# Oral Liquids

**Oral administration** is a route of administration where a substance is taken through the mouth. Many medications are taken orally because they are intended to have a systemic effect, reaching different parts of the body via the bloodstream, for example.

## Scope

Oral administration is a part of enteral administration, which also includes

- Buccal (dissolved inside the cheek)
- Sublabial (dissolved under the lip) and
- Sublingual administration (dissolved under the tongue). Note that due to rapid absorption many consider SL a parenteral route.

## Buccal administration

**Buccal administration** refers to a Route of administration. Topical route of administration by which drugs held or applied in the buccal area (in the cheek) diffuse through the oral mucosa (tissues which line the mouth) and enter directly into the bloodstream. Buccal administration may provide better bioavailability of some drugs and a more rapid onset of action compared to oral administration because the medication does not pass through the digestive system and thereby avoids first pass metabolism.

As of May 2014, buccal forms of the psychiatric drug, asenapine; the opioid drugs buprenorphine, naloxone, and fentanyl; the cardiovascular drug nitroglycerin; the nausea medication Prochlorperazine; the hormone replacement therapy testosterone, and nicotine as a smoking cessation aid, were commercially available in buccal forms, as was midazolam, an anticonvulsant, used to treat acute epileptic seizures.

Buccal administration of vaccines has been studied, but there are challenges to this approach due to immune tolerance mechanisms that prevent the body from over-reacting to immunogens encountered in the course of daily life.

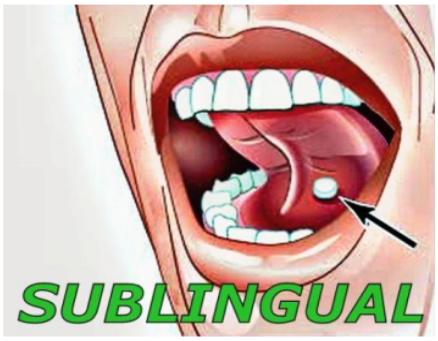
**Sublabial**, literally 'under the lip', from Latin, refers to the pharmacological route of administration by which the active substance is placed between the lip and the gingiva. The frenula may be irritated when in contact with corrosive materials but can be avoided with this route.

It is usually used for drugs such as Glyceryl trinitrate, for example, in angina pectoris.

**Upper lip administration**

Some drugs are inactive in the digestive tract, but this can be avoided if held between the upper lip and gum. This prevents the substances from getting swallowed with salivation, as would normally occur between the lower lip and gum, permitting slow release of the drug to prolong the duration of action.

**Sublingual** (abbreviated **SL**), from the Latin for "under the tongue", refers to the pharmacological route of administration by which drugs diffuse into the blood through tissues under the tongue. Many drugs are designed for sublingual administration, including cardiovascular drugs, steroids, barbiturates, opioid analgesics with poor gastrointestinal bioavailability, enzymes and, increasingly, vitamins and minerals.




**Principle**

When a chemical comes in contact with the mucous membrane beneath the tongue, it diffuses through it. Because the connective tissue beneath the epithelium contains a profusion of capillaries, the substance then diffuses into them and enters the venous circulation. In contrast, substances absorbed in the intestines are subject to "first-pass metabolism" in the liver before entering the general circulation.

Sublingual administration has certain advantages over oral administration. Being more direct, it is often faster, and it ensures that the substance will risk degradation only by salivary enzymes before entering the bloodstream, whereas orally administered drugs must survive passage through the hostile environment of the gastrointestinal tract, which risks degrading them, either by stomach acid or bile, or by the many enzymes therein, such as monoamine oxidase (MAO).

Furthermore, after absorption from the gastrointestinal tract, such drugs must pass to the liver, where they may be extensively altered; this is known as the first pass effect of drug metabolism. Due to the digestive activity of the stomach and intestines and the solubility of the GI tract, the oral route is unsuitable for certain substances, such as salvinorin A.

**Forms**

Pharmaceutical preparations for sublingual administration are manufactured in the form of:

- Sublingual tablets—tablets which easily melt in the mouth, dissolve rapidly and with little or no residue. Nitroglycerine tablets are an example, the anti-emeticondansetron is another.
- Sublingual strips—similar to that tablets in that they easily melt in the mouth and dissolve rapidly. Suboxone is an example of medication that comes in a sublingual strip.
- Multi-Purpose Tablets—Soluble tablets for either oral or sublingual (or buccal) administration, often also suitable for preparation of injections, Hydrostat (hydromorphone) and a number of brands of morphine tablets and cubes.
- Sublingual Drops—a concentrated solution to be dropped under the tongue, as with some nicocodeine cough preparatations,
- Sublingual Spray—spray for the tongue; certain human and veterinary drugs are dispensed as such.
- Lozenge—effects a metred and patient-controlled-rate combination of sublingual, buccal, and oral administration, as with the Actiq fentanyl lozenge-on-a-stick (lollipop).
- Effervescent Buccal or Sublingual Tablets—this method drives the drug through the mucous membranes much faster (this is the case in the stomach with carbonated or effervescent liquids as well) and is used in the Fentora fentanyl buccal tablet.

**Psychoactives**

In addition to Salvinorin A, other psychoactives may also be applied sublingually. LSD, MDMA, morphine, alprazolam, clonazepam, and many other drugs including the psychedelic tryptamines and phenethylamines are all viable candidates for administration via this route. Most often, the drug in question is powdered and placed in the mouth (often directly under the tongue). If held there long enough, the drug will diffuse into the blood stream, bypassing the GI tract. This may be a preferred method to simple oral administration, because MAO is known to oxidize many drugs (especially the tryptamines such as DMT) and because this route translates the chemical directly to the brain, where most psychoactives act. The method is limited by excessive salivation washing the chemical down the throat. Also, many alkaloids have an unpleasant taste which makes them difficult

to hold in the mouth. Tablets of psychoactive pharmaceuticals usually include bitter chemicals such as denatonium in order to discourage abuse and also to discourage children from eating them.

**Allergens**

Allergens may also be applied under the tongue, and the FDA is reviewing this method of allergen immunotherapy but it is not yet approved in the US. In 2007, Roder published work showing sublingual immunotherapy with grass pollen is not effective in symptomatic youngsters in primary care.

**Therapeutic peptides and proteins**

A relatively new way of administration of therapeutic peptides and proteins (such as cytokines, domain antibodies, Fab fragments or single chain antibodies) is sublingual administration. Peptides and proteins are not stable in the gastro-intestinal tract, mainly due to degradation by enzymes and pH differences. As a consequence, most peptides (such as insulin, exenatide, vasopressin, etc...) or proteins (such as interferon, EPO and interleukins) have to be administered by injection. Recently, new technologies have allowed sublingual administration of such molecules.

**Vaccines**

The sublingual route may also be used for vaccines against various infectious diseases. Thus, preclinical studies have found that sublingual vaccines can be highly immunogenic and may protect against influenza virus and *Helicobacter pylori*, but sublingual administration may also be used for vaccines against other infectious diseases.

**Enteral medications come in various forms, including:**

- tablets to swallow, chew or dissolve in water or under the tongue
- capsules and chewable capsules (with a coating that dissolves in the stomach or bowel to release the medication there)
- time-release or sustained-release tablets and capsules (which release the medication gradually)
- powders or granules
- teas
- drops
- liquid medications or syrups.

# Injections

An **injection** is an infusion method of putting fluid into the body, usually with a syringe and a hollow needle which is pierced through the skin to a sufficient depth for the material to be administered into the body. An injection follows a parenteral route of administration; that is, administration via a route other than through the digestive tract. Since the process inherently involves a small puncture wound to the body (with varying degrees of pain depending on injection type and location, medication type, needle gauge and the skill of the individual administering the injection), fear of needles is a common phobia.

There are several methods of injection or infusion used in humans, including intradermal, subcutaneous, intramuscular,intravenous, intraosseous, intraperitoneal, intrathecal, epidural, intracardi ac, intraarticular, intracavernous, and intravitreal. Rodents used for research are often administered intracerebral, intracerebroventricular, or intraportal injections as well. Long-acting forms of subcutaneous/intramuscular injections are available for various drugs, and are called depot injections.

Injections are among the most common health care procedures, with at least 16 billion administered in developing and transitional countries each year. 95% of injections are administered in curative care, 3% are for immunization, and the rest for other purposes, such as blood transfusions. In some instances the term *injection* is used synonymously with inoculation even by different workers in the same hospital. This should not cause confusion; the focus is on what is being injected/inoculated, not the terminology of the procedure.

## Intramuscular injection

In an **intramuscular injection**, the medication is delivered directly into a muscle. Many vaccines are administered intramuscularly, as are codeine, metoclopramide, and many other medications. Many drugs injected intramuscularly are absorbed into the muscle fairly and quickly, while others are more gradual. Injections to the buttocks are known to reach the bloodstream quickly due to the large amount of muscular tissue and corresponding blood supply.

Generally, intramuscular injections are administered by a trained medical professional; however, prescribed self-administered intramuscular injections are becoming more common for patients who require these injections routinely.

**Depot injection**

A **depot injection** is an injection, usually subcutaneous, intradermal, or intramuscular, that deposits a drug in a localized mass, called a depot, from which it is gradually absorbed by surrounding tissue. Such injection allows the active compound to be released in a consistent way over a long period. Depot injections are usually either solid or oil-based. Depot injections may be available as certain forms of a drug, such as decanoate salts or esters. Examples of depot injections include Depo Provera and haloperidol decanoate. Prostate cancer patients receiving hormone therapy usually get depot injections as a treatment or therapy. Zoladex is an example of a medication delivered by depot for prostate cancer treatment or therapy.

The advantages of using a long-acting depot injection include increased medication compliance due to reduction in the frequency of dosing, as well as more consistent serum concentrations. A significant disadvantage is that the drug is not immediately reversible, since it is slowly released.

In psychiatric nursing, a short acting depot, zuclopenthixol acetate (Clopixol Acuphase), which lasts in the system from 24 – 72 hours, is now more regularly used for rapid tranquillisation

**Infiltration**

The pharmaceutical injection type of infiltration involves loading a volume of tissue with the drug, filling the interstitial space. Local anesthetics are often infiltrated into the dermis and hypodermis.

**Hypodermic injections in nature**

Various animals, and some plants, have been injecting for various reasons long before humans began doing so in a process commonly called stinging. Some examples include:

- Snakes, wasps, scorpions: poison, to kill prey and self-defense.
- Some bees: poison, to defend themselves and their nests.
- Cnidaria (jellyfish, etc.): poison, to kill prey.

- Stinging nettles: poison, to try to avoid being eaten.
- Stingrays: poison, defense mechanism when provoked

**Injection pain**

The pain of an injection may be lessened by prior application of ice or topical anesthetic, or simultaneous pinching of the skin. Recent studies suggest that forced coughing during an injection stimulates a transient rise in blood pressure which inhibits the perception of pain. Sometimes, as with an amniocentesis, a local anesthetic is given.[4] The most common technique to reduce the pain of an injection is simply to distract the patient.

Babies can be distracted by giving them a small amount of sweet liquid, such as sugar solution, during the injection, which reduces crying.

**Injection safety**

40% of injections worldwide are administered with unsterilized, reused syringes and needles, and in some countries this proportion is 70%, exposing millions of people to infections.

Another risk is poor collection and disposal of dirty injection equipment, which exposes healthcare workers and the community to the risk of needle stick injuries. In some countries, unsafe disposal can lead to re-sale of used equipment on the black market. Many countries have legislation or policies that mandate that healthcare professionals use a safety syringe (safety engineered needle) or alternative methods of administering medicines whenever possible.

Open burning of syringes, which is considered unsafe by the World Health Organization, is reported by half of the non-industrialized countries.

According to one study, unsafe injections cause an estimated 1.3 million early deaths each year.

To improve injection safety, the WHO recommends:

1. Changing the behavior of health care workers and patients
2. Ensuring the availability of equipment and supplies
3. Managing waste safely and appropriately

A *needle tract infection* is an infection that occurs when pathogenic micro-organisms are seeded into the tissues of the body during an injection. Such infections are also referred to as *needlestick infections*.

# Topical applications

A **topical medication** is a medication that is applied to a particular place on or in the body, as opposed to systemically. Most often this means application to body surfaces such as the skin or mucous membranes to treat ailments via a large range of classes including but not limited to creams, foams, gels, lotions, and ointments.

Many topical medications are epicutaneous, meaning that they are applied directly to the skin. Topical medications may also be inhalational, such as asthma medications, or applied to the surface of tissues other than the skin, such as eye drops applied to the conjunctiva, or ear drops placed in the ear, or medications applied to the surface of a tooth. As a route of administration, topical medications are contrasted with enteral (in the digestive tract) and intravascular/intravenous (injected into the circulatory system).

A topical effect, in the pharmacodynamic sense, may refer to a local, rather than systemic, target for a medication. However, many topically administered drugs have systemic effects, because they reach the circulation after being absorbed by the tissues.

Topical medications differ from many other types of drugs because mishandling them can lead to certain complications in a patient or administrator of the drug.

Some hydrophobic chemicals, such as steroid hormones, can be absorbed into the body after being applied to the skin in the form of a cream, gel, or lotion.Transdermal patches have become a popular means of administering some drugs for birth control, hormone replacement therapy, and prevention of motion sickness. One example of an antibiotic that may be applied topically is chloramphenicol.

**Choice of base formulation**

A medication's potency often is changed with its base. For example, some topical steroids will be classified one or two strengths higher when moving from cream to ointment. As a rule of thumb, an ointment base is more occlusive and will drive the medication into the skin more rapidly than a solution or cream base.

The manufacturer of each topical product has total control over the content of the base of a medication. Although containing the same active ingredients, one manufacturer's cream might be more acidic than the next, which could cause skin irritation or change its absorption rate. For example, a vaginal formulation ofmiconazole antifungal cream might irritate the skin less than an athlete foot formulation of miconazole cream. These variations can, on occasion, result in different clinical outcomes, even though the active ingredient is the same. No comparative potency labeling exists to

ensure equal efficacy between brands of topical steroids (percentage of oil vs water dramatically affect the potency of topical steroid). Studies have confirmed that the potency of some topical steroid products may differ according to manufacturer or brand. An example of this is the case of brand name Valisone cream and Kenalog cream in clinical studies have demonstrated significantly better vasoconstrictions than some forms of this drug produced by generic drug manufacturers. However, in a simple base like an ointment, much less variation between manufacturers is common.

In dermatology, the base of a topical medication is often as important as the medication itself. It is extremely important to receive a medication in the correct base, before applying to the skin. A pharmacist should not substitute an ointment for a cream, or vice versa, as the potency of the medication can change. Some physicians use a thick ointment to replace the waterproof barrier of the inflamed skin in the treatment of eczema, and a cream might not accomplish the same clinical intention.

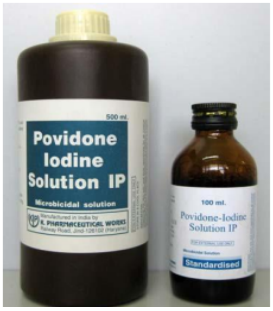
**Classes of topical medications**

There are many general classes, with no clear dividing line between similar formulations. As a result, what the manufacturer's marketing department chooses to list on the label of a topical medication might be completely different from what the form would normally be called. For example, Eucerin "cream" is more appropriately described as an ointment than as a cream.

**Topical solution**


Topical solutions are of low viscosity and often use water or alcohol in the base. The solution can cause drying of the skin if alcohol is used in the base.[4] These are usually a powder dissolved in water, alcohol, and sometimes oil. Alcohol in topical steroids can frequently cause drying if it is used as a base ingredient. There is significant variability between brands. There is a risk of irritation, depending on the preservative(s) and fragrances used in the base. Some examples of topical solutions are given below:

1. Aluminium acetate topical solution: This is colorless, with a faint acetous odour and sweetish taste. It is applied topically as an astringent after dilution with 10-40 parts of water. This is used in many types of dermatologic lotions, creams, and pastes. Commercial premeasured and packed tablets and powders are available for this preparation.
2. Povidone iodine topical solution: This is a chemical complex of iodine with polyvinylpyrrolidone, the agent being a polymer having an



average molecular weight of 40,000. The povidone iodine contains 10% available iodine, slowly released when applied to skin. This preparation is employed topically as a surgical scrub and non irritating antiseptic solution, with its effectiveness being directly attributed to the presence and release of iodine from the complex. Commercial product: Betadine solution.

**Lotion**

Lotions are similar to solutions but are thicker and tend to be more emollient in nature than solution. They are usually oil mixed with water, and more often than not have less alcohol than solutions. Lotions can be drying if they contain a high amount of alcohol. There is a significant variability in the ingredients between different lotions.

Lotions can be used for the delivery to the skin of medications such as:

- Antibiotics
- Antiseptics
- Antifungals
- Corticosteroids
- Anti-acne agents
- Soothing, smoothing, moisturizing or protective agents (such as calamine)

**Shake lotion**

A mixture that separates into two or three parts with time. Frequently oil mixed with a water-based solution needs to be shaken into suspension before use. "Shake well before use".

**Cream**

A cream is an emulsion of oil and water in approximately equal proportions. It penetrates the stratum corneum outer layer of skin wall.. Cream is thicker than lotion, and maintains its shape when removed from its container. It tends to be moderate in moisturizing tendency. For topical steroid products, oil-in-water emulsions are common. Creams have a significant risk of causing immunological sensitization due to preservatives. It has a high rate of acceptance by patients. There is a great variation in ingredients, composition, pH, and tolerance among generic brands.

**Uses of creams**

- The provision of a barrier to protect the skin
  - This may be a physical barrier or a chemical barrier as with sunscreens

- To aid in the retention of moisture (especially water-in-oil creams)
- Cleansing
- Emollient effects
- As a vehicle for drug substances such as local anaesthetics, anti-inflammatories (NSAIDs or corticosteroids), hormones, antibiotics, antifungals or counter-irritants.


Creams are semisolid dosage forms containing one or more drug substances dissolved or dispersed in a suitable base. This term has traditionally been applied to semisolids that possess a relatively fluid consistency formulated as either water-in-oil (e.g., Cold Cream) or oil-in-water (e.g., Fluocinolone Acetonide Cream) emulsions. However, more recently the term has been restricted to products consisting of oil-in-water emulsions or aqueous microcrystalline dispersions of long-chain fatty acids or alcohols that are water washable and more cosmetically and aesthetically acceptable. Creams can be used for administering drugs via the vaginal route (e.g., Triple Sulfa Vaginal Cream). Creams are used to help sun burns

Composition: There are four main ingredients of the cold cream 1: Water 2: Oil 3: Emulsifier 4: Thickening agent

**Oinments**

An **ointment** is a homogeneous, viscous, semi-solid preparation, most commonly a greasy, thick oil (oil 80% - water 20%) with a high viscosity, that is intended for external application to the skin or mucous membranes. Ointments have a water number that defines the maximum amount of water that it can contain.They are used as emollients or for the application of active ingredients to the skin for protective, therapeutic, or prophylactic purposes and where a degree of occlusion is desired.

Ointments are used topically on a variety of body surfaces. These include the skin and the mucous membranes of the eye(an *eye ointment*), chest, vulva, anus, and nose. An ointment may or may not be medicated.

Ointments are usually very moisturizing, and good for dry skin. They have a low risk of sensitization due to having few ingredients beyond the base oil or fat, and low irritation risk. There is typically little variability between brands of drugs. They are often disliked by patients due to greasiness.

The vehicle of an ointment is known as the *ointment base*. The choice of a base depends upon the clinical indication for the ointment. The different types of ointment bases are:

- Hydrocarbon bases, e.g. hard paraffin, soft paraffin, microcrystalline wax and ceresine
- Absorption bases, e.g. wool fat, beeswax
- Water-soluble bases, e.g. macrogols 200, 300, 400
- Emulsifying bases, e.g. emulsifying wax, cetrimide
- Vegetable oils, e.g. olive oil, coconut oil, sesame oil, almond oil and peanut oil.

The medicaments are dispersed in the base and are divided after penetrating the living cells of the skin.

` The water number of an ointment is the maximum quantity of water that 100g of a base can contain at 20 °C.

Ointments are formulated using hydrophobic, hydrophilic, or water-emulsifying bases to provide preparations that are immiscible, miscible, or emulsifiable with skin secretions. They can also be derived from hydrocarbon (fatty), absorption, water-removable, or water-soluble bases.

**Evaluation of ointments**

1. Drug content
2. Release of medicament from base
3. Medicament penetration
4. Consistency of the preparation
5. Absorption of medicament into blood stream
6. Irritant effect

Properties which affect choice of an ointment base are:

1. Stability
2. Penetrability
3. Solvent property
4. Irritant effects
5. Ease of application and removal

**Methods of preparation of ointments**

**Trituration**

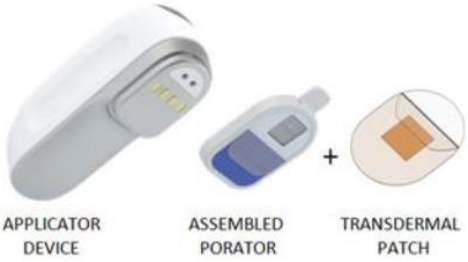
In this, finely subdivided insoluble medicaments are evenly distributed by grinding with a small amount of the base followed by dilution with gradually increasing amounts of the base.

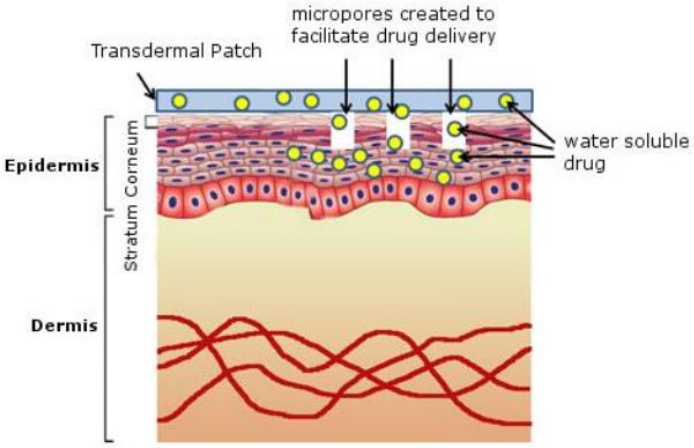
**Fusion**

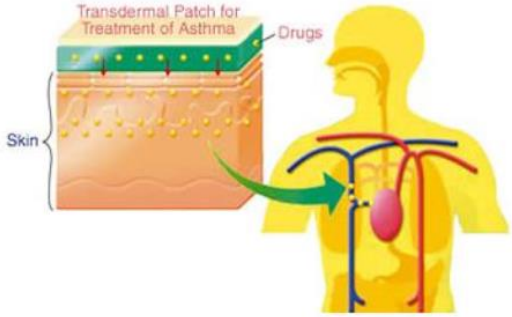
In this method the ingredients are melted together in descending order of their melting points and stirred to ensure homogeneity.

**Transdermal patch**

Transdermal patches can be a very precise time released method of delivering a drug. Cutting a patch in half might affect the dose delivered.




The release of the active component from a transdermal delivery system (patch) may be controlled by diffusion through the adhesive which covers the whole patch, by diffusion through a membrane which may only have adhesive on the patch rim or drug release may be controlled by release from a polymer matrix. Cutting a patch might cause rapid dehydration of the base of the medicine and affect the rate of diffusion.

**Gel**

Gels are thicker than a solution. Gels are often a semisolid emulsion in an alcohol base. Some will melt at body temperature. Gel tends to be cellulose cut with alcohol or acetone. Gels tend to be drying. Gels tend to have greatly variable ingredients between brands. Gels carry a significant risk of inducing hypersensitivity due to fragrances and preservatives. Gel is useful for the scalp and body folds. In applying gel one should avoid fissures and erosions due to the drying and stinging effect of the alcohol base. Gel enjoys a high rate of acceptance due to its cosmetic elegance.

**Foam**


Foam can be seen with topical steroid marketed for the scalp.

Eg: Desonide is a synthetic nonfluorinated corticosteroid; topical corticosteroids have anti-inflammatory, antipruritic, and vasoconstrictive properties. The mechanism of these properties, however, is unclear for the dermal route of administration. Following absorption through the skin, corticosteroids follow pharmacokinetic pathways similarly to intravenously administered corticosteroids. The mechanism of corticosteroids is thought to induce phospholipase A2 inhibitory proteins (lipocortins). Lipocortins control the biosynthesis of inflammation mediators, likes prostaglandins and leukotrienes. Lipocortins can inhibit the common precursor of inflammation mediators, arachidonic acid.

**Biofrequency chip**

A topical dosage form that is programmed with low frequencies recognized by the body and complements topical medication adhered to the backing of the chip.

**Powder**


Powder is either the pure drug by itself (talcum powder), or is made of the drug mixed in a carrier such as corn starch or corn cob powder (Zeosorb AF - miconazole powder). Can be used as an inhaled topical (cocaine powder used in nasal surgery).

Eg: Miconazole is an imidazole antifungal agent, developed by Janssen Pharmaceutica, commonly applied topically to theskin or to mucous membranes to cure fungal infections. It works by inhibiting the synthesis of ergosterol, a critical component of fungal cell membranes. It can also be used against certain species of *Leishmania* protozoa which are a type of unicellular parasites that also contain ergosterol in their cell membranes. In addition to its antifungal

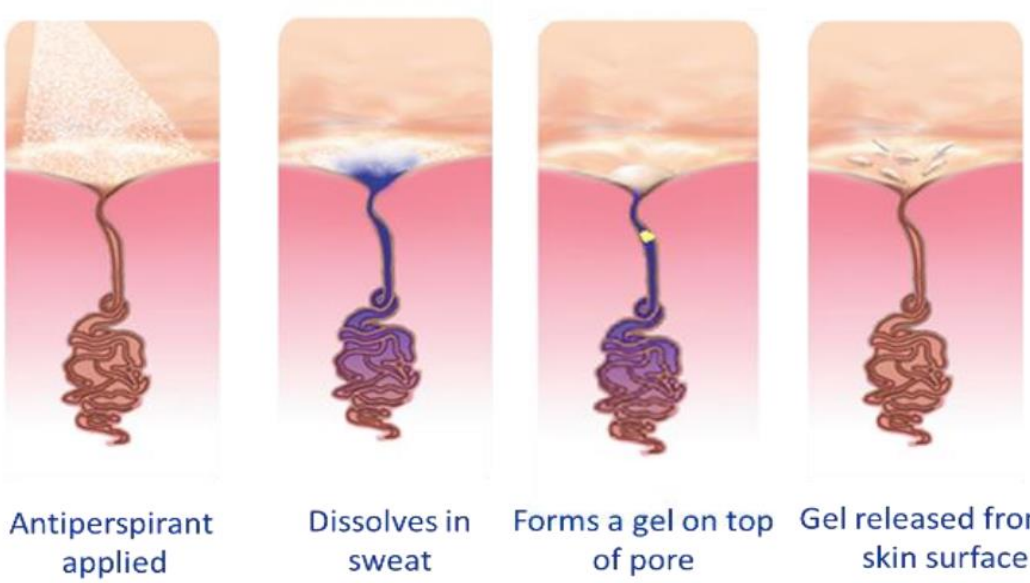
and antiparasitic actions, it also has some antibacterial properties. It is marketed in various formulations under various brand names.

**Solid**

Medication may be placed in a solid form. Examples are deodorant, antiperspirants, astringents, and hemostatic agents. Some solids melt when they reach body temperature (e.g. rectal suppositories).

Eg: Action of antiperspirants

- Antiperspirants contain ingredients that control sweat and body odour safely and effectively. They are readily available on the market as sprays (aerosol), sticks, creams or roll-ons.
- When an antiperspirant is applied to the skin surface, its anti-perspirant ingredients – usually aluminium salts – dissolve in the sweat or moisture on the skin surface of the armpit. The dissolved substance forms a gel, which creates a small temporary 'plug' near the top of the sweat gland, significantly reducing the amount of sweat that is secreted to the skin surface. Bathing and washing will remove the antiperspirant gel.




- Re-application of antiperspirants can be beneficial to help reduce sweating and keep fresh throughout the day. Antiperspirants reduce underarm sweating but they do not impact on the natural ability of the body to control its temperature (thermoregulation).

**Sponge**

Certain contraceptive methods rely on sponge as a carrier of a liquid medicine. Lemon juice embedded in a sponge has been used as a primitive contraception in some cultures.

**Tape**


Cordran tape is an example of a topical steroid applied under occlusion by tape. This greatly increases the potency and absorption of the topical steroid and is used to treat inflammatory skin diseases.

This medication is used to treat a variety of skin conditions (e.g., eczema, dermatitis, allergies, rash). Flurandrenolide reduces the swelling, itching, and redness that can occur in these types of conditions. This medication is a medium-strength corticosteroid. The tape acts to protect the treated skin and makes the medication more effective and longer-lasting.

**Vapor**

Some medications are applied as an ointment or gel, and reach the mucous membrane via vaporization. Examples are nasal topical decongestants and smelling salt.

Topical decongestants are decongestants applied directly to the nasal cavity. By applying them directly to the site of action, topical decongestants relieve nasal congestion while reducing the side effects associated with systemically-acting decongestants, such as high blood pressure. Topical decongestants should only be used by patients for a maximum of 5–7 days in a row, because rebound congestion may occur in the form of rhinitis medicamentosa.

Topical decongestants are a common form of nasal relief, due to their quick effects which can clear the sinus in as little as ten seconds.

Topical decongestants are vasoconstrictors, and work by constricting the blood vessels within the nasal cavity. Examples include:

- Ephedrine
- Levomethamphetamine
- Naphazoline
- Oxymetazoline
- Phenylephrine
- Pseudoephedrine
- Tramazoline

- Xylometazoline

**Paste**

Paste combines three agents - oil, water, and powder. It is an ointment in which a powder is suspended.

Eg: Toothpaste is a paste or gel dentifrice used with a toothbrush as an accessory to clean and maintain the aesthetics and health of teeth. Toothpaste is used to promote oral hygiene: it serves as an abrasive that aids in removing the dental plaque and food from the teeth, assists in suppressing halitosis, and delivers active ingredients (most commonly fluoride) to help prevent tooth decay (dental caries) and gum disease (gingivitis). Salt and sodium bicarbonate (baking soda) are among materials that can be substituted for commercial toothpaste. Toothpaste is not intended to be swallowed due to the fluoride content, but is generally not very harmful if accidentally swallowed in small amounts; however, one should seek medical attention after swallowing abnormally large amounts

In addition to 20–42% water, toothpastes are derived from a variety of components, the three main ones being abrasives, fluoride, and detergents.

**Abrasives**

Abrasives constitute at least 50% of typical toothpaste. These insoluble particles help remove plaque from the teeth. The removal of plaque and calculus helps minimize cavities and periodontal disease. Representative abrasives include particles of aluminum hydroxide ($Al(OH)_3$), calcium carbonate ($CaCO_3$), various calcium hydrogen phosphates, various silicas and zeolites, and hydroxyapatite ($Ca_5(PO_4)_3OH$).

Abrasives, like the dental polishing agents used in dentists' offices, also cause a small amount of enamel erosion which is termed "polishing" action. Some brands contain powdered white mica, which acts as a mild abrasive, and also adds a cosmetically pleasing glittery shimmer to the paste. The polishing of teeth removes stains from tooth surfaces, but has not been shown to improve dental health over and above the effects of the removal of plaque and calculus.[3]

**Fluorides**

Fluoride in various forms is the most popular active ingredient in toothpaste to prevent cavities. Fluoride occurs in small amounts in plants, animals, and some natural water sources. The additional fluoride in toothpaste has beneficial effects on the formation of dental enamel and bones. Sodium fluoride (NaF) is the most common source of fluoride, but stannous fluoride ($SnF_2$), olaflur (an organic salt of fluoride), and sodium monofluorophosphate ($Na_2PO_3F$) are also used. Stannous fluoride has been shown to be more effective than sodium fluoride in reducing the incidence of dental caries and controlling gingivitis.

Much of the toothpaste sold in the United States has 1,000 to 1,100 parts per million fluoride. In European countries, such as the UK or Greece, the fluoride content is often higher; a NaF content of 0.312% w/w (1,450 ppm fluoride) is common.

**Surfactants**

Many, although not all, toothpastes contain sodium lauryl sulfate (SLS) or related surfactants (detergents). SLS is found in many other personal care products, as well, such as shampoo, and is mainly a foaming agent, which enables uniform distribution of toothpaste, improving its cleansing power.

**Other components in tooth paste**

**Antibacterial agents**

Triclosan, an antibacterial agent, is a common toothpaste ingredient in the United Kingdom. Triclosan or zinc chloride prevent gingivitis and, according to the American Dental Association, helps reduce tartar and bad breath. A 2006 review of clinical research concluded there was evidence for the effectiveness of 0.30% triclosan in reducing plaque and gingivitis.

**Flavorants**

Toothpaste comes in a variety of colors, and flavors intended to encourage use of the product. Three most common flavorants are peppermint, spearmint, and wintergreen. Toothpaste flavored with peppermint-anise oil is popular in the Mediterranean region. These flavors are provided by the respective oils, e.g. peppermint oil. More exotic flavors include Anethole anise, apricot, bubblegum, cinnamon, fennel, lavender, neem, ginger, vanilla, lemon, orange, and pine. Alternatively, unflavored toothpastes exist.

**Remineralizers**

Hydroxyapatite nanocrystals and a variety of calcium phosphates are included in formulations for remineralization, i.e. the reformation of enamel.

**Miscellaneous components**

Agents are added to suppress the tendency of toothpaste to dry into a powder. Included are various sugar alcohols, such asglycerol, sorbitol, or xylitol, or related derivatives, such as 1,2-propylene glycol and polyethyleneglycol. Strontium chloride or potassium nitrate is included in some toothpaste to reduce sensitivity. Sodium polyphosphate is added to minimize the formation of tartar.

**Tincture**

A **tincture** is typically an alcoholic extract of plant or animal material or solution of such or of a low volatility substance (such as iodine and mercurochrome). Herbal tinctures are not always made using ethanol as the solvent, though this is most commonly the case. Other solvents include vinegar, glycerol, diethyl ether and propylene glycol, not all of which can be used for internal consumption. Ethanol has the advantage of being an excellent solvent for both acidic and basic (alkaline) constituents.

A tincture is a skin preparation that has a high percentage of alcohol. It would normally be used as a drug vehicle if drying of the area is desired.