



## **Fish and Sea foods**

**MODULE NO. 28: Post mortem changes in fish and sea foods**

# Post mortem changes in fish and sea foods



- Postmortem biochemical processes are directly linked to final quality attributes.
- Postmortem tenderization of fish muscle.
- Loss of freshness.
- Muscle spoilage.
- Autolysis.
- Fat hydrolysis.

# Proteolysis in muscle



- Myofilament degradation.
- Degradation vary from one fish species to another.
- Degradation of titin, desmin, nebulin, dystrophin,  $\alpha$ -actinin release, myosin proteolysis, and tropomyosin delocalisation.
- Costameres also degrades within 24 hr postmortem.
- Proteolysis of sarcoplasmic 16Da protein.
- Connective tissue collagen degradation.

# Postmortem muscle structural changes



- Very little structural change occurs in fish myofibrils during postmortem.
- Fish myofibrils are structurally stable.
- Both fish and mammals show myofiber to connective tissue (endomysium) detachments within 24h postmortem.
- Perimysium shows some weakening.
- Myocommata is also mechanically weakened during storage



# Role of proteases in postmortem autolysis of fish muscle

- Physical, chemical, biochemical and microbial processes combinely deteriorate the fish flesh.
- Proteolysis of muscle protein by enzymes.
- Fat hydrolysis.
- Bacterial contamination is minimum



# Changes in fish flesh biochemistry post mortem

- Rigor mortis
- Autolysis
- Bacterial attack
- Protein denaturation
- Decreasing flesh pH
- TVB-Total Volatile Base



# Rigor mortis

- On death, the circulatory system stops and the ATP levels drop.
- Resulting in rigid muscles.
- Actin and myosin, combine in the presence of calcium ions to form actomyosin.
- ATP is used to supply energy for contraction.
- After loss of ATP, permanent actomyosin complex is formed.



# Autolysis

- Autolytic reactions by enzymes occurs, decomposing various compounds.
- Tasteless and bitter one compounds -By enzymes in flesh.
- Soupy mess – By gut enzymes.





# Bacterial attack

- On autolysis, bacteria start to decompose muscle.
- Anaerobic bacteria- Foul type spoilage.
- Slimy texture.

# Protein Denaturation



- The destruction of its secondary, tertiary and quaternary structure.
- By slow freezing and variability of storage conditions.
- Impaired water holding ability.
- Dull, white and spongy.
- Fibrous and tasteless.



# Decreasing flesh pH

- A living fish has a flesh pH of 7.0.
- Decrease in pH after death- Glycolysis.
- At 6.6 –soft texture.
- Below this level, firm and eventually tough.

# TVB-Total Volatile Base



- Total amount of nitrogen-containing substances which are produced during storage.
- For example TMA (Trimethylamine).
- Fishy smell.
- Odourless and tasteless.
- During frozen storage- TMA oxide converted to dimethylamine (DMA) and formaldehyde.
- Formaldehyde denatures the muscle structure.



# Suggested readings

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