

# Drugs & Chemicals - Part 2: Synthetic Introduced Chemicals

(drugs, e.g. medications, recreational drugs (manufactured), 'smart' drugs, food additives)

## In This Section

- Drugs for medication
- 'Recreational' drugs [manufactured]
- Other drugs for neurohacking ['smart' drugs etc.]
- Drugs where you may not expect to find them [e.g. in your dinner]

## Drugs for Medication

Acting on the brain and nervous system (categories are alphabetical):

### Anticonvulsant Drugs

[drugs used to prevent and treat epileptic seizures and other types of seizures]

Common types:

### **Benzodiazepines**

- Diazepam
- Clonazepam
- Lorazepam

□

### **Other Anticonvulsant drugs**

- Carbamazepine
- Ethosuximide
- Gabapentin
- Lamotrigine
- Phenobarbital
- Phenytoin
- Primidone
- Sodium valproate
- Topiramate

Anticonvulsants have a direct effect on electrical activity in the brain. A seizure occurs when excessive electrical activity spreads from one part of the brain to other areas, causing uncontrolled stimulation of nerves supplying many parts of the body.

Anticonvulsants reduce these abnormally high levels of electrical activity and thereby prevent or reduce the muscle spasms that are characteristic of a seizure.

□

### **Antianxiety Drugs (anxiolytics)**

[drugs that are used to reduce and control the symptoms of chronic stress and anxiety]

Types of drugs:

### **Benzodiazepines**

- Chlordiazepoxide
- Diazepam
- Lorazepam
- Oxazepam

### **Beta-blocker drugs**

- Atenolol
- Propanolol

### **Other antianxiety drugs**

- Buspirone

Benzodiazepines reduce agitation and so make you feel relaxed, but they should only be used for a short time in order to avoid dependence.

Beta blockers can help reduce the symptoms that come with anxiety, but they are not suitable for long term treatment. The drugs block the actions of two hormones, epinephrine [adrenalin] and norepinephrine [noradrenaline], that produce the physical symptoms of anxiety, reducing heart rate and muscle tremor.

Buspirone is less addictive than the benzodiazepines and has a less sedative effect, but it can take up to 2 weeks to become effective.

### Antidepressant Drugs

[used to treat the symptoms of depression]

Types of drugs:

#### SSRIs [Selective Serotonin Reuptake Inhibitors]

- Citalopram
- Fluoxetine
- Fluvoxamine
- Paroxetine
- Sertraline

#### Tricyclics

- Amitriptylene
- Clomipramine
- Imipramine

#### MAOIs [Monoamine Oxidase Inhibitors]

- Phenelzine
- Tranylcypromine

#### Other antidepressant drugs

- Maprotilene
- Nefazodone

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- Trasdodone
- Venlafaxine

SSRIs are the most commonly used antidepressant [2009]. They may also be used to treat phobias and panic attacks. They cause fewer side effects than other kinds of antidepressants and are less toxic if taken in more than prescribed amounts. They work by blocking the reabsorption of the neurotransmitter serotonin, leaving more of it around to stimulate brain cells.

Tricyclics interfere with the reabsorption of both serotonin and norepinephrine in the brain. As a result, levels of these mood-lifting chemicals increase.

MAOIs are only usually used as a last resort. They work by blocking the activity of monoamine oxidase [the enzyme that makes serotonin and norepinephrine inactive] in brain cells. These drugs interact badly with other substances including some common foods and you should take care you know what not to eat as the results of a mistake could be fatal!

There are two other drugs, maprotilene and tradozone, that are related to tricyclic antidepressants. Maprotilene is used to treat both depression and anxiety when sedation is required. Tradozone is also used to treat depression when sedation is required.

Venlafaxine blocks the reuptake of serotonin and norepinephrine. It has fewer side effects than most antidepressants.

Nefazodone works in a similar way to SSRIs but also blocks serotonin receptors.

### Antimigraine Drugs

[Drugs to prevent migraine & Drugs to relieve migraine]

### Drugs used to prevent migraine

- Amitriptyline
- Clonidine
- Cyproheptadine
- Methysergide
- Nifedipine
- Propranolol
- Sodium valproate
- Verapamil

### Drugs used to relieve migraine

- Ergotamine
- Naratriptan
- Rizatriptan
- Zolmitriptan

During a migraine attack, blood flow inside the brain changes. Initially, the blood vessels narrow, reducing blood flow. Then they rapidly widen, and a severe headache develops. Drugs that are used to prevent migraine prevent these changes in blood vessel size.

Triptan drugs and ergotamine relieve the symptoms by returning widened blood vessels to their normal size.

## Antipsychotic Drugs

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[used to treat schizophrenia and other severe psychiatric disorders]

Common drugs:

- Chlorpromazine
- Clozapine
- Droperidol
- Fluphenazine
- Haloperidol
- Loxapine
- Olanzapine
- Pimozide
- Promazine
- Risperidone
- Sertindole
- Thioridazine
- Trifluoperazine

Many antipsychotic drugs block the action of the neurotransmitter dopamine. The chemical is released in the brain at higher levels than normal in people with some psychotic disorders. Some antipsychotic drugs also block the action of serotonin and other chemicals involved in regulating mood.

The type of antipsychotic drug prescribed will depend on factors such as whether sedation is needed and your susceptibility to side effects. A low dose will be prescribed initially, then slowly increased until the symptoms are under control.

If you have bipolar affective disorder, Lithium may be prescribed [see mood stabilizing drugs]

### Central Nervous System Stimulant Drugs

[used to increase mental alertness and wakefulness]

Common drugs:

- Caffeine
- Dexamfetamine
- Methylphenidate

CNS stimulants act by increasing activity in the brain by promoting the release of neurotransmitters that increase wakefulness and mental alertness. Their main use is in the treatment of narcolepsy (although modafinil is likely to outdate them-2009)

Some CNS stimulants, including methylphenidate, are used in the treatment of attention deficit disorder.

### Mood Stabilising Drugs

[used to treat severe psychiatric disorders involving excessive mood swings.]

Common drugs:



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- Carbamazepine
- Lithium
- Sodium valproate

Mood stabilising drugs are used for the treatment of bipolar affective disorder and less commonly for severe depression.

Lithium is the drug most commonly used to treat bipolar disorder because it can control or reduce the intensity of mania. It may also prevent or reduce the frequency of attacks and lift depression. However, it can have nasty side effects, and you have to be careful what you eat because it interacts badly with salt. It is important to avoid dehydration.

You should have blood tests to monitor levels when on these drugs

### **Painkillers**

[drugs of varying potency that are used to relieve pain]

Common types of painkillers:

#### **Opioid painkillers**

- Codeine
- Fentanyl
- Meperidine
- Methadone
- Morphine
- Pentazocine

- Tramadol

### **Non-opioid painkillers**

- Aspirin
- Diclofenac
- Etodolac
- Fenoprofen
- Ibuprofen
- Indometacin
- Ketoprofen
- Ketorolac
- Mefenamic acid
- Naproxen
- Paracetamol
- Piroxicam

### **Combination painkillers**

- Aspirin with codeine
- Dextropropoxyphene with paracetamol
- Dihydrocodeine with paracetamol
- Paracetamol with codeine

Painkillers work in two different ways. Some drugs block the nerve pathways that transmit pain signals from a part of the body to the brain. Others reduce the perception of pain by preventing further transmission of pain signals once they reach the brain.

### **Sleeping Drugs**

[reduce nerve cell activity in the brain and are used to treat insomnia]

Common types:

#### **Benzodiazepines**

- Flurazepam
- Nitrazepam
- Temazepam

#### **Other sleeping drugs**

- Amobarbital sodium
- Chloral hydrate
- Zolpidem
- Zopiclone

Benzodiazepines reduce the level of activity in the brain, causing drowsiness. They should be used for short periods only to avoid dependence and in order to ensure sufficient REM sleep.

Chloral hydrate and amobarbital sodium are only ever used nowadays as a last resort, as they have unpleasant side effects.

Zolpidem and zopiclone also reduce the level of electrical activity within the brain. Their effects are brief but they are less likely to cause dependence. It is still inadvisable to use them for long periods.

Lay off sleeping tablets except in an emergency. They are bad, bad news, for your mind.

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### **'Recreational' drugs [manufactured]**

Types of drugs: Psychostimulants & Sedatives

#### **Psychostimulants**

- Amphetamine [speed]
- Methamphetamine [crystal meth, ice]
- Cocaine
- crack cocaine
- LSD
- MDMA [ecstasy]
- PCP
- Amyl nitrite

- GTN
- 2C-B

### How Psychostimulants Work

Psychostimulants are useful for: euphoria, elation, alertness, attention focusing, mood-elevation, appetite suppression and fatigue reduction.

Amphetamines, methamphetamine and cocaine increase dopamine, glutamate, serotonin and norepinephrine.

Amphetamines are stimulants that affect the central nervous system, and are generally referred to as "speed." The stimulation of the central nervous system usually causes an increase in motor activity and mental alertness, a mood elevation effect, a general sense of well-being and a decrease in appetite. Amphetamines can be taken orally in pill or capsule form, intravenously injected, snorted or smoked. Amphetamines and methamphetamines have a similar but somewhat different molecular structure. Tolerance will develop to all drugs in this class.

Amphetamines are excreted slowly and cumulative effects may occur with continued administration. Stimulation is often followed by a rebound effect manifest as fatigue, and feeling "burned out "or "fried". Withdrawal sometimes includes feelings of depression as neurotransmitters swing up and down in an attempt to rebalance.

Methamphetamine is a very strong form of amphetamine which is often sold under street names of ice, crystal, crank or glass. It is touted as an aphrodisiac and often has hallucinatory aspects connected to its abuse. Its effects are characterized by an initial "rush" if injected or snorted, and its high usually lasts for approximately 8 hours.

Ritalin is a central nervous stimulant that is often used in children and young adults with Attention Deficit Disorder. In these cases, it decreases motor restlessness and increases attention span.

### **Cocaine and Crack Cocaine**

Cocaine is an alkaloid drug compound that creates central nervous system stimulation. It is processed from an organic source, which is the coca leaf. In the initial processing a substance of crude cocaine is created which is called Bazooko. Further processing creates a powdery substance known as pure cocaine hydrochloride, or it can be further processed into a prefabricated rock form called crack cocaine. When it is processed into a prefabricated, freebased cocaine called crack (the term crack refers to the crackling sound made when the substance is smoked). Powder cocaine is a white, odorless crystalline powder and it is usually ingested by snorting it or tooting it up the nose. It can also be rubbed on any other mucous membrane. It can also be injected.

Users of cocaine or crack most commonly report feelings of increased energy, focus and alertness and an improved sense of self.

High doses of cocaine may cause headache, paranoid ideation and disturbances in attention and concentration, often referred to as the "coke bug". Cocaine and alcohol are almost always used in combination with one another because the depressing effect of alcohol can help take someone down from a cocaine high if it is becoming too intense.

### **LSD**

LSD is a powerful synthetic hallucinogen, which is commonly referred to as "acid". There is considerable variance in the strength of LSD that one buys on the street. (Confiscated street samples of LSD can range from 10 to 300 micrograms in a single dose). Most commonly the dose ranges from 20 - 80 micrograms and is usually sold in "blotter paper" form.

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It can be found in 'micro dot form' or sold as 'window pane'. It is manufactured as an odorless, colorless liquid.

Psychological and behavioral effects begin about thirty minutes to an hour after oral ingestion, and generally peak between 2 to 8 hours. There is a gradual 'come-down' within 10 to 12 hours.

LSD can be useful for enhancing eidetic memory, imagination and creativity, but is hopeless for declarative memory. It is sometimes used for spiritual purposes.

### Ecstasy

(MDMA) increases serotonin, dopamine, norepinephrine and oxytocin. It is sometimes called Intimacy. It promotes a decrease in anxiety and depression while heightening a sense of introspection and intimacy. In general, low doses provide few side effects. Larger doses though, when taken with alcohol or other drugs, have produced fatalities, usually through over- or under-consumption of liquids, consequently electrolyte balance or fluid intake needs to be carefully monitored to avoid dehydration or hyperhydration. The safe way to hydrate is to sip small amounts of liquids regularly, not wait until you're dying of thirst and then knock back several pints! Irresponsibility about hydration is responsible for most ecstasy deaths and users should wise up about hydration. Do not go to sleep whilst dehydrated. It's handy to keep a few dioralyte sachets in your med kit and take one if you have symptoms. These reset your electrolyte balance and make recovery quicker.

When intake of the drug ceases, the excess of neurotransmitters can turn into a shortage.

### PCP

PCP, also called angel dust, which is Phencyclidin, is also a widely used hallucinogenic drug. In its pure form it is a water soluble powder. It is often mixed with other drugs such as marijuana. In terms of purchasing it on the street, generally it can be found in powder form, tablet form and

also in liquid form. A typical street dose is about 5 mg. but confiscated street samples have revealed that purity can run from 5% to 100% depending on the form. This wide variance can create a tremendous risk for the user.

PCP is most commonly ingested orally, smoked, snorted, but can even be inserted vaginally. The mode of administration dramatically alters the onset of effects. Chronic use leads to persistent memory loss, difficulties with speech and thinking, depression, and weight loss. Symptoms have been known to last for up to one year after drug use is stopped.

PCP can create lethal complications, and currently there is no treatment available to block its effects, so treatment for overdose must focus on symptom control. PCP levels can continue unevenly for hours or even days after last dosage.

### **Amyl Nitrite**

Used as an inhalant, Amyl nitrite is a potent vasodilator, i.e., it expands blood vessels, resulting in lowering of blood pressure. Alkyl nitrites function as a source of nitric oxide, which signals for relaxation of involuntary muscles. Other physical effects include decrease in blood pressure, flushing of the face, increased heart rate, possible dizziness. Overdose symptoms include nausea, vomiting, hypotension, shortness of breath and fainting. The effects set in very quickly, typically within a few seconds and disappearing soon after (within a minute).

Psychologically it induces a brief euphoria; a sensation of heat and excitement, and if already intoxicated with stimulant drugs such as cocaine or MDMA the euphoric state intensifies and lasts for several minutes longer.

“Poppers” is the street term for various alkyl nitrites taken for recreational purposes, particularly amyl nitrite, butyl nitrite, isopropyl nitrite and isobutyl nitrite. Amyl nitrite has a long history of safe medical use in treating angina



Amyl nitrite and several other alkyl nitrites which are used in over-the-counter products, (such as air fresheners or tape head cleaners) are often inhaled with the goal of enhancing sexual pleasure.

### **GTN (glyceril trinitrate)**

Is nitroglycerine, a potent vasodilator that makes more blood accessible to the brain, causing the user to feel more alert for a short period of time, usually 15-20 minutes. It also prolongs erection if put inside the tip of a condom. The downside is it causes bad headaches and a multitude of nasty free radicals, so not a gentle drug by any means.

### **2C-B**

Commonly mistaken for and/or sold as ecstasy, 2C-B is a psychedelic related to mescaline, first synthesized by Alex Shulgin in 1974. It binds to serotonin receptors. The dosage range is listed as 16–24mg.

2C-B is sold as a white powder sometimes pressed in tablets or gel caps, under street names such as &quot;Bromo&quot;, &quot;Venus&quot;, &quot;Nexus&quot;, &quot;Erox&quot;, &quot;XTC&quot; and &quot;Spectrum&quot;. The drug is usually taken orally or snorted (but is somewhat painful; like snorting chilli sauce). The onset, or 'coming up', happens very rapidly, usually reaching the peak at about 20–40 minutes lasting anywhere from 30 minutes to a few hours depending on dosage. "Plateau effects" are reached in about 20-40 min and last for about 2–3 hours,

As with many psychostimulants, excessive giggling or smiling is common. Hallucinations are much less intense than LSD with the 'rush' that users feel off MDMA and grinding of teeth is often reported in less experienced users. There have been cases where 2C-B has been reported to be more intense than LSD with extremely high doses.

The visuals 'waver' or come and go in a carousel-like pattern meaning that when the effect is strong then dies down, users may feel that the trip is over, only for it to come back stronger. The duration as a whole, though is only about 2–5 hours depending on dosage.

Some users report aphrodisiac effects at lower doses (5–10mg). Laboratory results have shown this dosage to produce effects similar to low dosage of amphetamines.

2-CB may be consumed in combination with MDMA; usually taken when effects of the latter wear off. In contrast to most amphetamines, 2-CB does not seem to deplete brain serotonin concentrations. Sensitivity to its effects varies widely between subjects

### **Anxiolytics / Sedatives**

- Barbiturates
- methaqualones
- meprobamate
- Benzodiazepines
- Rohypnol
- GBH/GHB
- Benzocetamine
- Ketamine (K), dextromethorphan (DXM), phencyclidine (PCP), and nitrous oxide (N<sub>2</sub>O)
- HU-210, WIN 55212-2, JWH-133

Sedatives are a class of drugs that are central nervous system depressants. These CNSs include barbiturates, benzodiazepines, methaqualone, as well as meprobamate. All of these medications when used at usual dosage depress the central nervous system and cause a mild analgesic effect. All drugs in this class can become both psychologically and physically addictive. They also demonstrate a cross-tolerance and potentiation of one another as well as with alcohol which is also a central nervous system depressant.

#### **Barbiturates**

Include drugs such as Seconal, Tuinal, Nembutal and Phenobarbital. They are used medically

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for anesthetic, and anti-convulsant effects, as well as for sleep aids and anti-anxiety effects. They are sedative hypnotics that can be administered as recreational drugs orally or by injection and produce an intoxication similar to that of alcohol.

### **Non-barbiturate sedative hypnotics**

Include drugs such as qualude, chloryl hydrate, methaqualone. These drugs are infrequently used medically and are dangerous because they cause a significant reduction in heart rate, respiration, and muscular coordination. They vary in activity:

Methaqualone: anxiolytic, muscle-relaxant, sedative, anticonvulsant, antihistaminic.

Cloroqualone: sedative, antitussive

Diproqualone: analgesic, sedative, anxiolytic, muscle-relaxant, antihistaminic

Mecloqualone: hypnotic

### **Benzodiazepines**

Are also central nervous system depressants. These are the most widely prescribed group of drugs in the treatment of anxiety and insomnia, and include medications such as Valium, Atavan, Librium, Zanax, Lorazepam, etc. They are considered to be less dangerous than barbiturates because they are less lethal and tend to be shorter acting in nature. The peak effect tends to occur within two to four hours. They are physically addicting and upon withdrawal there may be prolonged experiences of problems with sleep, high anxiety, panic attacks and frightening dreams. They tend to be used for an anti-anxiety medication and therefore create a sense of relaxation or detachment in the user. These drugs do not produce a "high"; that is often sought after by recreational drug users. They are most frequently abused by people who are addicted to other drugs, such as heroin, as a drug to minimize or reduce symptoms of withdrawal from the main drug.

Benzodiazepines, when mixed with any other central nervous system depressant, including alcohol, can be toxic.

### **Rohypnol (Flunitrazepam)**

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Induces a sedative-hypnotic effect including muscle relaxation and amnesia, and giving euphoric and relaxing effects. The effects last for about eight hours.

Street names for Rohypnol include rophies, ropies, ruffies, roofies, roche, R-2, mexican valium, rib, and rope.

Users report mixing it with beer to enhance the feeling of drunkenness, and it has been reported to be used in combination with marijuana and cocaine, as well as heroin.

It is also used to ease the come down from a cocaine or crack binge.

A part of the Valium family, it is 10 times more potent. When mixed with alcohol or other central nervous system depressants, Rohypnol can be fatal. It is addictive and withdrawal symptoms can include seizures. It rose to prominence abused as a date rape drug because it was originally colourless, odourless and tasteless and causes sedation and/or euphoria in approximately 20 to 30 minutes. It now contains a blue dye that will appear when it is added to any drink, and it is slower to dissolve.

### **GBH/GHB**

GHB (Gamma-hydroxybutyrate) is a depressant that acts on the central nervous system and is used for its euphoric and sedative effect. GBH has also been used for its anabolic effect by body builders and athletes. It has more than 30 common street names, but is often referred to as "Liquid Ecstasy", "Scoop", liquid X, g-juice or "Grievous Bodily Harm."

GBH occurs in the body naturally, as a neurochemical compound. It was first manufactured in 1960, and has been used in several countries as a general aesthetic, and for treatment of the sleep disorders, insomnia, and narcolepsy. More recently, GBH has been trialled as a treatment for alcohol and opiate (eg heroin) withdrawal.

Psychologically the effects are: drowsiness, increased sociability and confidence, enhanced

sense of touch, dizziness, relaxation and wellbeing.

"GBH" is freely available, over the internet, through mail-order catalogues and in sex shops. It is a colourless liquid normally sold in small bottles. It also occasionally appears in a bright blue liquid form as ,blue nitro, however the different name simply reflects the addition of blue food dye rather than any difference in the drug. GBH also comes as a crystal powder. It is mostly taken orally.

The effects of GBH vary greatly according to the amount used - a small increase in amount can result in a dramatic increase in effect.

One of the most dangerous aspects of using GBH is the narrow margin between an amount that produces the desired effect, and the amount that results in overdose. A further risk is that there is often no way to be sure that the drug has been manufactured correctly. Improperly made GBH can result in an extremely toxic mixture of GBH and the chemical sodium hydroxide.

### **Benzocetamine**

Possesses sedative and anxiolytic properties. It is different from most sedative drugs because in most clinical trials it does not produce respiratory depression but stimulates the respiratory system (although when co-administered with other drugs that cause respiratory depression, such as morphine, it can cause increased respiratory depression). Peak effects are reached at about an hour, and effects wear off after about 2–3 hours.

Benzocetamine appears to increase serotonin by reducing turnover.

### **Ketamine (K),dextromethorphan (DXM), phencyclidine (PCP), and nitrous oxide (N2O)**

NMDA is a receptor that allows for the transfer of electrical signals between neurons in the brain. For electrical signals to pass, the NMDA receptor must bind to glutamate. NMDA receptor antagonists either block this receptor or interfere in transmission in other ways.

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Those listed above are the most well known. There are many others such as Amantadine (used for treating Parkinson's disease, influenza and Alzheimer's), Dextrophan (active metabolite of dextromethorphan), Ibogaine, Memantine (used for the treatment of Alzheimer's disease), Riluzole, Tilemine (an animal anesthetic.)

This class of drugs is popular due to their dissociative, hallucinogenic and/or euphoriant properties.

Ketamine is a short-acting but powerful general anaesthetic which depresses the nervous system and causes a temporary loss of body sensation. It has powerful hallucinogenic qualities (with a distortion of objects and reality). It can give the user a floating feeling as if the mind and body have been separated. Users can trip for up to an hour and may feel after-effects for some hours.

Street names for ketamine include: Green, K, special K, super K, vitamin k. It usually comes as a grainy white powder which is usually snorted but it may also be obtained as a tablet. Ketamine from labs comes in liquid form. Often adulterated (commonly found with ephedrine added) and sometimes passed off as ecstasy.

It can result in very high blood pressure if mixed with ecstasy or amphetamines.

At high, fully anesthetic level doses, ketamine has also been found to bind to opioid receptors.

Dextromethorphan is commonly found in cough medicines),

### **HU-210, WIN 55,212-2 and JWH-133**

HU-210 is a potent analgesic with many of the same effects as natural THC. It is a synthetic cannabinoid first synthesized in 1988 by a group led by Professor Raphael Mechoulam.

HU-210 is 100 to 800 times more potent than natural THC from cannabis and has an extended duration of action.

With daily doses over a few weeks HU-210 stimulates neural growth in rats hippocampus regions. It has antianxiety and antidepressant effects, is implicated in preventing the inflammation caused by amyloid beta proteins involved in Alzheimer's disease, prevents cognitive impairment and loss of neuronal markers. The anti-inflammatory action is induced through the activation of cannabinoid receptors which prevents the microglial activation that elicits the inflammation. Additionally, cannabinoids completely abolished neurotoxicity related to microglia activation in rat models.

Other similar synthetic cannabinoids are: WIN 55,212-2 and JWH-133

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## □ Other Drugs for Neurohacking ['smart' drugs etc.]

### Smart Drugs

Latest (2010) chemicals used for intelligence enhancement: Adderall, a stimulant composed of mixed amphetamine salts, (is commonly prescribed for ADHD). Increases dopamine and norepinephrine.

Ampakines, which target a type of glutamate receptor in the brain; prescribed for memory loss associated with diseases like Alzheimer's. Improve working memory, attention and alertness, improves communication between the two brain hemispheres.. Four structural classes of

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ampakine drugs have been developed so far, most useful are the racetam drugs such aspiracetam and aniracetam.

Aricept, an Alzheimer's drug that may also enhance memory in healthy adults. Thought to reduce the breakdown of acetylcholine.

Centrophenoxine raises brain acetylcholine levels thereby increasing alertness and attention span and improving learning ability.

Cholinesterase inhibitors, which are already being used with some success to treat Alzheimer's patients. Improve alertness and memory recall.

Desmospressin (see: Vasopressin) Bovine and porcine versions of Vasopressin such as Diapid (Lypressin and Argipressin) have been withdrawn from the World market. They are being replaced by a synthetic version called Desmopressin, (branded DesmoSpray or Minurin). Desmospressin has more potency and a longer half-life than the previous animal-sourced Vasopressin.

Donepezil (Aricept ), Improves verbal and visual episodic memory and sensorimotor responses.

Galantamine, is extracted from the snowdrop plant (a type of daffodil) and is used as an Alzheimer's treatment under the brand name Reminyl. Improves memory and learning ability. Inhibits acetylcholinesterase, the enzyme that breaks down acetylcholine (the brain neurotransmitter necessary for learning and memory), stimulates brain nicotinic receptors, and reduces the build up of amyloid plaque (deposits containing amyloid peptide and dead neurons) in the brain.

Huperzine A (*Huperzia serrata*) is found in Chinese Moss and enhances mental functioning by prolonging the life of the neurotransmitter acetylcholine.



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Idebenone, increases Nerve Growth Factor (NGF) in the brain. Evidence for benefits is sparse, although it is a powerful anti-oxidant it has side effects, possible gastrointestinal disturbances, dizziness, headaches, anxiety and uneasiness and sleep alterations.

Green tea is just as powerful an anti-oxidant and comes without these snags.

Magnesium – a mineral found in nuts, legumes and green vegetables such as spinach – may be as effective a memory enhancer as genetic manipulation. The magnesium ion blocks entry to the NMDA receptor so more magnesium forces brain cells to increase expression levels of the more efficient NR2B to compensate.

Phenserine, a potent acetylcholinesterase inhibitor. Improves focus, concentration and alertness.

Picamilon, enhances cerebral circulation. Picamilon is used in Russia to treat anxiety, depression, headaches, glaucoma, and eye disorders.

Piracetam, Factual data on piracetam's benefits for healthy people are virtually nonexistent, it is thought to enhance acetylcholine, and many users believe that the drug increases blood flow to the brain and improves association. Unifiram and Sunifiram are active in extremely small amounts (fractions of a milligram). Korphendon, also called Phentropyl, is a 'racetam', from Russia.

Provigil, known generically as modafinil or adafinil, which was developed to treat narcolepsy, and Nuvigil, a longer-lasting variant of Provigil. Increases dopamine and norepinephrine, improves attention, concentration and alertness.

Pyritinol, used since 1961 for various cognitive conditions such as dementia, head injury, stroke recovery, coma, Attention Deficit Disorder (ADD) and cerebral circulatory disorders. Improves memory, concentration, and to enhance information processing.

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Ritalin (methylphenidate), commonly prescribed for ADHD. Increases dopamine and norepinephrine. Improves attention & focus.

Rolipram, Originally used as an antidepressant. May elevate levels of cyclic adenosine monophosphate to boost memory. Improves cognition in rats.

Selegiline (Deprenyl) is an amphetamine analogue without the negative side effects, and with a different pharmacological action.

Neuroprotective, it increases myelination and improves memory, alertness and focus.

Vasopressin (& Desmopressin), Vasopressin is a peptide hormone found naturally in the brain and is partly responsible for the formation of memories. Its effects rapidly improve short-term memory and enhance memory imprints (i.e. after the event). Using vasopressin (nasal spray) 15 minutes before recall or concentration is required produces a marked affect, sometimes within seconds, which can then last for a few hours.

Vasopressin or desmopressin should be avoided if you suffer from cardiovascular problems, and only used infrequently, (i.e. only as necessary). Side effects include nausea and headaches. Caution, avoid the intake of large amounts of liquids when using Vasopressin, as the drug's "approved" use is to decrease the frequency of urination, excessive water intake can dilute salt in the body leading to vomiting and in the worst possible case- convulsions.

Vinpocetine, is a periwinkle plant extract that dilates arteries of the brain but does not dilate other blood vessels. Improves the brain's utilization of glucose, and increases ATP within the brain's neurons.

### **Best of the Mixes (2010)**

**"Get Smart"**

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Contains Huperzine A (an extract from Chinese moss that prevents brain deterioration), periwinkle extract, Aniracetam and Oxiracetam, which are both in the Racetam family, like Piracetam, Vinpocetine, Centrophenoxine, Picamilon, Idebenone, Galantamine, and Pyritinol (a drug used in Europe to aid healing in severe head trauma). Improves focus and memory, and enhances creativity.

### **“Learning Factors”**

Contains tuna-fish–oil extract (omega 3), omega-6 fatty acids, borage oil. Omega 3 improves overall brain condition, assists myelination and improves concentration, memory and comprehension. Borage oil is an anti-inflammatory. Claims to contain 40 brain-boosting substances but most seem to be minerals and vitamins, which may or may not be chelated. Read the jar carefully.

### **Latest Research (2010)**

There are over 100 compounds in clinical development right now focused on treating some form of memory loss. The most promising are looking at transgenic over-expression of the NR2B gene, which in turn increased communication between NMDA receptor sites maybe a hundred milliseconds longer than normal, just enough to enhance learning and memory.

Stimulant drugs such as nicotine and caffeine have long been used to improve cognition. In the case of nicotine a complex interaction with attention and memory occurs, and several pharmaceutical companies are working on drugs that target nicotine receptors in the brain, in the hope that they can replicate the cognitive uptick that smokers get from cigarettes.

Advances in the scientific understanding of memory enabled the development of drugs with

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more specific actions, such as drugs stimulating the cholinergic system, which is involved in gating attention and memory encoding. Current interest is focused on intervening in the process of permanent encoding in the synapses, a process which has been greatly elucidated in recent years and is a promising target for drug development.

Pharmacological agents might be useful not only for increasing memory retention but also for unlearning phobias and addictions. Potentially, the combination of different drugs administered at different times could give users a more fine-grained control of their learning processes, perhaps even the ability to deliberately select specific memories that they want to retain or get rid of.

Working memory can be modulated by a variety of drugs. Drugs that stimulate the dopamine system have demonstrated effects, as do cholinergic drugs (possibly through improved encoding). Modafinil has been shown to enhance working memory in healthy test subjects, especially at harder task difficulties and for lower-performing subjects. (Similar findings of stronger improvements among low performers were also seen among the dopaminergic drugs, and this might be a general pattern for many cognitive enhancers.) Modafinil has been found to increase forward and backward digit span, visual pattern recognition memory, spatial planning, and reaction time/latency on different working memory tasks. What seems to happen is that modafinil enhances adaptive response inhibition, making the subjects evaluate a problem more thoroughly before responding, thereby improving performance accuracy. The working memory effects might thus be part of a more general enhancement of executive function.

Naps are more effective in maintaining performance than modafinil and amphetamine during long (48h) periods of sleep deprivation, while the reverse holds for short (24h) periods of sleep deprivation. Naps followed by a modafinil dose may be more effective than either one on its own. These results, together with studies on hormones like melatonin which can control sleep rhythms, suggest that drugs can enable fine-tuning of alertness patterns to improve task performance under demanding circumstances or disturbed sleep cycles.

There also exist drugs that influence how the cerebral cortex reorganizes in response to damage or training. Noradrenergic agonists such as amphetamine have been shown to promote faster recovery of function after a brain lesion when combined with training, and to improve learning of an artificial language. A likely explanation is that higher excitability increases cortical plasticity, in turn leading to synaptic sprouting and remodeling.

An alternative to pharmacologic increase of neuromodulation is to electrically stimulate the neuromodulatory centers that normally control plasticity through attention or motivation. (See 'tech' section).

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## Drugs Where You may not Expect to Find Them [e.g. in your dinner]

### Food additives [manufactured]

One good reason to watch your diet is that a lot of food additives are harmful to the brain. Here is a list of some of the worst:

- Acesulphame K
- Aspartame & other artificial sweeteners
- BGH (Bovine Growth Hormone)
- BHA & BHT
- Coal tar dyes & food colorings
- MSG (monosodium glutamate)
- Olestra
- Potassium bromate
- Propyl gallate
- Sodium nitrite
- Sulfur dioxide
- Table sugar (sucrose)
- Table salt (sodium chloride)
- Taurine (bull bile)

- Trans fats

### Avoiding Toxins

We're not just talking about car exhausts and coal smoke here...the worst pollutants affecting the brain (and body) currently are aerosols. Show me a household where a previously healthy person suddenly develops asthma, and I'll show you a cupboard full of aerosols.

Air fresheners are pretty bad too...you may not know this, but those little cardboard 'fresh-air' or 'de-odorizer' things that people hang in their cars/bathrooms/office don't actually make the smell go away. They work by blocking your nasal neuron receptors, and after a certain length of exposure the receptors die. You are actually destroying your own sense of smell by using the things. The worst part is, to people who don't use them, your car/house/office still smells of whatever it did before you became unable to smell it!

As well as scents that we are conscious of, our sense of smell gives us vital input regarding pheromones/trace chemicals that we don't actually detect consciously, and without those receptor neurons your amygdala can't accurately compute danger signals (or even take hints). Do your perception a favor and avoid these things.

Metals are important, especially if you are suffering memory loss. If the brain begins to degenerate it can have trouble getting rid of trace metals, so avoid aluminium foil or pans, copper and brass jewellery [despite the rumors] and any unnecessary metallic packaging on food. Always wash fruit and veg –[either it is non-organic and has been sprayed with pesticides, or it is organic, in which case the insects probably didn't bother climbing off it to go to the toilet.]

Nasty things get put into street drugs too, and are the cause of many deaths that then get the original substance a bad press. In some countries you can get substances tested to confirm what they are, or you can look into how to test things yourself. If you are ever offered anything from anywhere that you doubt the quality or authenticity of, don't risk it. Some people are sadly very unscrupulous and you could be swallowing anything, including toilet cleaner.

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Here is a list of rogue chemicals you should try to avoid in personal products:

- 1, 4 Dioxane
- Bentonite
- Benzylphanone
- Diethanolamine (DEA)
- Dioxin
- Glycerin
- PABA / Oxybenzone / benzophenone
- Polyethylene glycol
- Propylene glycol (antifreeze)
- Sodium benzoate
- Sodium lauryl sulfate (SLS) and sodium laureth sulfate (SLES)