

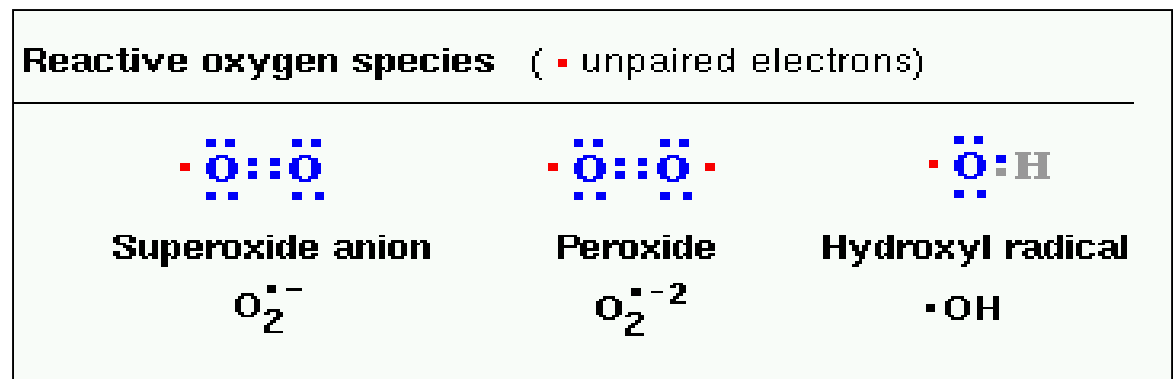
Estimation of Total phenolic content in different plants



Free radicals

- **Free radicals** are those particles and molecules that **cause damage to the body's cells** and essential fatty acids by their ready **reactivity and oxidizing ability**.
- This characteristic is defined by their **unpaired electron**.

These free radical molecules are released during the normal metabolic process of oxidation.



Free radicals

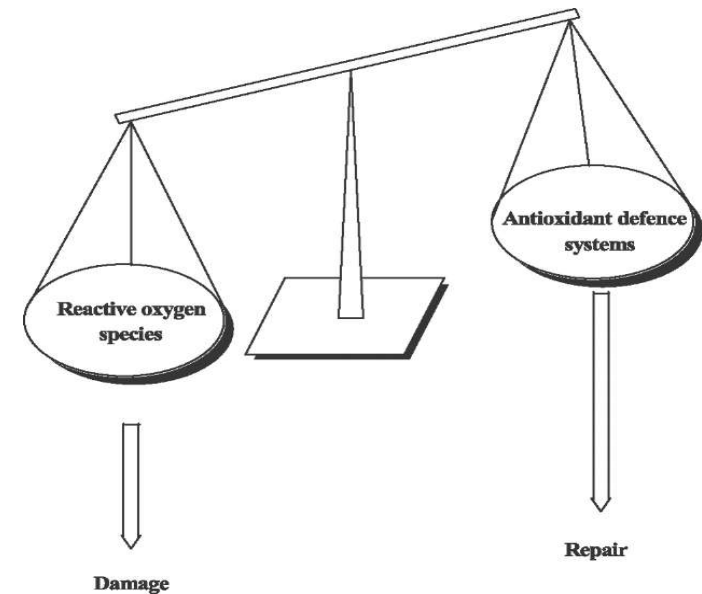
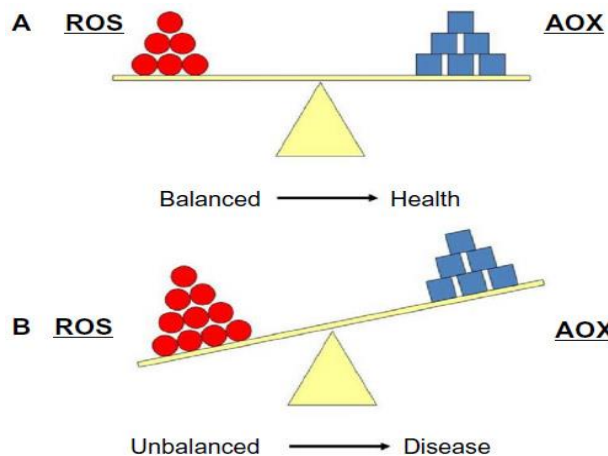
Free radicals come from a wide variety of sources but mainly our diet.

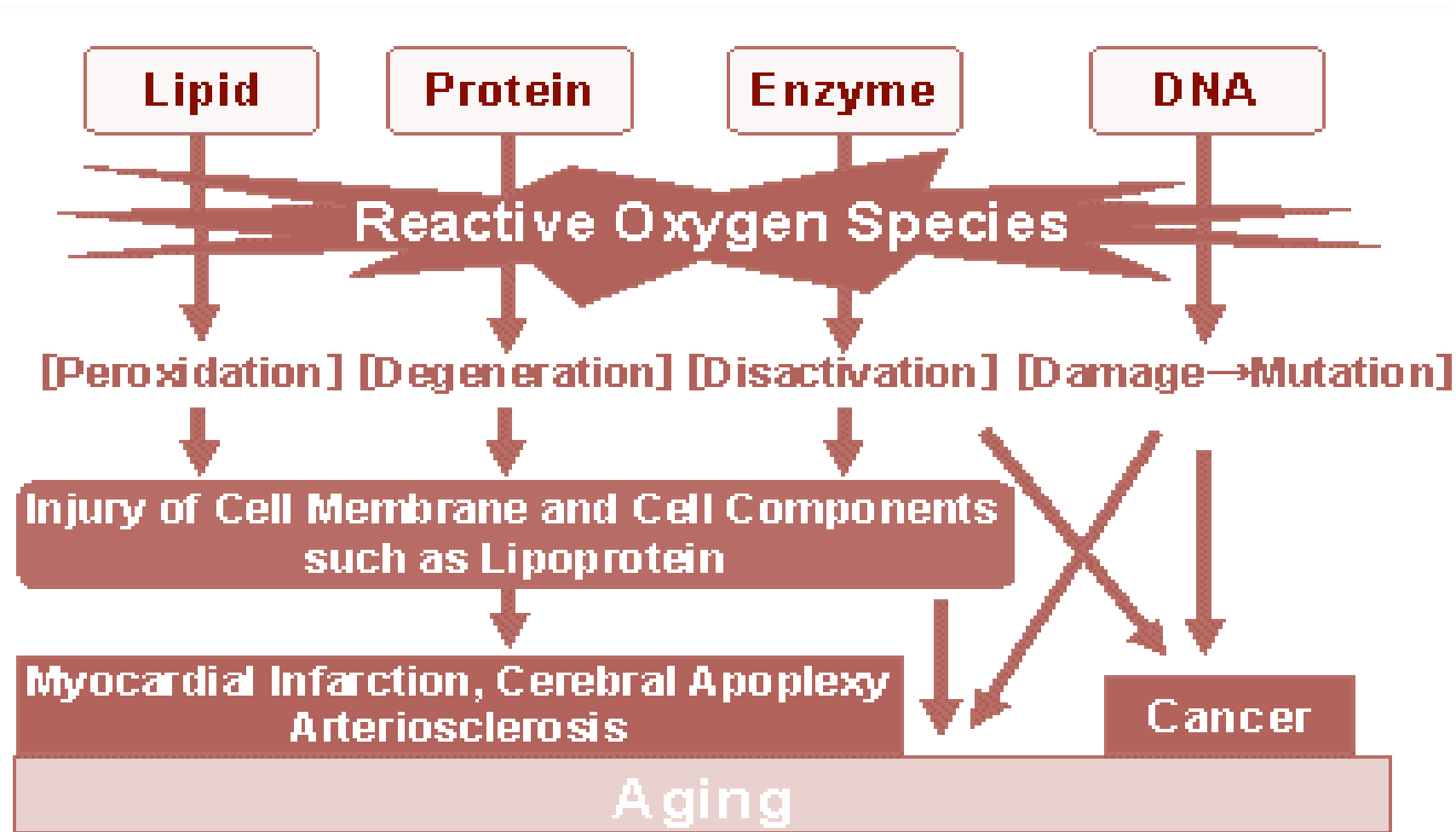
The biggest source of ingested free radicals is probably fried foods and heated cooking oils, e.g. potato crisps/chips, french fries, onion rings etc. (fried in vegetable oils which oxidises readily into free radicals).

Oxidative stress

Oxidative stress is an imbalanced state where **excessive quantities of reactive oxygen and/or nitrogen species over come endogenous antioxidant capacity**, leading to oxidation of a varieties of biomacromolecules, such as enzymes, proteins, DNA and lipids.

Oxidative stress involve in the development of chronic degenerative **diseases** including coronary heart disease, cancer and aging.

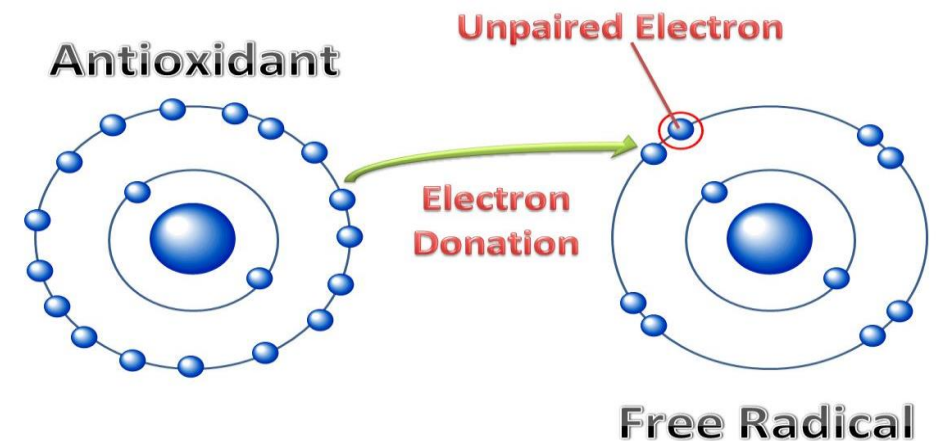




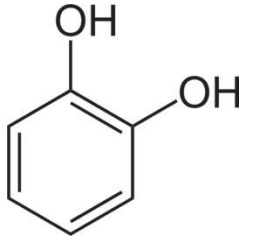
Antioxidant

Antioxidants are defined as compounds that can delay, inhibit, or prevent the oxidation of oxidizable materials by **scavenging free radicals** and diminishing oxidative stress.

Fruits and vegetables contain a wide variety of free-radical scavenging molecules, including **phenolic compounds**, carotenoids, and vitamins.

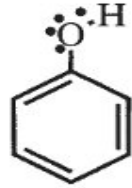


Phenolic compounds

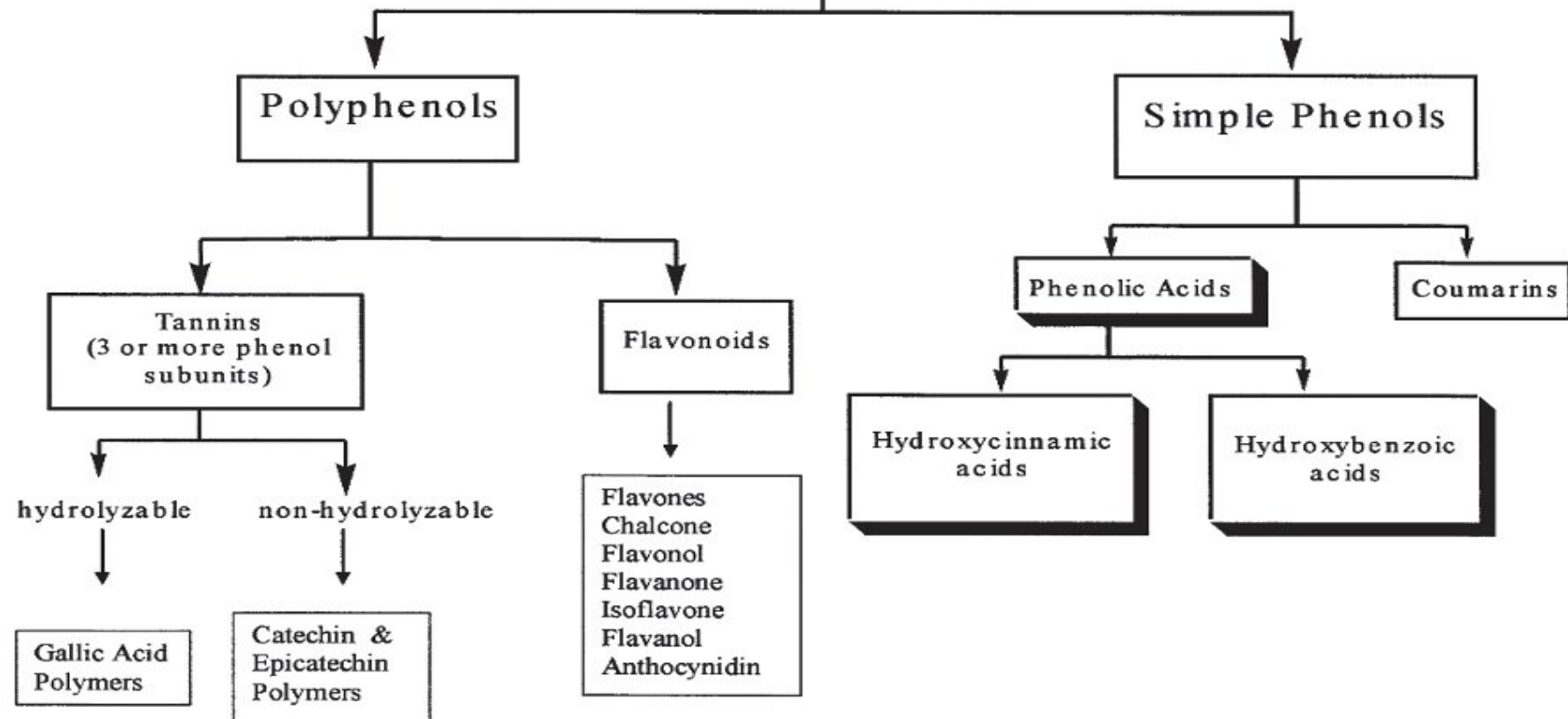


- **Phenolics** are compounds possessing one or more aromatic rings with one or more hydroxyl groups.
- Plant phenolic compounds are extremely heterogeneous and may range from simple monomers to very large polymers.
- Studies have shown that consumption of food rich in phenolics can slow the progression of various debilitating diseases.

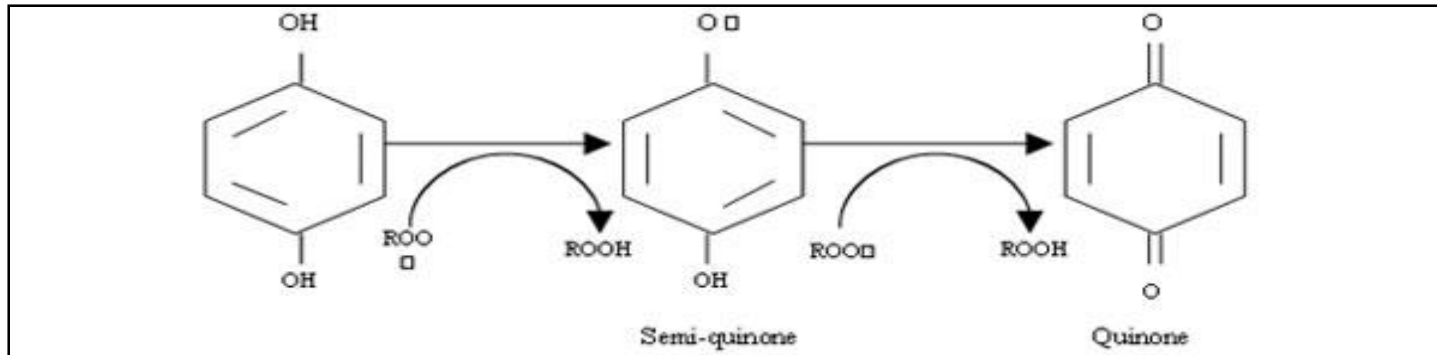
Therefore, mostly, the current focus is on the **anti-oxidant action of phenolics**.



PHENOLICS



The antioxidant activity of phenol is mainly related to **redox properties**.



- **Tea** remains one of the most popular beverages world-wide and contains a variety of **phenolic compounds** which are potent antioxidants.



Objective

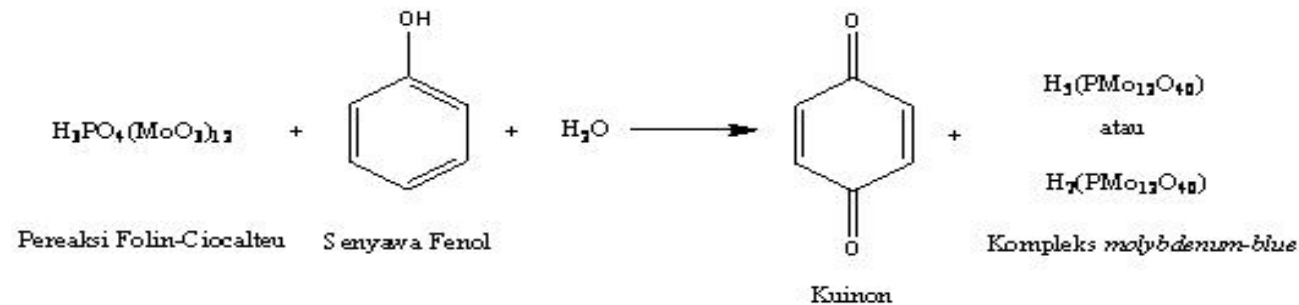
Determination of total phenolic content in green tea, black tea and ginger.



Principle

- In this method, we will use a colorimetric method, the **Folin-Ciocalteu assay**, to quantify the total phenolic content of the samples.

- The **oxidation of a phenolate ion** from the sample and the **reduction** of the phosphotungstic-phosphomolybdic reagent which known as **Folin-Ciocalteu**, the result of this reduction produce a **blue phosph complex**.



- The reaction must take place under **alkaline conditions** in order to aid with the uptake of oxygen by the phenol, which occurs most efficiently **near the pka (approximately 10) of the phenol**, and this is done by the addition of **sodium carbonate**.

Method

Tube	Catechol standard 10mg/dl	Dist. H ₂ O (ml)	Sample (ml)	Folin-Ciocalteu reagent (ml)		Na ₂ CO ₃ (ml)
Blank	--	4	--	0.5 ml	Wait 3 min	2 ml
1	0.2	3.8	--			
2	0.4	3.6	--			
3	0.6	3.4	--			
4	0.8	3.2	--			
5	1	3	--			
6	1.2	2.8	--			
7	1.4	2.6	--			
Black tea	--	3.8	0.2			
Green tea	--	3.8	0.2			
ginger	--	3.8	0.2			

- Mix thoroughly and measure the absorbance at **650 nm** against a reagent blank.
- Prepare a standard curve using different concentrations of catechol.

Result

	Absorbance	Concentration (mg/dl)
1		
2		
3		
4		
5		
6		
7		
Black tea		
Green tea		
ginger		

Calculation

1- The concentration from the standard curve x dilution factor=.....A....(mg/dl)

(preparation of our sample: 2g in 100ml of water)

2- $A \times 1\text{dl} = \dots\dots B \dots\dots$

3- B-----→ 1 grams

?-----→ 100 grams

Phenol content=.....mg/100 g

Discussion

Discuss your results

H.W

Does coffee contain phenolics and antioxidant property?