

HA →

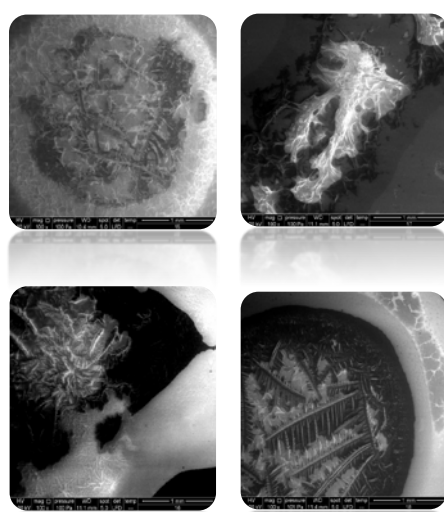
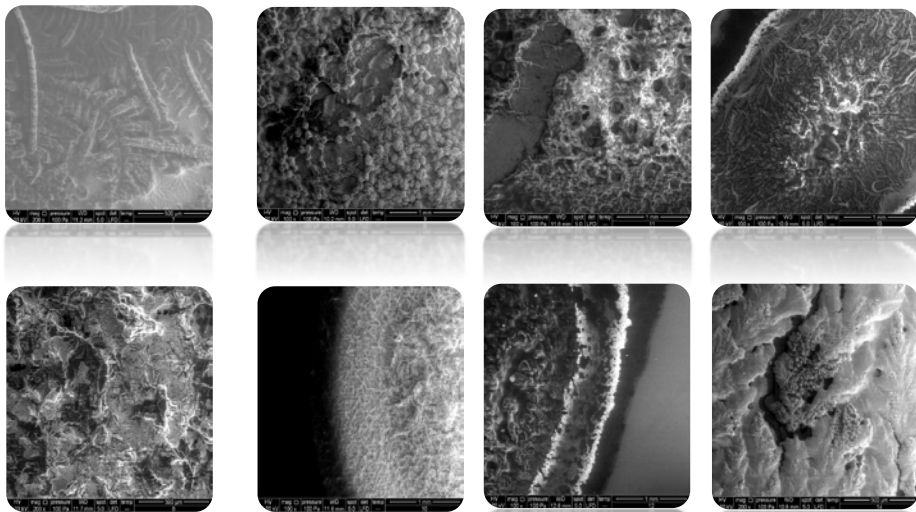
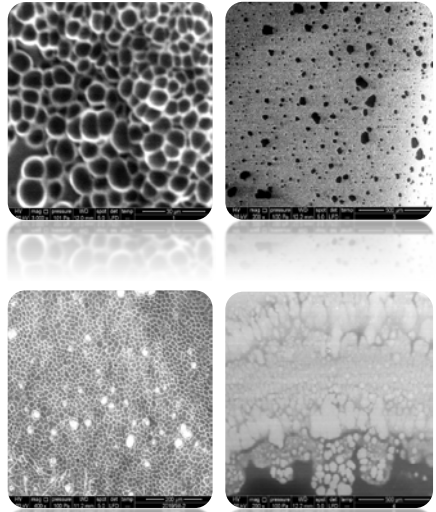
HA is a natural biopolymer in human body. It is tissue specific and age, gender, and health/disease state dependent.

It can be obtained from animal, bacterial strains that naturally produce HA, genetically modified bacteria, and from marine sources.

If slightly modified without altering its chemical bonds. This type can be called **Linear HA or unmodified chemically**

OR

Modification to its chemical bonds by many methods (most famous one is cross-linking method). This type is the **modified HA**.



Factors that affect the HA molecule upon modification:

- Source of HA
- Manufacturing process
- HA molecular weight
- Modification process used
- Purity of HA
- Degree of modification
- Degree of grafting with other materials.

This study aimed to examine different types of HA formulations to see if each product has its own morphological form. The result was that each product has its (morphological print)

Future research should aim to compare different HA formulations indicated for the same clinical application to determine the most optimal form of HA for each desired clinical effect.

Accordingly, each HA product should be examined independently by physical tests, in vivo, animal, and human studies to evaluate its characteristics and clinical uses.

Those characteristics affect its clinical use in terms of:

- Its Biocompatibility
- Its biological effects
- Its indication of use
- Mode of administration
- Its residence time
- Its degradation
- Its turnover rate
- Its elimination

Final HA product will have specific characteristics in terms of its:

- Solubility
- Viscosity
- Elasticity
- Osmolality
- Swelling capacity
- Particles size
- Pores size
- Compressive strength
- Diffusion
- **Morphological form**