DERIVATION OF MEDICAL TERMINOLOGY: SUFFIXES AND PREFIXES

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Abstract: *Medical terminology often prefixes and suffixes in Latin and Ancient Greek. The formation of these terms implies a good knowledge not only of their etymology but also of some cultural landmarks because the references can be some of the most varied: from history, to mythology, biology, aesthetic values. Those who study the formation of medical terms undertake a work of linguistic archeology that offers the satisfaction of understanding some of the most varied areas of knowledge.*

Key words: prefixes, suffixes, derivation, compounding, eponymy

Main types of word-formation:

One of the most productive type of terms formation is derivation by adding affixes (morphemes):

endocardium = endo- (prefix) + card(ium) (root)
pericarditis = peri- (prefix) + card (root) + -itis (suffix)
cytology = cyt(o) (root) + -logy (suffix)
parathyroiditis = para (prefix) + thyroid (root) + -itis(suffix)
sarcoma = sarx (root) + oma (suffix)

Usually, the vowel o is added to the root in order to soothe the sound of the word:

hepatogastric (hepat/o/gastric)
gastromegaly (gastr/o/megaly)
myodynia (my/o/dynia)

Another productive type of word-formation is compounding: blood donor, hay fever, Black Death.

Compound words may be written:
1. as two or three words: acute coronary syndrome, myocardial infarction, blood group, central nervous system;
2. with a hyphen: life-span, collar-bone, birth-control;
3. as one word: thrombocytopenia, haemophilia, leucocytopenia, pseudopolycytemia.

Another way of building new terms is the syntactic way. Some examples are: Attention deficit disorder, African sleeping sickness, Severe Acute Respiratory Syndrome, Irritable Bowel Syndrome, Congenital heart disease, Limb girdle syndrome, Alopecia contractures dwarfism.

Abbreviation is a shortened form of a word or phrase. A letter or a group of letters from a word or phrase: graphic one (g – gram, dl- decilitre); both a graphic and phonetic one (E.R.) for emergency room; an acronymic one (CPR, CT scan)

Eponyms usually use names of:

A person: Lou Gehrig disease (the name of a baseball player), Hartnup disease (the name of a family who had it), Graves' disease (the name of the Irish physician Robert Graves), Mirels' score (after Hilton Mirels),

A place (toponymic): Ebola virus (the name of an African river), Bornholm disease (the name of a Danish island), Stockholm syndrome, Glasgow Coma Scale,

An object: pilar fracture (fracture of the tibia), greenstick fracture (a type of fracture which occurs in children), bumper fracture.

They are used to create names of:

- diseases/ conditions/ signs: Alice in Wonderland syndrome, Pott' disease, Apgar score
- medical devices/ treatments/ procedures/ tests: Penrose drain, Heimlich manoeuvre, Hartmann's operation
- anatomical parts: Eustachian tube, Fallopian tube, Bundle of His
- used in different branches of medicine: Alzheimer's disease (neurology), Crohn's disease (gastroenterology), Addison's disease (endocrine insufficiency).

Marginal types of formation of terms:
Conversion is when words transfer from one category to another:
test —> to test,
blind —>to blind,
cough —>to cough

Back-formation (back-derivation or de-affixation) is the process of creating a new word, by removing actual or supposed affixes:
addict from addicted (root: addicere Lat.)
adduct from adduction
to euthanase or euthanize comes from the noun euthanasia.

Clipping leads to formation of shortened words from longer ones.
Back clipping is the most common type, in which the beginning is retained:
exam(ination), (polio)myelitis, lab(oratory), doc(tor),
In middle clipping, the middle of the word is retained:
flu (influenza)

Patterns of using suffixes and prefixes

ROOT+SUFFIX

Medical Term	Root	Suffix
cholecystitis	cholecyst	-itis

PREFIX+ROOT

Medical Term	Prefix	Root
polyuria	poly-	uria

PREFIX+ROOT+SUFFIX

Medical Term	Prefix	Root	Suffix
myocarditis	myo-	card	-itis

TWO OR MORE ROOTS

Medical Term	Root	Root	Root
agoraphobia	agora	phobia	
sternocleidomastoid	stern	cleid (clavicle)	mastoid

Suffixes:

There are four categories of suffixes:

- nominal suffixes: amniocentesis (-centesis), leukocyte (-cyte), cardiology (-logy), physician (-ian), oncologist (-ist),
- verbal suffixes: to complicate (-ate), to harden (-en), to clarify (-ify), to realise (-ise),
- adjectival suffixes: cardiac (ac), drinkable (able), retinal (-al), osseous (-ous), pelvic (-ic), urinary (ary), patellar (-ar),
- adverbial suffixes: easily (-ly), backwards (-wards), lengthwise (-wise).

It is important to note that suffixes could either be:

in need of the combining-vowel (usually –o) form if the suffix begins with a consonant (cystoscopic, cystolith)

not in need of the combining-vowel form , as they already have a vowel in the root (gastroenteritis, macrostomia).

Barbara Janson Cohen points out that suffixes can change roots into nouns.

Therefore, we can have the following two categories:

- functional (semantic) prefixes-referring to diseases: enterocolitis (-itis), tuberculosis (-osis), lithiasis (-iasis), anorexia (-ia)
- those referring to medical specialties or specialists: psychiatry (-iatry), geriatrics (-iatrics)

Adjective suffixes

-	ac	amnesiac	pertaining to the amnesia
-	al	abdominal	pertaining to the abdomen
-	ar	muscular	pertaining to a muscle
-	ary	ciliary	pertaining to cilia
-	form	muciform	resembling mucus
-	ic	pelvic	pertaining to pelvis
-	ical (ic + al)	cranial	pertaining to cranium
-	ile	febrile	pertaining to fever
-	oid	toxoid	resembling poison
-	ory	perspiratory	pertaining to perspiration
-	ous	poisonous	pertaining to a poison

Suffixes pertaining to diseases

- algia; -dynia pain
- itis inflammation
- lysis separation; destruction
- pathy disease
- oma tumour
- rhea discharge; flow
- rhexis rupture
- schisis splitting

Some examples are scapulodynia; cardialgia, myositis, cytolysis, enteropathy, carcinoma, otorrhea, cardiorrhexis, cheiloschisis

Chemical suffixes

-ase, asis , slime a colloid enzyme

- amylase, a starch splitting enzyme, amylon-starch
- lipase, a fat splitting enzyme, lipos-fat

-ate , a salt base

- phosphate, a salt of phosphoric acid
- sulphate, a salt of sulphuric acid

-ide , a name for a binary compound with a non-metallic element

- chloride, a compound of chlorine with another element
- sulphide, a compound of sulphur with a base

-in , a termination noting a glucoside

- fibrin, fibra-fiber
- gelatin, gelatum-congealed
- protein, protos-first

-ine , an ending used in the names of alkaloids

- heroine, alkaloidal ester of morphine
- morphine, alkaloid of opium

-ite , a suffix for a salt of an acid ending in -ous

- phosphite, a salt of phosphorous acid
- sulphite, a salt of sulphurous acid

Prefixes

Prefixes are placed before the root to create new words

They are usually adverbs or prepositions derived from Greek or Latin

They must be read contextually so as to achieve the correct meaning:

- anteversion (tilting forward) vs antepartum (before birth) vs antecubital (in front of the elbow)
- epidermis (outer layer of skin) vs epigastric (above the stomach)
- myelocyte (bone marrow cell) vs myelopathy (disease of the spinal cord) vs myelogram (contrast material introduced into the spinal canal)
- orthodontics (teeth straightening) vs orthopnea (upright breathing)
- oxytocin (from Greek oxus=sharp, acute) vs oxygenated (enriched with oxygen)
- parathyroid (around the thyroid) vs parapraxis (against practice)
- posttraumatic (after a trauma) vs postcardial (behind the heart)
- preoperative (before operation) vs preaxial (in front of axis of the body)
- radiopaque (opaque to radiation) vs radial (pertaining to the radius)
- reflux (backward flow) vs regenerate (start again)
- zoospore (living asexual spores produced by fungi) vs zooparasite (parasite of an animal)

Sometimes there are both Latin and Greek prefixes meaning the same but used in different words:

- coelom (Gk. coelo-=hollow cavity vs vacuole (Lat. vacuo-=hollow)
- cryogeny (Gk. cryo-=cold) vs frigid (Lat. grigi-cold)
- cryptorchidism (Gk. crypto-=hidden) vs calyptosuchus (Lat. calypto-=hidden)
- idiosyncrasy (Gk. idio-=private, distinct) vs suicidical (Lat. sui-=own)
- isotonic (Gk. iso-=equal) vs equidistant (Lat. equi-=equal)
- glycerol (Gk. glyco-=sweet) vs dulcified (Lat. dulci-=sweet)
- gyroma=large, convoluted mass in the ovary (Gk. gyro-=around) vs circumcision (Lat. circum-=around)
- leptocephaly (Gk. Lepto-=thin, small) vs tenualosa=type of fish (Lat. tenu/i-=thin)
- mesoderm (Gk. meso-=middle) vs medionidus=genus of freshwater mussels (Lat. medio-=middle)
- oligospermia (Gk. oligo-=few) vs paucisynaptic (Lat. pauci-=few)
- parovivurus (Lat. parvo-=little) vs microorganism (Gk. Micro-=small)
- pachydactyly (Gk. pachy-=thick) vs crassicaulis stem (Lat. crassi-=thick)
- picrotoxins (Gk. picro-=bitter) vs amaricoccus (Lat. amari-=bitter)
- stenosis (Gk. steno-=narrow) vs Echinacea Angustifolia (Lat. angusti-=narrow)
- levocardia (Lat. levo-=left) vs sinistrocardia (Lat. sinistro-=left)
- eupnea (Gk. Eu-=good) vs kalon (Gk. Kalo-=good, beautiful)
- heterosexual (Gk. hetero-=different) vs allograft (Gk. allo-=different)

Hyphenated prefixes:

- hyphenated prefix attached to a noun:
  anti-inflammatory, non-smoker, pre-eclampsia
- hyphenated prefix attached to an abbreviation:
  anti-DNA, anti-HBc,
- hyphenated prefix attached to an adjective or a participle:
  self-limited, pre-medicated, anti-static,
- hyphenated prefix followed by a proper noun:
  non-Hodgkin, anti-Alzheimer.

Prefixes pertaining to numbers

Some examples include monosaccharide hexahydrate, hemicardia, heptapeptide, diplobacterium octophobia, triacid, nonigravida, quadriceps, decilitre, pentamethylene.

Greek and Latin prefixes pertaining to colours

GREEK AND LATIN PREFIXES	Meaning
COCCINO-, ERYTHTO-, RHODO-, EO-; purpureo-rubri-, rufi-, rutuli-, rossi-, roseo-, flammeo-	shades of red
CHRYSO-, CIRRHO-; aureo-, flavo-, fulvi-	orange
XANTHO-, OCHREO-; fusci-, luteo-	yellow
CHLORO-; prasini-, viridi-	green
CYANO-, IODO-; ceruleo-, violaceo-	blue
PORPHYRO-; puniceo-, purpureo-	violet
LEUKO-; albo-, argenti-	white
POLIO-, GLAUCO-, AMAURO-; cani-, cinereo-, atri-	grey
MELANO-; nigri-	black

Prefixes or suffixes pertaining to direction

- dextr/o- right dextrogastria
- diplo- double diplophase
- sinistr/o- left sinistromanual
- ec-, ecto- out ectopic
- ex/o- away from excise
- end/o- within endoderm
- histo- tissue histolysis
- mes/o- middle mesencephalon
- neo- new neoplasia
- pan- all over pandemic
- phago- eat phagocytic
- philic attracting chromophile
- pro- before progestational
- tel/e-, tel/o- end telophase

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