusion
  - Stupor
  - Coma
  - Respiratory Depression

Issues

- Can create excitement and loss of control
- Clouds consciousness (Cannot recall what you did)
- Decreases memory
- Results
  - Is not as attractive as other hallucinogens
  - Low use rates

Catecholamine-Like

- Mescaline
- DOM (STP)., MDA, DMA, MDMA, TMA MDE
- Myristin, Elemicin

- Resemble NE and Dopamine
- Are mixed serotonin and dopamine receptor agonists
- Generally, bind on the 5-HT_{2a} receptor

Mescaline

- Comes from the Peyote plant
- Is a spineless cactus with a small crown or "button" on its top.
- Button is cut and dried
  - (called mescal button)
- Is softened in the mouth and swallowed

Use

- Is primarily used in Native American religious ceremonies.
- Is legally available for religious use
- Used to gain insight by the user

Effects

- Is absorbed rapidly and completely
- Get adequate brain concentrations in 1-2h
- 3.5 - 4 hours causes effects (usually visual)
- Lasts for approx. 10 hours
- Is not metabolized before being excreted.
  - One of a few drugs to do so

Brain Effects

- Works on frontal lobe (especially right hemisphere)
- Produces unusual psychic effects and hallucinations

Behavioral Effects

- Anxiety
- Tremors
- Visual hallucinations (Bright lights, geometric designs,
- Color and space perception is impaired
- Can often recall information

DOM (STP), MDE, DMA, TMA MDA, MDMA,

- Are similar to mescaline and methamphetamine
- Produce similar effects
- Psychedelic effects increase as doses increase
- Are more potent than mescaline

Dimethoxy-Methamphetamine (DOM)

- Also called STP
- Effects are similar to mescaline but 100 times more potent
- Is less potent than LSD
- Highly associated with overdoses
  - Convulsions, Death
- Got a bad reputation
- Not often used anymore

Designer Psychedelics

- Are structural variations of amphetamine
- Many types
  - Methylene-dioxy-amphetamine (MDA)
  - Dimethoxy-methyl-amphetamine (DMA)
  - Methylene-dioxy-ethylamphetamine (MDE) also called Eve
  - Trimethoxy amphetamine (TMA)

Effects

- Resemble mescaline and LSD
- Are a mix of catecholamine and serotonin interactions
- Side effects are similar to MDMA

MDA

- Is a metabolite of MDMA (Ecstasy)
- May be the active ingredient of MDMA
- Causes serotonin and dopamine release
  - Actually stimulates serotonin receptors more than MDMA
  - Causes more psychedelic-like effects
  - Has more stimulant / psychedelic hallucinogenic qualities
  - Less intense empathogenic properties
- Is less predictable than MDMA

MDMA / Ecstasy

- Variety of street names
  - XTC
  - Adam
  - M
  - M
  - Essence
  - E
  - Others

Effects

- Resembles MDA in structure
- Is less hallucinogenic than MDA
- Fewer visual distortions
- Lots of side effects

Effects on Neurons

- Causes an increase of serotonin in the synaptic cleft
- Then blocks the reuptake of serotonin from the synaptic cleft
- Does the same thing with Dopamine neurons

Reported Positive Effects

- Enhanced mood
- Increased emotional sensitiveness
- Little anxiety
- No hallucinations
- Heightened sensory awareness
- Increased psychomotor drive

Side Effects

Adverse Neuronal and Brain Effects

- Down Regulation
- Reduces the number of post synaptic receptors

Major Long Term Effects

- Is a potent and selective neurotoxin to serotonin neurons
- Serotonin levels and metabolites are reduced
- Damages presynaptic elements
  - Terminals degenerate
- Damage remains at least two years and probably forever

Conclusions about MDMA

- Is seen as safe by users
- Is really bad stuff even at low doses
- Look at reviews in NIDA

Other Stuff

- Have Herbal Ecstasy
  - Combines ephedrine and caffeine
  - Very dangerous for overdose
  - Hypertension
  - Cardiac Arrhythmias
- Candyflipping
  - Combines MDMA and LSD
  - Produces a synergistic effect

Myristin, Elemicin

Myristin, Elemicin

- Myristin (Nutmeg)
- Elemicin (Mace)
- Are common spices
- Usually put in tea 1-2 tsp
- Effects occur in approximately 2-5 hours

Effects

- Feelings of unreality
- Euphoria
- Visual Hallucinations
- Disorientation
- Confusion

Side Effects

- Feelings of impending doom
- Acute psychotic reactions
- Nutmeg
  - Also produces nausea, vomiting, tremors
  - Usually prevents repeat usage

Serotonin-Like

- Also called Indoleamines
- Lysergic Acid Diethylamide (LSD)
- Dimethyltryptamine (DMT)
- Psilocybin, Psilocin, bufotenine
- Ololiuqui (Morning Glory Seeds)
- Harmine

Effects

- Work on Serotonin receptors
- Produce psychedelic effects
- Causes distortion of sensory inputs

LSD

- First synthesized by Albert Hoffman in 1938
- Major research using LSD began in the 1950's as part of research investigating psychotic behavior
- Has been used as part of psychotherapy in very low doses (not street levels)

Effects

- Is distributed through the body
- Enters the brain in about 60 minutes
- Effects last about 6-8 hours (depends on the dose)
- Is very potent

Alterations in Perception

- Get changes in thinking, mood, emotion
- Time is slowed
- Sensory input intensifies
- Visualize imagined objects
- Visual alterations
- Colors may be heard
- Sounds may be seen
- Others

Phases

- Somatic Phase
  - Where absorption occurs and body changes occur
- Sensory/Perceptual Phase
  - Where sensory distortions and pseudo hallucinations occur
  - Desired phase
- Psychic Phase
  - Changes in mood,
  - Disruption of thought process
  - True hallucinations occur
  - Not desired - Bad Trip

Tolerance

- Get tolerance to the drug
- Get cross tolerance to other psychedelics
- Lost after several days of not taking the drug
- No physical dependence
- Few withdrawal effects occur (if any)

Side Effects

- Increased
  - Heart rate
  - Blood Pressure
  - Pupils Dilate
  - Drowsiness
  - Sometimes nausea
- Overall, Is a relatively safe drug

Dimethyl-Tryptamine (DMT)

- Is an active ingredient in some plants
- Produces effects similar to LSD
- Binds to serotonin receptors
- Is usually snorted or smoked (not Oral)
- Onset 2 minutes
- Effects last 30 minutes
- Called businessman's lunch or LSD

Effects

- Increased HR, BP, Temperature, etc
- Increased endorphin levels
- Causes
  - visual hallucinations
  - Intoxication
  - Loss of awareness to surroundings

Psilocybin and Psilocin

- Are agents found in some mushrooms
- Resemble but are less powerful than LSD
- Peak effects in about 2 hours
- Lasts about 6-8 hours
- Are taken orally
- Are used in some Native American ceremonies

Ololiuqui

- Found in morning glory seeds
- Used for spiritual communication
- Are about 1/10th as powerful as LSD
- Are still potent

Conclusion

- Most are safe
- Cause a wide variety of sometimes powerful effects

Psychedelic Anesthetics

- Phencyclidine (Sernyl)
- Ketamine (Ketalar)

- Were developed for anesthesia
- Both produce a psychedelic state
- Psychedelic effects are unique - Do not involve Serotonin, ACH or Dopamine neurons

Phencyclidine (Sernyl)

- Angel Dust, Super grass, Killer Weed, Rocket Fuel
- Was developed as an anesthetic
- Abandoned because of reactions in surgery
- Still used as an immobilizing agent in veterinary anesthesia in large animals
- Blocks Ca influx via Glutamate NMDA receptors

Effects

- Detachment,
- Slurred Speech loss of coordination
- Auditory hallucinations
- Severe mood disorders
- Amnesia
- others

Side Effects

- Acute anxiety
- Paranoia
- Feeling of impending doom
- Violent hostility
- Symptoms often resemble an acute psychotic disorder and may become permanent
- Resembles schizophrenia psychotic states
- Can be very dangerous

Ketamine (Ketalar)

- Other Names Special K, K
- Is a general anesthetic for humans and animals
- Produces effects similar to PCP
- Produces visual effects similar to LSD

Effects

Overt hallucinatory effects are short lasting (one hour)

- Effects
  - Judgment
  - Senses
  - Coordination
- Get from diverted supplies and vet. Clinics, etc.
- Are starting to see at rave parties

Sites of Action for PCP and Ketamine

- Block N-Methyl-D-aspartate (NMDA)/glutamate receptors
- Glutamate is an excitatory NT
- Induces a schizophrenic effect
- NMDA blockers are among the best amnesic drugs known
- May be useful for head trauma

NMDA Receptors

- Is a glutamate ionotropic receptor for calcium ions
- Are widely distributed in the brain and SC
- High concentrations in the hippocampus and cortex
- May aid in protecting brain tissue following trauma or strokes

Hallucinogens In General

- For the most part, have high LD_{50} levels.
- Are some of the most potent drugs
- Create a wide variety of effects
-