Chapter 01

Scientific Vocabulary & Word Mechanics

CHAPTER 1: Scientific Vocabulary & Word Mechanics

1. Introduction

Scientific vocabulary is an essential tool for understanding biological and medical concepts. In biology, students frequently encounter complex scientific terms used to describe cells, tissues, organs, physiological processes, diseases, and laboratory techniques. Although these terms may initially appear difficult, many are constructed from smaller elements with specific meanings.

This chapter introduces the fundamental principles of scientific word formation, focusing on four important elements: prefixes, roots, combining forms, and suffixes. Understanding these elements enables students to analyze unfamiliar scientific words, identify their meanings, and develop a stronger scientific vocabulary.

A prefix is a word element placed at the beginning of a term to modify its meaning. A root carries the central meaning of the word, often referring to an organ, tissue, cell, or biological process. A combining form consists of a root and a combining vowel, usually o, which facilitates pronunciation and connects word elements. A suffix is placed at the end of a term and often indicates a condition, disease, procedure, or scientific discipline.

For example, the term hypothermia can be analyzed into three elements: hypo- (below normal), therm (heat), and -ia (condition). Together, these elements describe an abnormally low body temperature.

Similarly, cardiology combines cardi/o (heart) and -logy (study of), meaning the study of the heart.

By learning how scientific terms are constructed, students can improve their ability to interpret biological terminology, understand scientific texts, and communicate more accurately in academic and professional settings.

Category	What it does	Examples
Prefix	**Adds meaning at the beginning**	**a- = without/not; hyper- = excessive; micro- = small**
Root	**Carries the central meaning**	**cyt = cell; therm = heat; morph = form**
Combining form	**Root plus a combining vowel, often o**	**cyt/o, bi/o, morph/o, cardi/o**
Suffix	**Adds meaning at the end**	**-itis = inflammation; -logy = study; -osis = condition or process**

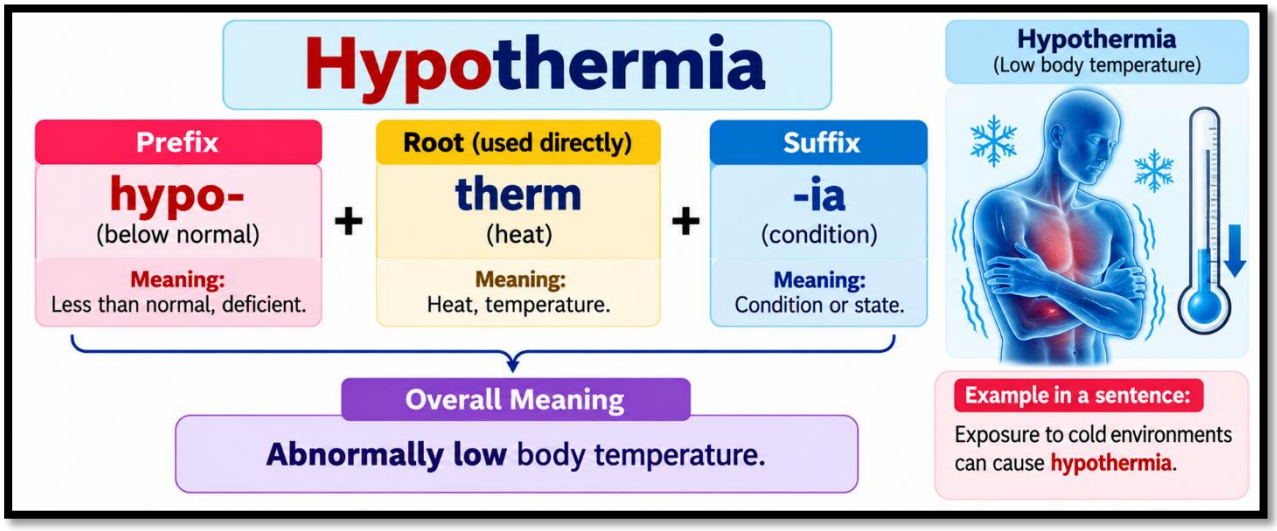


Figure 1 – General structure of a scientific word

1.1. Prefixes

A prefix is a meaningful word element placed at the beginning of a biological or scientific word to modify, clarify, or specify its meaning. Prefixes are important components of scientific terminology because they provide additional information about the quantity, size, position, time, speed, intensity, or condition associated with a biological structure or process. A prefix is generally combined with a root, which carries the central meaning of the word, and may be followed by a suffix that indicates a condition, disease, process, or scientific discipline.

By recognizing prefixes, students can understand the meaning of unfamiliar biological terms without memorizing every word individually. For example, the prefix hyper- means excessive or above normal, while hypo- means below normal or deficient. Therefore, hyperthermia refers to an abnormally high body temperature, whereas hypothermia refers to an abnormally low body temperature. Similarly, the prefix poly- means many or multiple, as in polyneuropathy, a disorder affecting multiple nerves, while micro- means small, as in microbiology, the study of microscopic organisms and their biological activities. Other prefixes describe location or position: endo- means within or inside, as in endocytosis, the process by which a cell takes substances into itself, and peri- means around, as in pericardium, the membrane surrounding the heart.

Prefixes can also describe speed, such as brady- meaning slow in bradycardia, and tachy- meaning fast in tachycardia. Understanding these elements helps biology students interpret scientific vocabulary more accurately, recognize relationships between terms, and improve their comprehension of biological processes, anatomical structures, physiological functions, and medical conditions.

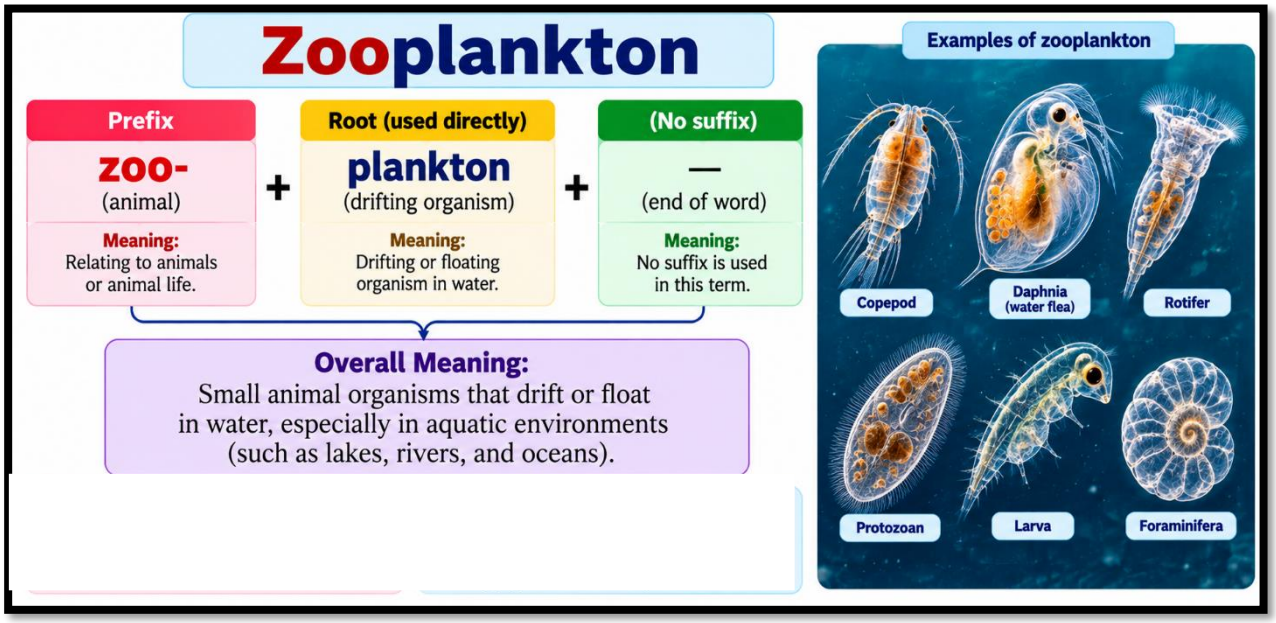


Figure 2 – Exemple of prefix in structure of a scientific word

1.1.1. Negation, absence, and opposition

Prefix	English meaning	Greek / Latin origin	Example	French	Arabic
a- / an-	Without; not	Greek a-, an-	Abiotic	Abiotique	لا حيوي
anti-	Against	Greek anti	Antibiotic	Antibiotique	مضاد حيوي
de-	Removal; reversal	Latin de	Decompose	Décomposer	يحلّل
dis-	Apart; reversal	Latin dis	Disinfection	Désinfection	تطهير
in- / im-	Not; without	Latin in-	Inactive	Inactif	غير نشط
non-	Not; absence of	Latin non	Nonliving	Non vivant	غير حي
contra-	Against	Latin contra	Contraception	Contraception	منع الحمل

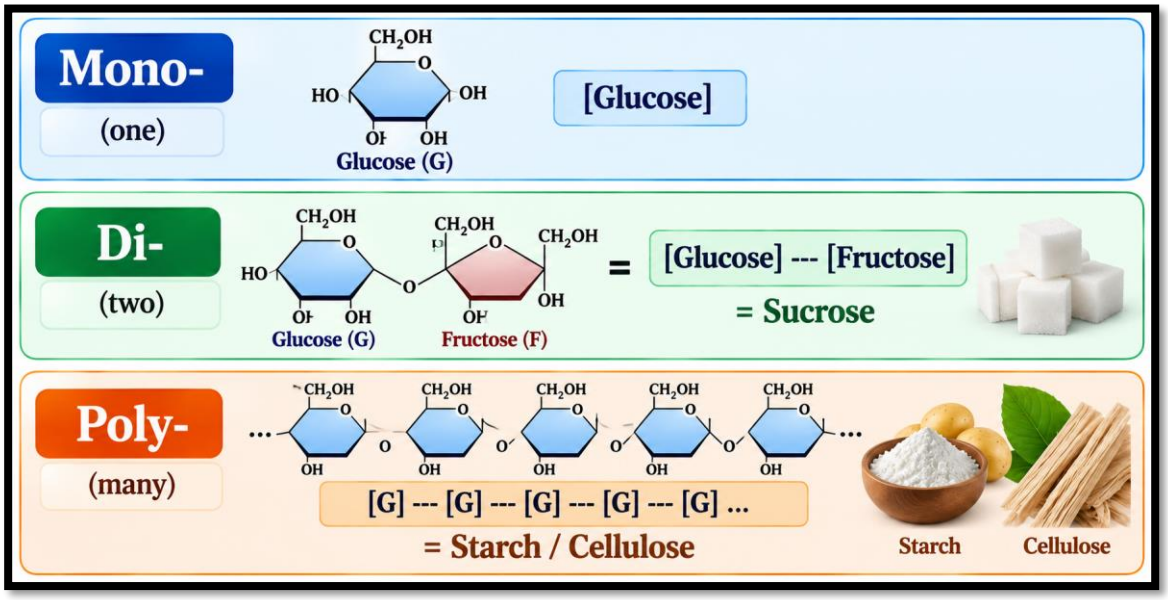


Figure 3 – Mono-, di-, and poly-saccharides

1.1.2. Number and quantity

Prefix	English meaning	Greek / Latin origin	Example	French	Arabic
mono-	One	Greek monos	Monocyte	Monocyte	خلية وحيدة النواة
uni-	One	Latin unus	Unicellular	Unicellulaire	وحيد الخلية
bi-	Two	Latin bi-	Bilateral	Bilatéral	ثنائي الجانب
di-	Two; double	Greek di-	Diploid	Diploïde	ثنائي الصيغة الصبغية
tri-	Three	Greek/Latin tri-	Trisomy	Trisomie	تثلث الصبغي
tetra-	Four	Greek tetra	Tetraploid	Tétraploïde	رباعي الصيغة الصبغية
poly-	Many	Greek polys	Polysaccharide	Polysaccharide	عديد السكاريد
oligo-	Few; little	Greek oligos	Oligosaccharide	Oligosaccharide	قليل السكاريد
multi-	Many	Latin multus	Multicellular	Pluricellulaire	متعدد الخلايا
hemi-	Half	Greek hēmi	Hemiplegia	Hémiplégie	شلل نصفي

semi-	Half; partly	Latin semi	Semipermeable	Semi-perméable	شبه منفذ

1.1.3. Size and degree

Prefix	English meaning	Greek / Latin origin	Example	French	Arabic
micro-	Small	Greek mikros	Microorganism	Micro-organisme	كائن مجهري
macro-	Large	Greek makros	Macromolecule	Macromolécule	جزيء ضخم
mega-	Very large	Greek megas	Megaspore	Mégaspore	بوغة كبيرة
nano-	Extremely small	Greek nanos	Nanobiology	Nanobiologie	علم الأحياء النانوي
hyper-	Excessive; above normal	Greek hyper	Hyperglycemia	Hyperglycémie	فرط سكر الدم
hypo-	Below normal; deficient	Greek hypo	Hypoglycemia	Hypoglycémie	نقص سكر الدم
ultra-	Beyond; extreme	Latin ultra	Ultraviolet	Ultraviolet	فوق بنفسجي
sub-	Under; below	Latin sub	Subcutaneous	Sous-cutané	تحت الجلد
super-	Above; excessive	Latin super	Superinfection	Surinfection	عدوى إضافية



Figure 4 – Micro- vs Macro-

1.1.4. Position, location, and direction

Prefix	English meaning	Greek / Latin origin	Example	French	Arabic
endo-	Inside; within	Greek endon	Endoskeleton	Endosquelette	هيكل داخلي
exo-	Outside	Greek exo	Exoskeleton	Exosquelette	هيكل خارجي
epi-	Upon; on; above	Greek epi	Epidermis	Épiderme	البشرة
peri-	Around	Greek peri	Pericardium	Péricarde	التامور
intra-	Within	Latin intra	Intracellular	Intracellulaire	داخل الخلية
inter-	Between	Latin inter	Intercellular	Intercellulaire	بين الخلايا
extra-	Outside; beyond	Latin extra	Extracellular	Extracellulaire	خارج الخلية
trans-	Across; through	Latin trans	Transmembrane	Transmembranaire	عابر للغشاء
para-	Beside; near; abnormal	Greek para	Parathyroid	Parathyroïde	جار الدرقية
ecto-	Outside; external	Greek ektos	Ectoparasite	Ectoparasite	طفيلي خارجي
meso-	Middle	Greek mesos	Mesoderm	Mésoderme	الأديم المتوسط
ab-	Away from	Latin ab	Abduction	Abduction	إبعاد

1.1.5. Time, development and evolutionary relationships

Prefix	English meaning	Greek / Latin origin	Example	French	Arabic

pre-	Before	Latin prae	Prenatal	Prénatal	قبل الولادة
post-	After	Latin post	Postnatal	Postnatal	بعد الولادة
pro-	Before; in front of	Greek/Latin pro	Prophase	Prophase	الطور التمهيدي
neo-	New	Greek neos	Neoplasm	Néoplasme	ورم مستحدث
re-	Again; back	Latin re	Regeneration	Régénération	تجدد
meta-	Change; after; beyond	Greek meta	Metamorphosis	Métamorphose	تحوّل
ana-	Up; back; again	Greek ana	Anabolism	Anabolisme	البناء الحيوي
cata-	Down; breakdown	Greek kata	Catabolism	Catabolisme	الهدم الحيوي

1.1.6. Prefixes related to color

Prefix	English meaning	Greek / Latin origin	Example	French meaning	المعنى بالعربية
chloro-	Green	Greek chlōros	Chloroplast	Chloroplaste	بلاستيدة خضراء
cyano-	Blue	Greek kyanos	Cyanobacteria	Cyanobactéries	بكتيريا زرقاء
erythro-	Red	Greek erythros	Erythrocyte	Érythrocyte	كرية دم حمراء
leuko- / leuco-	White	Greek leukos	Leukocyte	Leucocyte	كرية دم بيضاء

melano-	Black, dark	Greek melas	Melanocyte	Mélanocyte	خلية ميلانينية
xanth(o)-	Yellow	Greek xanthos	Xanthophyll	Xanthophylle	زانثوفيل ، صبغة صفراء

1.1.7 Shape, structure and form

Prefix	English meaning	Greek / Latin origin	Example	Definition of example	French	العربية
ortho-	Straight, correct	Greek orthos	Orthodontics	Correction of tooth alignment	Orthodontie	تقويم الأسنان
allo-	Other, different	Greek allos	Allosteric	Involving a regulatory site distinct from an active site	Allostérique	تفارغي
iso-	Equal, same	Greek isos	Isotonic	Having equal effective osmotic pressure	Isotonique	متساوي التوتر
hetero-	Different	Greek heteros	Heterozygous	Having different alleles at a gene locus	Hétérozygote	متغاير الزيجوت
homo-	Same	Greek homos	Homozygous	Having identical alleles at a gene locus	Homozygote	متماثل الزيجوت
eu-	Good, true, normal	Greek eu	Eukaryote	Organism whose cells have a nucleus	Eucaryote	حقيقي النواة

pseudo-	False, resembling	Greek pseudes	Pseudopod	Temporary cell projection used for movement or feeding	Pseudopode	قدم كاذبة
crypto-	Hidden	Greek kryptos	Cryptogam	Plant or plant-like organism reproducing without flowers or seeds	Cryptogame	نبات خفي التكاثر
diplo-	Double	Greek diploos	Diploid	Having two sets of chromosomes	Diploïde	ثنائي الصيغة الصبغية
haplo-	Single	Greek haploos	Haploid	Having one set of chromosomes	Haploïde	أحادي الصيغة الصبغية

1.1.8 More advanced scientific prefixes

Prefix	English meaning	Greek / Latin origin	Example	Definition of example	French	العربية
amphi-	Both, on both sides	Greek amphi	Amphibian	Vertebrate adapted to life in water and on land, often during different life stages	Amphibien	برمائي
auto-	Self	Greek autos	Autotroph	Organism that produces organic compounds	Autotrophe	ذاتي التغذية

				from inorganic sources		
hetero-	**Different, other**	**Greek heteros**	**Heterotroph**	**Organism obtaining organic nutrients from other organisms or their products**	**Hétérotrophe**	**غير ذاتي التغذية**
zoo-	**Animal**	**Greek zōion**	**Zooplankton**	**Plankton consisting of animals or animal-like organisms**	**Zooplancton**	**العوالق الحيوانية**
myco-	**Fungus**	**Greek mykēs**	**Mycology**	**Study of fungi**	**Mycologie**	**علم الفطريات**
phyto-	**Plant**	**Greek phyton**	**Phytoplankton**	**Plankton consisting of photosynthetic organisms**	**Phytoplancton**	**العوالق النباتية**
ornitho-	**Bird**	**Greek ornis**	**Ornithology**	**Study of birds**	**Ornithologie**	**علم الطيور**
ichthyo-	**Fish**	**Greek ichthys**	**Ichthyology**	**Study of fish**	**Ichtyologie**	**علم الأسماك**
helio-	**Sun**	**Greek hēlios**	**Heliotropism**	**Growth or movement in response to the direction of sunlight**	**Héliotropisme**	**الانتحاء الشمسي**

magneto-	**Magnetism**	**Greek-derived scientific form**	**Magnetoreception**	**Ability to detect magnetic fields**	**Magnétoréception**	**الاستقبال المغناطيسي**

1.2. Biological Roots

A root is the fundamental part of a biological or scientific word that carries its central meaning. It usually refers to a body part, organ, tissue, cell, substance, organism, or biological process. The root provides the essential information needed to understand what a scientific term describes. Other word elements, such as prefixes and suffixes, can be added to the root to modify or specify its meaning. A prefix appears at the beginning of a word and may indicate quantity, position, size, or degree, whereas a suffix appears at the end and often indicates a disease, condition, procedure, or scientific discipline. For example, in the term hepatitis, the root hepat means “liver,” and the suffix -itis means “inflammation”; therefore, hepatitis means inflammation of the liver.

Similarly, in gastritis, the root gastr means “stomach,” while -itis indicates inflammation, giving the meaning “inflammation of the stomach.” In the term biology, the root bio means “life,” and -logy means “study of,” so biology is the study of life. Roots may appear alone or as part of a combining form, which consists of a root plus a combining vowel, usually o.

For example, cardi is the root meaning “heart,” while cardi/o is its combining form, as used in cardiology, the study of the heart. Understanding roots helps students identify the common meanings shared by related scientific terms, interpret unfamiliar biological vocabulary, and understand the terminology used in anatomy, physiology, zoology, microbiology, and other life sciences.

Figure 5 below illustrates some human body systems associated with these roots.

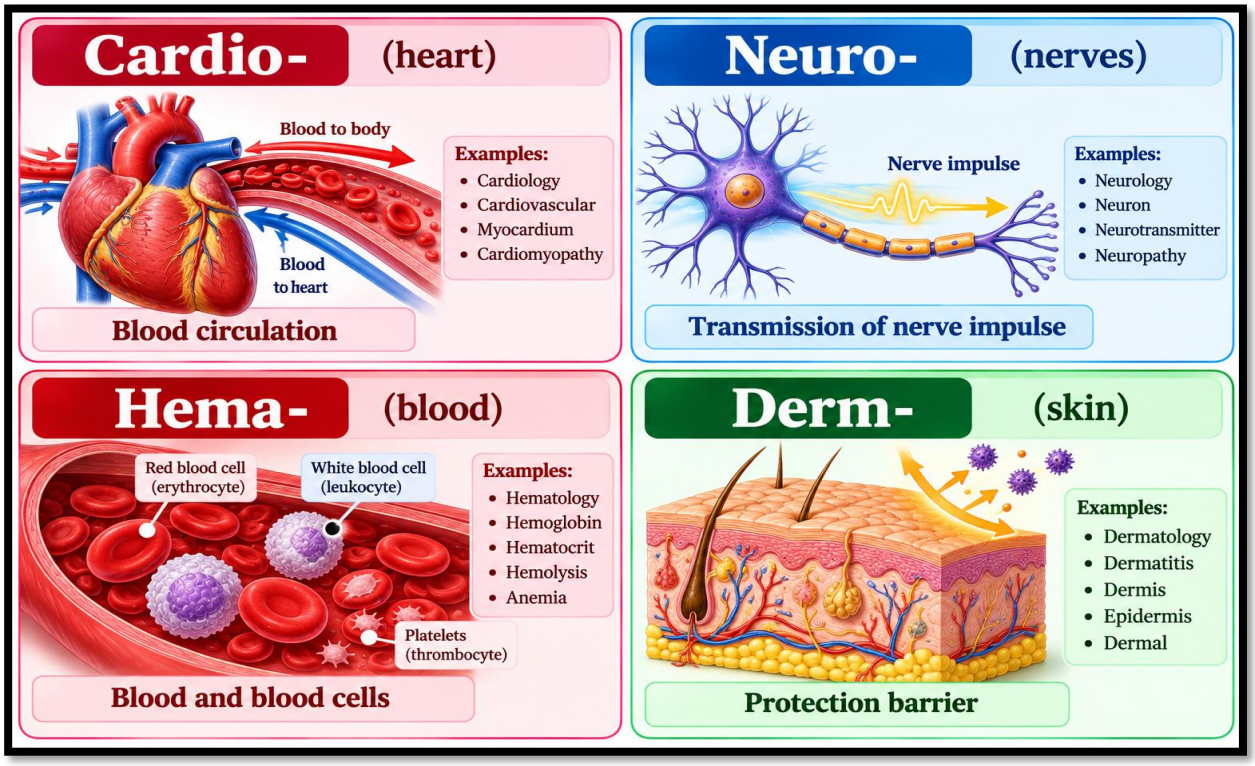


Figure 5 – Human body systems and roots

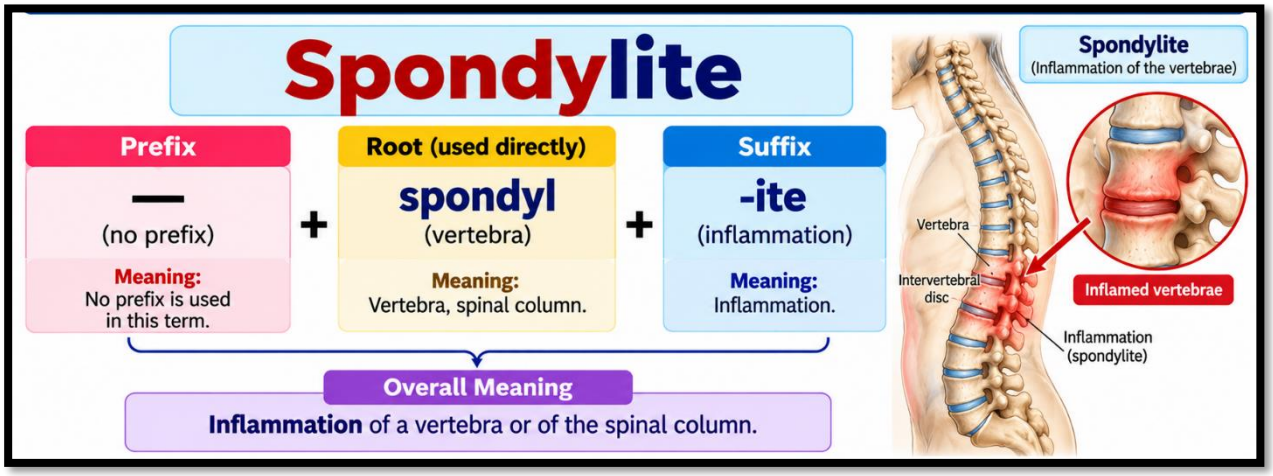


Figure 6 – Exemple Human body systems and roots

1.2. 1. General biological roots

Root	English meaning	Greek / Latin origin	Example	French	Arabic
therm	Heat	Greek thermē	Thermometer	Thermomètre	مقياس الحرارة
gen	Origin; production	Greek genos	Genetics	Génétique	علم الوراثة
my	Muscle	Greek mys	Myocyte	Myocyte	خلية عضلية
hist	Tissue	Greek histos	Histology	Histologie	علم الأنسجة

kary	**Nucleus**	**Greek karyon**	**Karyotype**	**Caryotype**	**النمط النووي**
chrom	**Color**	**Greek chroma**	**Chromosome**	**Chromosome**	**صبغي**
nucle	**Nucleus**	**Latin nucleus**	**Nucleolus**	**Nucléole**	**النُّوَيّة**
blast	**Bud; immature cell**	**Greek blastos**	**Osteoblast**	**Ostéoblaste**	**خلية بانية للعظم**
phag	**Eat; engulf**	**Greek phagein**	**Phagocyte**	**Phagocyte**	**خلية بلعمية**
mit	**Thread**	**Greek mitos**	**Mitosis**	**Mitose**	**الانقسام المتساوي**
mei	**Reduction**	**Greek meiōsis**	**Meiosis**	**Méiose**	**الانقسام المنصف**
phen	**Appearance**	**Greek phainein**	**Phenotype**	**Phénotype**	**النمط الظاهري**
clon	**Shoot; twig**	**Greek klōn**	**Clone**	**Clone**	**مستنسخة**
bio	**Life**	**Greek bios**	**Biology**	**Biologie**	**علم الأحياء**
cyt	**Cell**	**Greek kytos**	**Cytology**	**Cytologie**	**علم الخلايا**
plasm	**Formed substance; material**	**Greek plasma**	**Cytoplasm**	**Cytoplasme**	**سيتوبلازم**
phot	**Light**	**Greek phōs, phōt-**	**Photoreceptor**	**Photorécepteur**	**مستقبل ضوئي**
derm	**Skin**	**Greek derma**	**Dermatitis**	**Dermatite**	**التهاب الجلد**
lip	**Fat**	**Greek lipos**	**Lipid**	**Lipide**	**دهن**
neur	**Nerve**	**Greek neuron**	**Neuron**	**Neurone**	**عصبون**
cardi	**Heart**	**Greek kardia**	**Cardiology**	**Cardiologie**	**طب القلب**

oste	Bone	Greek osteon	Osteocyte	Ostéocyte	خلية عظمية
hem / hemat	Blood	Greek haima	Hematology	Hématologie	علم الدم
glyc	Sweet; sugar	Greek glykys	Glycogen	Glycogène	غليكوجين
morph	Form; shape	Greek morphē	Morphology	Morphologie	علم الشكل

1.2.2 Anatomy and body systems

Root	English meaning	Greek / Latin origin	Example	French	Arabic
hepat	Liver	Greek hēpar	Hepatitis	Hépatite	التهاب الكبد
gastr	Stomach	Greek gastēr	Gastritis	Gastrite	التهاب المعدة
enter	Intestine	Greek enteron	Enteritis	Entérite	التهاب الأمعاء
nephr	Kidney	Greek nephros	Nephrology	Néphrologie	علم الكلى
ren	Kidney	Latin ren	Renal	Rénal	كلوي
pneum	Lung; air	Greek pneumōn	Pneumonia	Pneumonie	التهاب رئوي
pulmon	Lung	Latin pulmo	Pulmonary	Pulmonaire	رئوي
angi	Vessel	Greek angeion	Angiography	Angiographie	تصوير الأوعية
arteri	Artery	Greek-derived	Arteriole	Artériole	شُرَيْن
phleb	Vein	Greek phleps	Phlebitis	Phlébite	التهاب الوريد
splen	Spleen	Greek splēn	Splenomegaly	Splénomégalie	تضخم الطحال

pancreat	**Pancreas**	**Greek-derived**	**Pancreatitis**	**Pancréatite**	**التهاب البنكرياس**
cyst	**Bladder; sac**	**Greek kystis**	**Cystitis**	**Cystite**	**التهاب المثانة**
hyster	**Uterus**	**Greek hystera**	**Hysterectomy**	**Hystérectomie**	**استئصال الرحم**
oophor	**Ovary**	**Greek ōophoron**	**Oophorectomy**	**Ovariectomie**	**استئصال المبيض**
orch	**Testis**	**Greek orchis**	**Orchitis**	**Orchite**	**التهاب الخصية**
mast	**Breast**	**Greek mastos**	**Mastitis**	**Mastite**	**التهاب الثدي**
ophthalm	**Eye**	**Greek ophthalmos**	**Ophthalmology**	**Ophtalmologie**	**طب العيون**
ot	**Ear**	**Greek ous, ōtos**	**Otology**	**Otologie**	**علم الأذن**
rhin	**Nose**	**Greek rhis, rhinos**	**Rhinitis**	**Rhinite**	**التهاب الأنف**
odont	**Tooth**	**Greek odous, odontos**	**Odontology**	**Odontologie**	**علم الأسنان**
arthr	**Joint**	**Greek arthron**	**Arthritis**	**Arthrite**	**التهاب المفاصل**
chondr	**Cartilage**	**Greek chondros**	**Chondrocyte**	**Chondrocyte**	**خلية غضروفية**
myel	**Bone marrow; spinal cord**	**Greek myelos**	**Myelocyte**	**Myélocyte**	**خلية نخاعية**
encephal	**Brain**	**Greek enkephalos**	**Encephalitis**	**Encéphalite**	**التهاب الدماغ**
cephal	**Head**	**Greek kephalē**	**Cephalopod**	**Céphalopode**	**رأسيات الأرجل**

pod	Foot	Greek pous, podos	Podiatry	Podologie	طب القدم
dactyl	Finger; toe	Greek daktylos	Polydactyly	Polydactylie	تعدد الأصابع
spondyl	Vertebra	Greek spondylos	Spondylitis	Spondylite	التهاب الفقرات
cost	Rib	Latin costa	Intercostal	Intercostal	بين الأضلاع

1.2.3. Chemistry and biochemistry

Root	English meaning	Greek / Latin origin	Example	French	Arabic
prote	Protein	Greek-derived	Proteomics	Protéomique	علم البروتيوم
pept	Digestible; peptide	Greek peptos	Peptide	Peptide	ببتيد
hydr	Water	Greek hydōr	Hydrolysis	Hydrolyse	التحلل المائي
oxid	Oxidation	Modern scientific formation	Oxidation	Oxydation	أكسدة
acid	Acid; sour	Latin acidus	Acidic	Acide	حمضي
lact	Milk	Latin lac, lactis	Lactose	Lactose	اللاكتوز
carb	Carbon; coal	Latin carbo	Carbohydrate	Glucide	كربوهيدرات
phosph	Phosphorus; phosphate	Greek-derived	Phosphate	Phosphate	فوسفات
nitr	Nitrogen-related	Scientific formation	Nitrate	Nitrate	نترات

calc	Lime; calcium	Latin calx	Calcification	Calcification	التكلس
adip	Fat	Latin adeps	Adipose	Adipeux	دهني
steat	Fat	Greek steatos	Steatosis	Stéatose	التشحم
enzym	Enzyme	Greek-derived	Enzyme	Enzyme	إنزيم
osm	Push; impulse	Greek ōsmos	Osmosis	Osmose	التناضح
electr	Electricity	Greek ēlektron	Electrolyte	Électrolyte	إلكتروليت
ferment	Ferment	Latin fermentum	Fermentation	Fermentation	التخمر
therm	Heat	Greek thermē	Thermogenesis	Thermogenèse	توليد الحرارة
gluc	Glucose; sweetness	Greek-derived	Glucose	Glucose	غلوكوز
sacchar	Sugar	Greek sakkharon	Saccharide	Saccharide	سكر
ole	Oil	Latin oleum	Oleic acid	Acide oléique	حمض الأوليبك

1.2.4 — Plants, animals and ecology

Root	English meaning	Greek / Latin origin	Example	French	Arabic
botan	Plant	Greek botanē	Botany	Botanique	علم النبات
phyt	Plant	Greek phyton	Phytoplankton	Phytoplancton	العوالق النباتية
flor	Flower	Latin flos, floris	Floral	Floral	زهري
anth	Flower	Greek anthos	Anthesis	Anthèse	تفتح الزهرة

carp	Fruit	Greek karpos	Carpology	Carpologie	علم الثمار
dendr	Tree	Greek dendron	Dendrology	Dendrologie	علم الأشجار
rhiz	Root	Greek rhiza	Rhizome	Rhizome	جذمور
xyl	Wood	Greek xylon	Xylem	Xylème	خشب
phlo	Bark	Greek phloios	Phloem	Phloème	لحاء
phyll	Leaf	Greek phyllon	Chlorophyll	Chlorophylle	اليخضور
chlor	Green	Greek chlōros	Chloroplast	Chloroplaste	بلاستيدة خضراء
xanth	Yellow	Greek xanthos	Xanthophyll	Xanthophylle	زانثوفيل

1.2.5 — Microbiology, disease and immunity

Root	English meaning	Greek / Latin origin	Example	French	Arabic
bacteri	Bacterium	Greek baktērion	Bacteriology	Bactériologie	علم البكتيريا
vir	Poison; virus	Latin virus	Virology	Virologie	علم الفيروسات
immun	Protected; exempt	Latin immunis	Immunology	Immunologie	علم المناعة
path	Disease; suffering	Greek pathos	Pathology	Pathologie	علم الأمراض
carcin	Cancer	Greek karkinos	Carcinoma	Carcinome	سرطانة
onc	Tumor	Greek onkos	Oncology	Oncologie	علم الأورام
tox	Poison	Greek toxikon	Toxicology	Toxicologie	علم السموم

parasit	Parasite	Greek parasitos	Parasitology	Parasitologie	علم الطفيليات
seps	Infection; putrefaction	Greek sēpsis	Sepsis	Sepsis	إنتان
staphyl	Cluster of grapes	Greek staphylē	Staphylococcus	Staphylocoque	المكورات العنقودية
strept	Twisted; chain-like	Greek streptos	Streptococcus	Streptocoque	المكورات العقدية
bacill	Small rod	Latin bacillum	Bacillus	Bacille	عصية
cocc	Berry; spherical bacterium	Greek-derived	Coccus	Coque	مكورة
spir	Coil; spiral	Latin spira	Spirochete	Spirochète	لولبية
lymph	Clear fluid	Latin lympha	Lymphocyte	Lymphocyte	خلية لمفاوية
allerg	Altered reaction	Modern scientific term	Allergy	Allergie	حساسية
phag	Eat; engulf	Greek phagein	Phagocytosis	Phagocytose	البلعمة
myc	Fungus	Greek mykēs	Mycosis	Mycose	عدوى فطرية

1.2.6 — Biological processes and scientific concepts

Root	English meaning	Greek / Latin origin	Example	French	Arabic
spir	Breathe	Latin spirare	Respiration	Respiration	التنفس
kinesi	Movement	Greek kinēsis	Kinesiology	Kinésiologie	علم الحركة

taxis	**Ordered movement**	**Greek taxis**	**Chemotaxis**	**Chimiotaxie**	**الانجذاب الكيميائي**
dynam	**Force; power**	**Greek dynamis**	**Dynamics**	**Dynamique**	**الديناميكا**
chron	**Time**	**Greek chronos**	**Chronobiology**	**Chronobiologie**	**علم الأحياء الزمني**
aesthes	**Sensation**	**Greek aisthēsis**	**Anaesthesia**	**Anesthésie**	**تخدير**
metab	**Change**	**Greek metabolē**	**Metabolism**	**Métabolisme**	**الأيض**
anab	**Build up**	**Greek anabole**	**Anabolism**	**Anabolisme**	**البناء الأيضي**
catab	**Break down**	**Greek katabolē**	**Catabolism**	**Catabolisme**	**الهدم الأيضي**
home	**Same; stable**	**Greek homoios**	**Homeostasis**	**Homéostasie**	**الاستتباب**
phylog	**Lineage; evolutionary history**	**Greek phylon**	**Phylogeny**	**Phylogénie**	**علم السلالات**
tax	**Arrangement; classification**	**Greek taxis**	**Taxonomy**	**Taxonomie**	**علم التصنيف**
clad	**Branch**	**Greek klados**	**Cladogram**	**Cladogramme**	**مخطط التفرع**
palae	**Ancient**	**Greek palaios**	**Palaeontology**	**Paléontologie**	**علم الأحافير**
dem	**People; population**	**Greek dēmos**	**Demography**	**Démographie**	**علم السكان**
migr	**Move**	**Latin migrare**	**Migration**	**Migration**	**هجرة**
symbi	**Living together**	**Greek symbiosis**	**Symbiosis**	**Symbiose**	**تكافل**

pred	**Prey**	**Latin praeda**	**Predation**	**Prédation**	**افتراس**
compet	**Strive together**	**Latin competere**	**Competition**	**Compétition**	**تنافس**

1.3. Combining form

A combining form is a word element in biological and scientific terminology consisting of a root and a combining vowel, usually the letter o. It carries the central meaning of a scientific term and helps connect the root to a suffix or another word element, making the term easier to pronounce and understand. The root usually refers to a biological structure, such as an organ, tissue, cell, or organism, while the combining vowel serves as a link between word elements and generally does not have an independent meaning.

Combining forms are widely used in biology, anatomy, physiology, zoology, microbiology, and medical terminology to construct scientific words systematically. For example, the root cardi means "heart," and its combining form cardi/o consists of the root cardi and the combining vowel o. When combined with the suffix -logy, meaning "study of," it forms cardiology, which means the study of the heart.

Similarly, gastr/o means "stomach" and appears in gastrology, while neur/o means "nerve" and appears in neurology, the study of the nervous system. The combining vowel is often retained when the suffix begins with a consonant, as in cardi/o/logy, but it is commonly omitted when the suffix begins with a vowel, as in gastr/itis, forming gastritis, meaning inflammation of the stomach. Learning to recognize combining forms helps students analyze unfamiliar scientific terms, understand their components, and build a more accurate biological vocabulary.

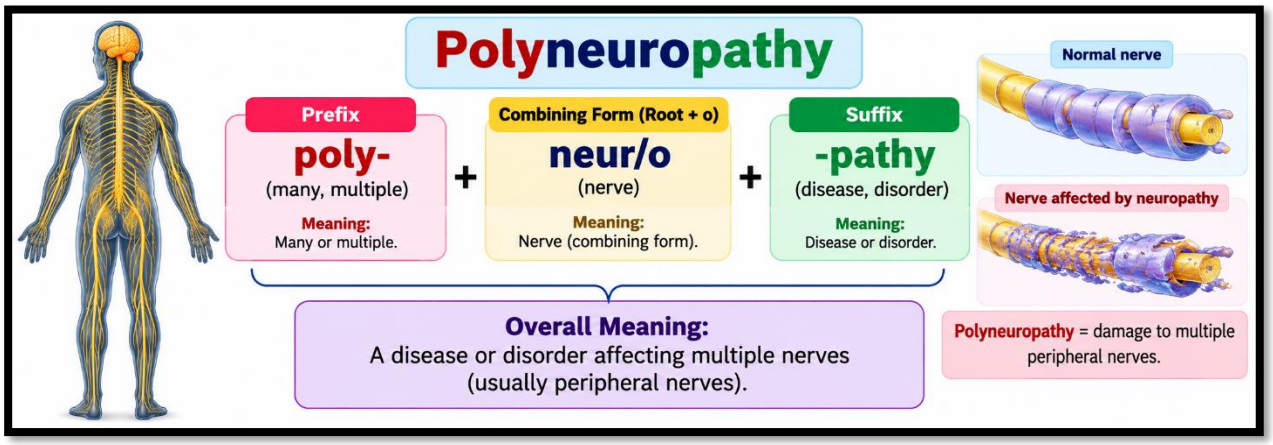


Figure 7 – Exemple of human body systems and combining form

Combining form	Root	English meaning	Example	French	Arabic
cyt/o	**cyt**	**Cell**	**Cytology**	**Cytologie**	**علم الخلايا**

plasm/o	**plasm**	**Formed substance; material**	**Cytoplasm**	**Cytoplasme**	**سيتوبلازم**
phot/o	**phot**	**Light**	**Photobiology**	**Photobiologie**	**علم الأحياء الضوئي**
dermat/o	**derm / dermat**	**Skin**	**Dermatology**	**Dermatologie**	**طب الجلد**
lip/o	**lip**	**Fat**	**Lipolysis**	**Lipolyse**	**تحلل الدهون**
neur/o	**neur**	**Nerve**	**Neurology**	**Neurologie**	**طب الأعصاب**
cardi/o	**cardi**	**Heart**	**Cardiovascular**	**Cardiovasculaire**	**قلبي وعائي**
oste/o	**oste**	**Bone**	**Osteology**	**Ostéologie**	**علم العظام**
hemat/o	**hemat**	**Blood**	**Hematology**	**Hématologie**	**علم الدم**
glyc/o	**glyc**	**Sugar**	**Glycolysis**	**Glycolyse**	**تحلل السكر**
morph/o	**morph**	**Form; shape**	**Morphogenesis**	**Morphogenèse**	**تشكل الأعضاء**
therm/o	**therm**	**Heat**	**Thermoregulation**	**Thermorégulation**	**تنظيم الحرارة**
gen/o	**gen**	**Origin; production**	**Pathogenesis**	**Pathogenèse**	**نشأة المرض**
my/o	**my**	**Muscle**	**Myopathy**	**Myopathie**	**اعتلال عضلي**

1.4. Suffixes

A suffix is a meaningful word element added to the end of a biological or scientific word to modify or complete its meaning. In biological terminology, suffixes often indicate a disease, medical condition, biological process, surgical procedure, scientific discipline, or the presence of a particular characteristic. A suffix is generally attached to a root or a combining form, which provides the central meaning of the term. By identifying the suffix, students can often determine what kind of process, condition, or scientific concept a word describes.

For example, the suffix -itis means “inflammation” and appears in gastritis, which means inflammation of the stomach, and dermatitis, which means inflammation of the skin. The suffix -

logy means "study of" and is used in biology, the study of life, and zoology, the study of animals. Similarly, -ectomy means "surgical removal" and appears in appendectomy, the surgical removal of the appendix, while -osis often indicates a condition or process, as in osteoporosis, a condition characterized by reduced bone density and increased bone fragility.

Other suffixes describe cells or biological structures, such as -cyte, meaning "cell," in leukocyte, a white blood cell. Understanding suffixes helps students interpret scientific vocabulary, recognize relationships between biological terms, and distinguish between different diseases, processes, procedures, and fields of study.

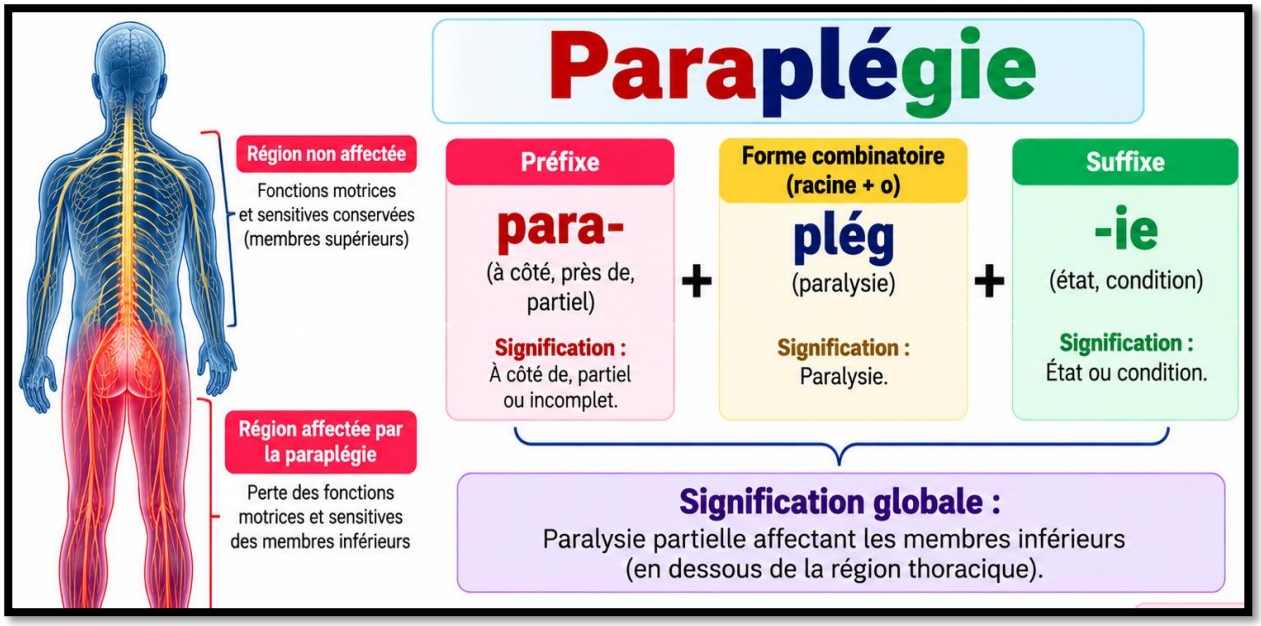


Figure 8 – Exemple of human body systems and suffix

1.4.1 Scientific and laboratory terminology

Suffix	*Etymology and original meaning*	*English meaning*	*Example*	*Example — English meaning*	*French translation*	*Arabic translation*
-ase	*Modern scientific enzyme-naming suffix*	*Enzyme*	*Lactase*	*An enzyme that breaks down lactose, the sugar found in milk*	*Lactase*	*اللاكتاز*
-in	*Latin-derived scientifi*	*Substance; protein or chemical*	*Insulin*	*A hormone that regulates*	*Insuline*	*الإنسولين*

	c naming conventi on			*blood glucose levels*		
-ine	*Latin / French-derived scientifi c naming conventi on*	*Substance or chemical*	*Caffeine*	*A chemical stimulant found in coffee, tea, and other plants*	*Caféine*	*الكافيين*
-gen	*Greek - genēs — produci ng; born from*	*Substance that produces or gives rise to something*	*Antigen ALLERGEN*	*A substance recognized by the immune system that can trigger an immune response*	*Antigène*	*مستضد*
- genic	*Greek - genēs — produce d by; causing*	*Producing ; causing*	*Mutagenic ALLERGENI C PATHOGENI C*	*Capable of causing genetic mutations*	*Mutagène*	*مُحدِث للطفرات*
- gram	*Greek gramma — written record*	*Record; image*	*Electrocardiog ram*	*A graphical record of the electrical activity of the heart*	*Électrocardiogra mme*	*تخطيط كهربائية القلب*
- grap h	*Greek graphei n — to*	*Recording instrument*	*Polygraph*	*An instrument that records several*	*Polygraphe*	*جهاز تسجيل متعدد الإشارات*

	write or record			*physiological signals simultaneously*		
-graphy	*Greek -graphia — writing; recording*	*Recording or imaging process*	*Angiography*	*A medical imaging procedure used to visualize blood vessels*	*Angiographie*	*تصوير الأوعية*
-metry	*Greek metron — measure*	*Measurement*	*Biometry*	*The measurement and statistical analysis of biological characteristics*	*Biométrie*	*القياسات الحيوية*
-metric	*Greek metron — measure*	*Relating to measurement*	*Biometric*	*Relating to the measurement and analysis of biological characteristics*	*Biométrique*	*متعلق بالقياسات الحيوية*
-scope	*Greek skopein — to look at*	*Viewing instrument*	*Endoscope MICROSCOPE*	*An instrument used to examine the inside of the body*	*Endoscope*	*منظار*

-scopic	*Greek skopein — to examine*	*Relating to visual examination*	*Endoscopic*	*Relating to examination of the inside of the body using an endoscope*	*Endoscopique*	*متعلق بالتنظير*

1.4.2. Cells, organisms, and biological characteristics

Suffix	Etymology and original meaning	English meaning	Example	Example — English meaning	French translation	Arabic translation
-zoa	Greek zōon — animal	Animals; animal group	Protozoa	Traditionally, a group of microscopic, animal-like organisms	Protozoaires	الأوّليات
-zoan	Greek zōon — animal	An animal or animal-related organism	Metazoan	A multicellular animal	Métazoaire	حيوان متعدد الخلايا
-phyte	Greek phyton — plant	Plant or plant-like organism	Sporophyte	The spore-producing stage in the life cycle of plants and some algae	Sporophyte	الطور البوغي
-phyll	Greek phyllon — leaf	Leaf; leaf-like structure	Chlorophyll	The green pigment that absorbs light energy for photosynthesis	Chlorophylle	اليخضور

-aceous	**Latin -aceus — having the nature of**	**Resembling; belonging to a group**	**Herbaceous**	**Having soft, non-woody stems**	**Herbacé**	**عشبي**
-oid	**Greek -oeidēs — resembling**	**Like; resembling**	**Amoeboid**	**Resembling an amoeba in shape or movement**	**Amoeboïde**	**شبيه بالأميبا**
-like	**Old English -lic — similar to**	**Resembling**	**Threadlike**	**Thin and elongated in shape, like a thread**	**Filiforme**	**خيطي الشكل**
-ous	**Latin -osus — full of; abundant in**	**Characterized by; full of**	**Venous**	**Relating to veins or the blood carried by veins**	**Veineux**	**وريدي**
-ic	**Greek / Latin-derived adjective ending**	**Relating to**	**Genetic**	**Relating to genes, heredity, or genetics**	**Génétique**	**وراثي**
-al	**Latin -alis — relating to**	**Relating to**	**Neural**	**Relating to nerves or the nervous system**	**Neural**	**عصبي**
-ary	**Latin -arius — connected with**	**Relating to**	**Pulmonary**	**Relating to the lungs**	**Pulmonaire**	**رئوي**
-ular	**Latin -ularis — relating to**	**Relating to; having the nature of**	**Cellular**	**Relating to cells**	**Cellulaire**	**خلوي**

-ule	Latin -ulus — diminutive	Small; little	Venule	A small blood vessel that carries blood from capillaries toward veins	Veinule	وريدة
-let	French diminutive -let	Small; little	Platelet	A small blood component that helps blood clot	Plaquette	صفيحة دموية

1.4.3. Medical conditions and symptoms

Suffix	Etymology and original meaning	English meaning	Example	Meaning	French translation	Arabic translation
-phobia	Greek phobos — fear	Fear; aversion	Hydrophobia	Abnormal fear of water; also associated with rabies.	Hydrophobie	رهاب الماء
-philia	Greek philia — love; affinity	Attraction; affinity	Hemophilia	Inherited bleeding disorder in which blood clotting is impaired.	Hémophilie	الهيموفيليا
-plegia	Greek plēgē — stroke; blow	Paralysis	Paraplegia	Paralysis of both legs, usually involving the lower body.	Paraplégie	شلل الطرفين السفليين

-paresis	**Greek paresis — weakening**	**Partial paralysis; weakness**	**Hemiparesis**	**Weakness affecting one side of the body.**	**Hémiparésie**	**ضعف نصفي**
-pnea	**Greek pnoē — breathing**	**Breathing**	**Apnea**	**Temporary cessation of breathing.**	**Apnée**	**انقطاع التنفس**
-rrhea	**Greek rhoia — flow**	**Flow; discharge**	**Diarrhea**	**Frequent passage of loose or watery stools.**	**Diarrhée**	**إسهال**
-rrhage	**Greek rhēgnynai — to burst forth**	**Excessive flow; bursting**	**Hemorrhage**	**Excessive bleeding or escape of blood from blood vessels.**	**Hémorragie**	**نزيف**
-rrhagia	**Greek rhēgnynai — to burst forth**	**Excessive bleeding or flow**	**Menorrhagia**	**Abnormally heavy or prolonged menstrual bleeding.**	**Ménorragie**	**غزارة الطمث**
-rrhaphy	**Greek rhaphē — sewing**	**Surgical suturing**	**Herniorrhaphy**	**Surgical repair of a hernia by suturing.**	**Herniorraphie**	**خياطة الفتق**
-stenosis	**Greek stenos — narrow + -osis — condition**	**Abnormal narrowing**	**Stenosis**	**Narrowing of a body passage, opening, or vessel**	**Sténose**	**تضيّق**

-sclerosis	**Greek sklērōsis — hardening**	**Hardening of tissue**	**Atherosclerosis**	**Buildup of plaques in artery walls, causing them to harden and narrow**	**Athéroscléro se**	**تصلب الشرايين**
-megaly	**Greek megas — large**	**Enlargement**	**Cardiomegaly**	**Abnormal enlargement of the heart**	**Cardiomégal ie**	**تضخم القلب**
-penia	**Greek penia — poverty; deficiency**	**Deficiency; reduced number**	**Leukopenia**	**Abnormally low white blood cell count**	**Leucopénie**	**نقص الكريات البيضاء**
-cytosis	**Greek kytos — cell + -osis — condition**	**Increased cell count or cell condition**	**Leukocytosis**	**Increased white blood cell count**	**Leucocytose**	**كثرة الكريات البيضاء**
-uria	**Greek ouron — urine**	**Urine condition or substance in urine**	**Hematuria**	**Presence of blood in the urine**	**Hématurie**	**بيلة دموية**
-lithiasis	**Greek lithos — stone + -iasis — condition**	**Formation or presence of stones**	**Nephrolithiasis**	**Formation or presence of stones in the kidneys**	**Néphrolithia se**	**تحصي الكلى**

-dynia	Greek odyne — pain	Pain	Mastodynia	Pain in the breast	Mastodynie	ألم الثدي

1.4.4. Biological processes and functions

Suffix	Etymology and original meaning	English meaning	Example	Example — English meaning	French translation	Arabic translation
-trophy	Greek trophē — nourishment	Growth; nourishment	Hypertrophy	Enlargement of an organ or tissue due to an increase in cell size	Hypertrophie	تضخم
-kinesis	Greek kinēsis — movement	Movement	Cytokinesis	Division of the cytoplasm during cell division	Cytocinèse	انقسام السيتوبلازم
-kinesia	Greek kinēsis — movement	Movement or movement condition	Dyskinesia	Abnormal or involuntary movement	Dyskinésie	خلل الحركة
-poiesis	Greek poiēsis — making; production	Formation; production	Hematopoiesis	The process of producing blood cells	Hématopoïèse	تكوّن الدم
-phoresis	Greek phoresis — carrying; bearing	Carrying or movement	Electrophoresis	Separation of charged particles using an	Électrophorèse	الرحلان الكهربائي

				electric field		
-genesis	**Greek genesis — origin; formation**	**Formation; development**	**Spermatogenesis**	**The process of producing sperm cells**	**Spermatogenèse**	**تكوّن الحيوانات المنوية**
-lysis	**Greek lysis — loosening; breaking**	**Breakdown; dissolution**	**Glycolysis**	**The breakdown of glucose to release energy**	**Glycolyse**	**تحلل السكر**
-morphosis	**Greek morphē — form + -osis — process**	**Formation or transformation**	**Metamorphosis**	**A major transformation in the form or structure of an organism during development**	**Métamorphose**	**تحول**
-escence	**Latin -escere — to begin to become**	**Beginning or process of becoming**	**Senescence**	**The process of aging, especially the gradual loss of cellular function**	**Sénescence**	**الشيخوخة الخلوية**
-ation	**Latin -atio — process or action**	**Process; action**	**Oxidation**	**A chemical process involving the loss of electrons, often**	**Oxydation**	**أكسدة**

				associated with reaction with oxygen		
-ization	Greek-derived / Latin-mediated -izare — to make or cause	Process of making or becoming	Mineralization	The process by which minerals accumulate in or form part of a material or biological tissue	Minéralisation	التمعدن

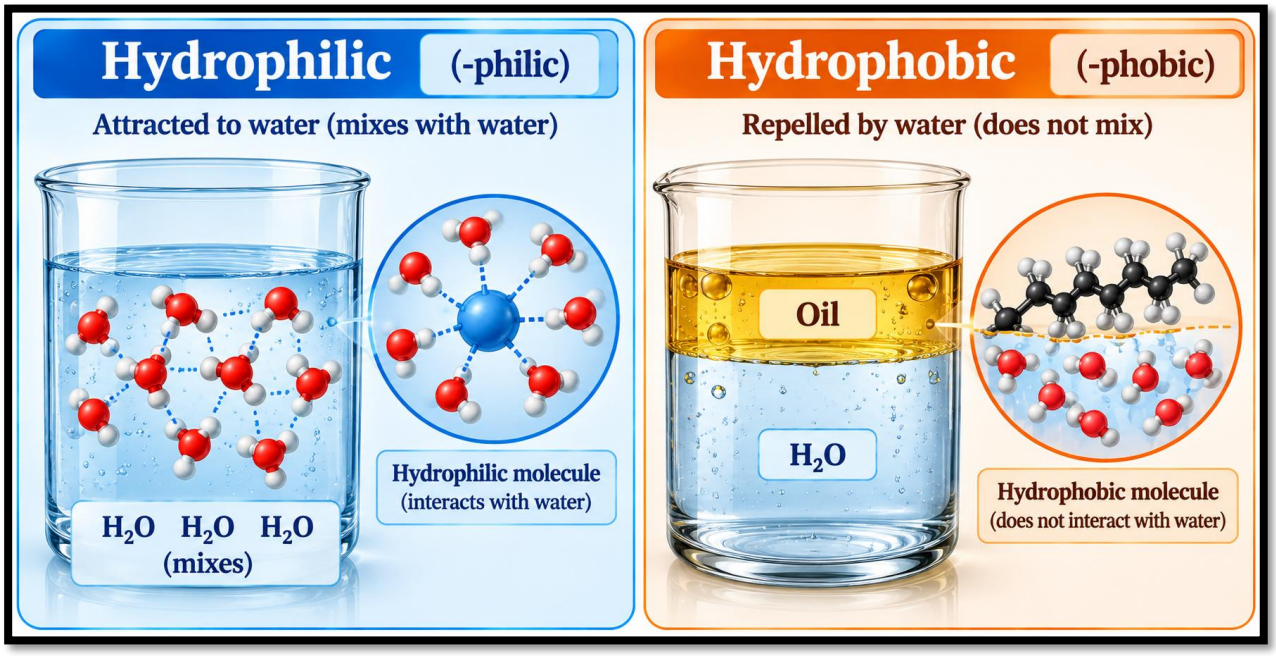


Figure 8 – Hydrophilic vs hydrophobic

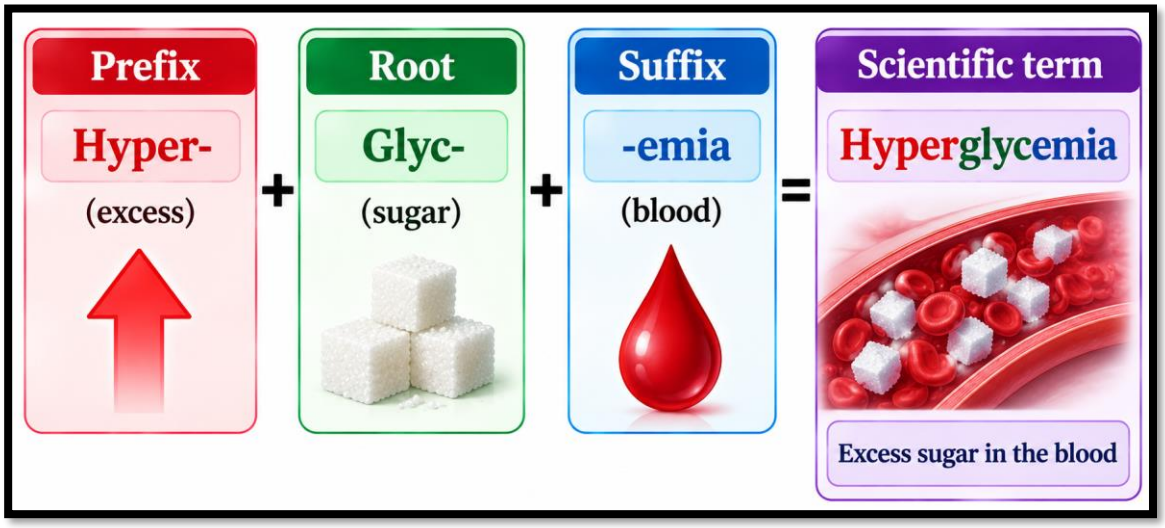


Figure 9 – Analysis flowchart

1.5. Conclusion

In conclusion, understanding scientific vocabulary and word mechanics is essential for learning and interpreting biological terminology. Many biological and medical words are constructed from meaningful elements, including prefixes, roots, combining forms, and suffixes. Each element contributes specific information to the meaning of a scientific term.

Prefixes modify the meaning by indicating characteristics such as quantity, position, size, or degree; roots carry the central meaning, often referring to an organ, tissue, cell, organism, or biological process; combining forms consist of a root and a combining vowel, usually o, which facilitates pronunciation and connects word elements; and suffixes indicate conditions, diseases, processes, procedures, or scientific disciplines.

By learning to identify and analyze these components, students can understand unfamiliar scientific words, recognize relationships between biological concepts, and improve their ability to read and interpret scientific texts. For example, analyzing terms such as hypothermia, cardiology, leukocyte, and polyneuropathy demonstrates how individual word elements combine to express precise scientific meanings.

Therefore, mastering scientific word formation provides a strong foundation for further study in biology, zoology, physiology, anatomy, microbiology, and other life sciences. These skills will help students develop a more accurate scientific vocabulary and communicate biological information more effectively in their academic and professional work.