

# Peptides (1. LF UK, NT)

## Structure

- condensation (amino acids → peptides)

File:Formation of cyclic dipeptide.jpg

- binding of some amino acids in an unusual way (Glu distal group COOH =  $\gamma$ -peptide bond)
- bound D-amino acids
- unusual amino acids bound
  - $\beta$ -alanine (3-aminopropionic) File:Beta-alanine.jpg,  $\alpha$ -aminobutyric (2-aminobutyric) File:Alpha-aminobutyric.jpg,  $\gamma$ -aminobutyric (4-aminobutyric) File:Gamma-aminobutyric.jpg, taurine File:Taurine.jpg, 2-aminoacrylic (dehydroalanine) File:2-aminoacrylic.jpg, (E)-2-aminocroton (dehydrobutyrin) File:Dehydrobutyrin.jpg, pyroglutam File:Pyroglutam.jpg

## Classification

Number of bound monomers (amino acids)

- oligopeptides (2–10 amino acids)
- polypeptides (formerly macropeptides, 11–100 amino acids)

String type

- linear
- cyclical

type of bonds

- homodet (peptide bonds only)
- heterodet (peptide and other bonds)
  - disulfide -S-S-, ester (depsipeptides) -CO-O-R

Bound folders

- homeomeric containing only amino acids
- heteromeric (peptoids) containing also other compounds
  - nucleopeptides – phosphopeptides
  - lipopeptides – chromopeptides
  - glycopeptides – metalloptides

## Occurrence

- products of metabolism, natural peptides
- products of proteolysis, enzymatic or non-enzymatic hydrolysis
- synthetic peptides, substitute sweeteners

## Properties

- biological activity
- sensory properties
- products of metabolism of lactic acid bacteria = bacteriocins
- nisin (*Streptococcus cremoris*, syn. *Lactococcus lactis* ssp. *Lactis*)
- preservative, stabilization of fermented products

## Significant Peptides

### Glutathione

(G-SH or G-S-S-G)  $\gamma$ -L-glutamyl-L-cysteinylglycine ( $\gamma$ -amide bond) File:Glutathione.jpg

#### Occurrence

- microorganisms, plants, animals
  - wheat flour (10–15 mg/kg)
  - meat (300–1500 mg/kg)

#### Function

- detoxification of toxic forms of oxygen

- transport (transfer) of amino acids into cells
- metabolic processes (leukotriene biosynthesis)
- stabilization of the oxidation state of SH-proteins (substrate of peroxidase, glutathione reductase)
- technology

### **Chorleywood method** of white bread production, ascorbic acid

- $\text{H}_2\text{A} + \frac{1}{2} \text{O}_2 \rightarrow \text{A} + \text{H}_2\text{O}$  (ascorbase)
- $\text{A} + 2 \text{G-SH} \rightarrow \text{H}_2\text{A} + \text{G-S-S-G}$  (glutathione dehydrogenase)
- G-S-S-G – without affecting the rheological properties of the dough
- G-SH – negative effect (gluten protein depolymerization)
- $\text{P-S-S-P} + \text{G-SH} \rightarrow \text{P-S-S-G} + \text{P-SH}$

### **β-alanylhistidine dipeptides**

- carnosine File:Karnosine.jpg, anserin File:Anserin.jpg, balenin File:Balenin.jpg

### **Occurrence**

- in meat

### **Function**

- participation in contraction of skeletal muscle
- buffering capacity of the muscle
- organoleptic properties

### **Products of proteolysis**

- spontaneous proteolysis (autolysis)
  - desired maturation of meat (consistency, aroma), production of yeast autolysates (additives)
  - undesirable
- intentional proteolysis
  - cheese production (desired consistency, aroma)
  - production of malt (stabilization of beer foam)
  - production of protein hydrolysates
    - Enzymatic:
      - soy sauce
      - hydrolysates of waste proteins (blood, whey, caseins)
    - sour: soup spices and other preparations

### **Bitter peptides of enzyme hydrolysates and foods**

- hydrophobic amino acids: Val, Leu, Ile, Phe, Tyr, Trp ( $M < 6000 \text{ Da}$ )

### **Synthetic Peptides**

- substitute sweetener Aspartame (Asp-Phe) File:Aspartame.jpg

## **Links**

### **Related Articles**

- Amino acids
- Proteins
- Amino acids, peptides, proteins

### **Source**

- *Incomplete citation of web.* . [cit. 2012-03-10]. <<https://el.lf1.cuni.cz/p51525121/>>.

## **References**