

Activated Charcoal

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Description

It was 1831. In front of his distinguished colleagues at the French Academy of Medicine, Professor Touery drank a lethal dose of strychnine and lived to tell the tale. He had combined the deadly poison with activated charcoal.

That's how powerful activated charcoal is as an emergency decontaminant in the gastrointestinal (GI) tract (which includes the stomach and intestines). Activated charcoal is considered to be the most effective single agent available. It is used after a person swallows or absorbs almost any toxic drug or chemical.

- Activated charcoal is estimated to reduce up to 60% of poisonous substances being absorbed.
- It works by adsorbing (soaking up) chemicals, thus reducing their toxicity (poisonous nature), through the entire length of the GI tract (stomach and small and large intestines).
- Activated charcoal itself is a fine, black powder that is odorless, tasteless, and nontoxic.
- Activated charcoal is often given after gastric lavage—the technique often called the stomach pump. Gastric lavage is only effective immediately after swallowing a toxic substance (within about one-half hour) and does not reach beyond the stomach as activated charcoal does.

How Activated Charcoal Works

Activated charcoal exerts its effects by adsorption of a wide variety of drugs and chemicals. Adsorption is a process in which atoms and molecules move from a bulk phase (such as a solid, liquid, or gas) onto a solid or liquid surface. In other words, the toxic substance attaches to the surface of the charcoal. Because charcoal is not "digested," it stays inside the GI tract and eliminates the toxin when the person has a bowel movement.

- This mechanism of action should not be confused with absorption. Absorption occurs when a substance passes into or through a tissue, like water passing into a sponge. Once the chemical or drug has been absorbed by the GI tract, activated charcoal can no longer retrieve the toxic ingestion. It will only attach to substances that are still inside the stomach or intestines.
- The charcoal is "activated" because it is produced to have a very fine particle size. This increases the overall surface area and adsorptive capacity of the charcoal. It is produced by adding acid and steam to carbonaceous materials such as wood, coal, rye starch, or coconut shells. To put this in perspective, one standard 50-gram dose of activated charcoal has the surface area of 10 football fields.

- Activated charcoal is often combined with sorbitol (medicine that stimulates the bowels to move, like a laxative) to shorten the amount of time to move through the system and reduce the possibility of [constipation](#). However, to avoid adverse effects, sorbitol will not be given with every dose of activated charcoal.
- All efforts should be made to reduce adsorption of severely toxic substances, even if activated charcoal has been proven not to work as well with a particular toxin. Activated charcoal does not bind as well with these substances:
 - [Lithium](#), strong acids and bases, metals and inorganic minerals (examples of these are sodium, iron, lead, arsenic, iodine, fluorine, and boric acid)
 - Alcohol (such as ethanol, methanol, isopropyl alcohol, glycols, and acetone)
 - Hydrocarbons (such as petroleum distillates and plant hydrocarbons like pine oil)
- Activated charcoal does not irritate the mucous membranes of the GI system. In addition to adsorption of toxins, activated charcoal also adsorbs food nutrients, vitamins, and minerals. However, do not worry about this short-term effect when activated charcoal is used to treat poisoning.

How Activated Charcoal Is Given

Activated charcoal may be given by mouth to someone who is awake and alert. It is a black liquid drink.

- If the person vomits the drink, another dose will be given through a gastric tube (a stomach tube that is inserted through the mouth or nose).
- If the person is unconscious (or nearly so), then the doctor may have to pass a breathing tube down the throat into the airway (trachea). This will allow oxygen to be delivered and will help protect the airway and lungs from gastric content. This will minimize the risk of the person vomiting and choking.
- Activated charcoal is usually given by a doctor. It is generally not a substance to be used at home. Doctors determine the dose or amount of charcoal to give based on the person's weight (with special doses for children) and on how much poison was swallowed. There are some doctors who will prescribe charcoal for emergency use in the home. This should only be done under the direct guidance of the doctor or poison control center.
- The doctor also determines when and if additional doses are given by monitoring blood levels of the poison. Other symptoms the doctor monitors are [nausea and vomiting](#), [abdominal pain](#), dizziness, and severe heart problems. Multiple doses of activated charcoal can often be given if someone swallowed large doses of long-acting, sustained release medications.
- If blood levels of the poison remain too high, the doctor may recommend kidney [dialysis](#). Dialysis is the best way to remove the toxin from the bloodstream.

When Not to Use Activated Charcoal

- Activated charcoal will not be given to people with an obstruction of the intestines or if the person swallowed a corrosive agent, such as a strong acid or alkali.
- Strong acids may "burn" through the lining of the GI tract. Doctors will need to look at the lining with an endoscope—a special instrument designed to look inside the stomach. Activated charcoal is not to be used with this type of poison because it is difficult to see the lining of the GI tract with the scope after charcoal is given.
- Activated charcoal can cause intestinal problems such as constipation, or it can create clumps of foreign material. This situation can be prevented by giving a laxative such as sorbitol. But repeated doses with sorbitol may cause excessive [diarrhea](#), [dehydration](#), and chemical imbalance.
- If the person is fructose intolerant, family members should notify the treating doctor, and sorbitol will not be given with the activated charcoal. Sorbitol is a sugar substitute that acts as a laxative to move the charcoal through the system. Children younger than 1 year should not be given sorbitol because it may cause excessive fluid losses.
- If an antidote to a specific type of drug poisoning is given, then the doctor may not give activated charcoal because the drug given as treatment will also be adsorbed. A classic example is an [acetaminophen](#) overdose in which there is a clearly established antidote with acetylcysteine (Mucomyst).

Emergency Home Care

- The best approach to poisoning is to identify the toxic substance and call your regional poison control center or go directly to the nearest Emergency Department.
 - Many poison centers recommend the use of ipecac—a preparation used to cause someone to vomit if they have swallowed poison—at home in specific circumstances. Always call the poison center first before treating a poisoning. In areas where it is recommended that ipecac be kept on hand, pharmacies will stock it.
 - Most doctors do not recommend home use of ipecac for people who have swallowed poison. Ipecac may bring on prolonged vomiting and make it difficult for the doctor to give activated charcoal.
 - A few poison centers recommend the use of activated charcoal in specific circumstances. Call your local poison center for guidance before giving it to someone. In areas where the poison center recommends activated charcoal, pharmacies will stock the product, and you can buy it over-the-counter. In general, if the local poison center doesn't recommend its use at home, pharmacies don't stock it.
- **Best advice from the [American Association of Poison Control Centers](#): Call your local poison center to get phone stickers with the emergency number. Ask what emergency products (such as ipecac and activated charcoal) to keep at home. If you need to phone for emergency advice, you may have the recommended products already on hand.**

- Milk products may decrease the ability of the charcoal to work. Don't attempt these types of home remedies. The best advice is to get the person to an Emergency Department.
- If the person cannot be aroused, may be vomiting, or has difficulty breathing, this is a 911 emergency. Bring the container of poison or medicine bottles, if known, to the Emergency Department.

References

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Cette fiche ne constitue en aucun cas un manuel d'exécution ni une référence et ne peut remplacer l'expérience et le savoir-faire d'un professionnel.