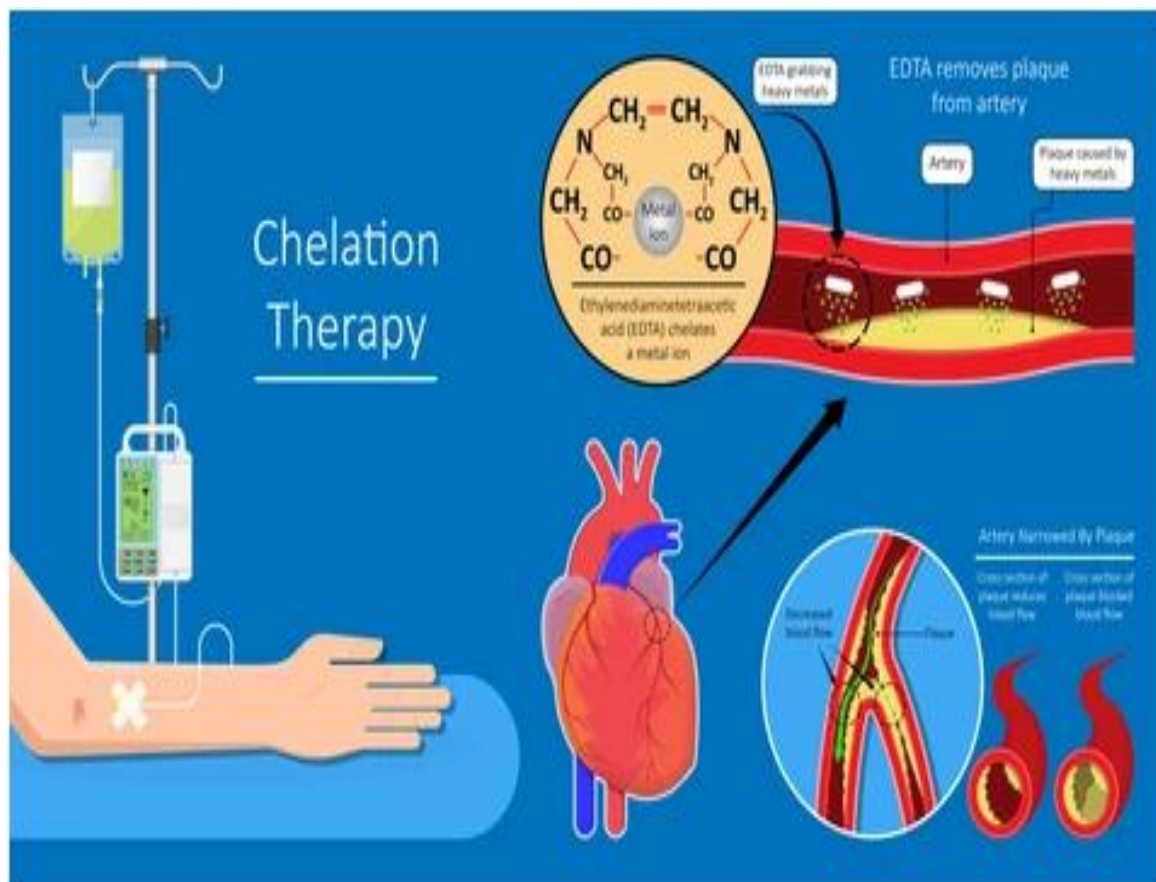


Chelating And Medical Interest



Chelation

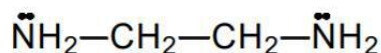
The process by which a molecule encircles and binds to a metal and removes it from tissue.

Chelating agent:

Organic chemicals that form coordination bonds with a central metal ion, used to chemically remove ions from solutions, medically against microorganisms, to treat metal poisoning and in chemotherapy protocols.

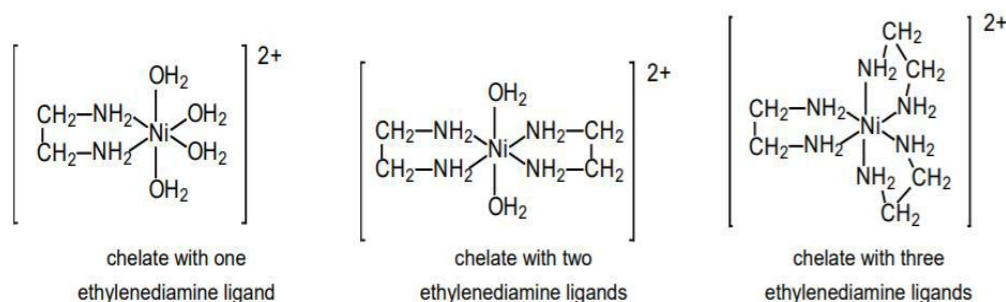
Lec. 4 Medical Chemistry Dr. Nada Hassan

A chelate is a chemical compound composed of a metal ion and a chelating agent. A chelating agent is a substance whose molecules can form several bonds to a single metal ion. In other words, a chelating agent is a multidentate ligand. An example of a simple chelating agent is ethylenediamine.



ethylenediamine

A single molecule of ethylenediamine can form two bonds to a transition-metal ion such as nickel(II), Ni^{2+} . The bonds form between the metal ion and the nitrogen atoms of ethylenediamine. The nickel(II) ion can form six such bonds, so a maximum of three ethylenediamine molecules can be attached to one Ni^{2+} ion.



In the two structures on the left, the bonding capacity of the Ni^{2+} ion is completed by water molecules. Each water molecule forms only one bond to Ni^{2+} , so water is not a chelating agent. Because the chelating agent is attached to the metal ion by several bonds, chelates tend to be more stable than complexes formed with monodentate ligands such as water.

Dental agent:

Biologically active substance intended for use in diagnosis, treatment, or prevention of oral disease or other oral abnormalities.

Dental caries inhibitor:

Any substance or agent which suppresses or prevents the development of dental cavities or caries.

Drug/agent:

Biologically active substance, including those intended for use in diagnosis, treatment, or prevention of disease or other abnormalities, for the relief of suffering, or control or improvement of a physical or mental state; includes biological products.

Chelation Therapy:

Chelation is a chemical process that has applications in many areas, including medical treatment, environmental site rehabilitation, water purification, and so forth. In the medical environment, Chelation is used to treat cardiovascular disease, heavy metal toxicity, and to remove metals that accumulate in body tissues because of genetic disorders (hemochromatosis).

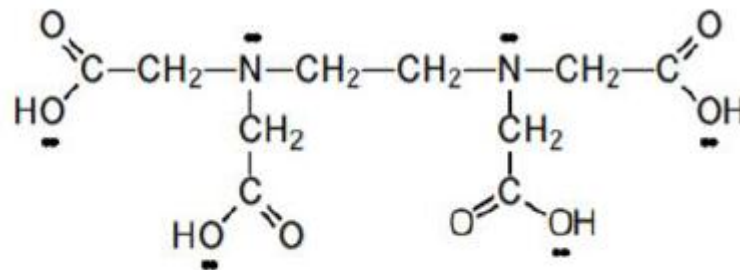
This protocol will address the use of Chelation therapy for the removal of heavy metals as a result of ingested or environmental exposure.

Chelation therapy, simply defined, is the process by which a molecule encircles and binds (attaches) to the metal and removes it from tissue. Depending on the drug used, chelating agents specific to the heavy metal involved are given orally, intramuscularly, or intravenously. Once the bound metal leaves the tissue, it enters the bloodstream, is filtered from the blood in the kidneys, and then is eliminated in the urine. The decision to chelate should be made only by professionals with experience using chelation therapy, preferably in consultation with a poison control center or a medical toxicologist.

The chelants are ligands that bind to metals present in the blood and tissues. They form complexes called chelates that are chemically inert and can be easily be excreted without interacting any further with the body. In this way, chelation therapy detoxifies poisonous metals such as arsenic, lead or mercury. Depending on the agent used and the type of metal intoxication, chelating agents may be taken orally or injected into a vein or muscle.

How does Chelation work to improve health?

Chelation Therapy, along with nutrition, promotes health by correcting the major underlying cause of arterial blockage and heart disease. Damaging oxygen free radicals are increased in the presence of such metals as iron, lead, and aluminum, and are believed to act as a chronic irritant to blood vessel walls and cell membranes. (EDTA) Chelation Therapy and other agents remove the heavy metals, thus decreasing the oxidant burden on the body and increasing its antioxidant reserves.



ethylenediaminetetraacetic acid (EDTA)

Other risk factors for heart disease including high homocysteine and insulin levels are also addressed. This combined approach utilizing nutrition and Chelation Therapy has helped many people rid themselves of angina pains and prevent further arterial blockages.

The following table summarizes chelating agents, the heavy metals they are used to treat, their route of administration, and their brand name.

Chelating Agent	Toxin	Drug
Dimercaprol (BAL)	Arsenic	Dimercaptol
	Lead	Injection
	Mercury	B.P.
	(inorganic)	BAL in Oil

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Dimercaptosuccinic acid (DMSA) (Succimer)	Arsenic Lead Mercury	Chemet
Dimer capto propane sulfonate (DMPS)	Arsenic	Bulk form for compounding by pharmacists
D-pencil amine	Arsenic Mercury Lead	Metalcaptase Pencil amine Cuprimine Deepen
Ethylene diamine tetra- acetic acid (EDTA) (Edetate disodium)	Lead	Cheal amide Versenate

Chelation can be accomplished with nutrients that protect our bodies from heavy metals.

- 1) Magnesium protects us from aluminum
- 2) Amino acids, calcium, iodine, selenium, vitamin C, and zinc protect us from arsenic.
- 3) Amino acids, calcium, vitamin C and zinc protect us from cadmium.
- 4) Amino acids, calcium, iron, Vitamin C, vitamin e, and zinc protect us from lead.
- 5) Amino acids, pectin selenium, and vitamin C protect us from mercury.
- 6) Vitamin C, molybdenum and sulfur-containing amino acids(cysteine and tyrosine) chelate copper.