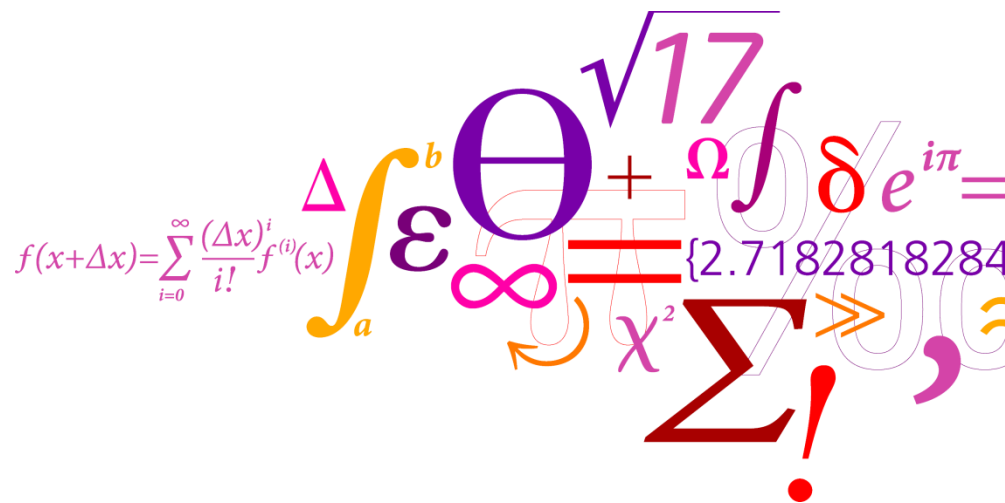


# New technological possibilities

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# Outline & Introduction

- Technologies to produce new compounds  
(e.g. from seaweed and protein hydrolysates)
- New technologies to produce existing compounds  
(e.g. from microalgae and yeast)
- New technologies to improve or maintain the quality of  
existing compounds  
(e.g. emulsification, nanoencapsulation)
- Conclusions

# New compounds from seaweed

Seaweeds contain many unusual compounds with potential health beneficial properties.



Source: Farvin & Holdt

Fucoxanthin: pigment/carotenoid from *Fucus* species (6%)

- Antioxidant
- Preventive effect on cerebrovascular diseases  
(change in brain blood flow)
- Affecting fat metabolism
  - Anti-obesity



Source: Farvin & Holdt

# New compounds from seaweed

- Fucosterols
  - Antiinflammatory
  - Reducing cholesterol levels
- Fucoidan and other oligosaccharides
  - Anticancer effects
  - Antiviral (HIV)
  - Preventing cardiovascular diseases

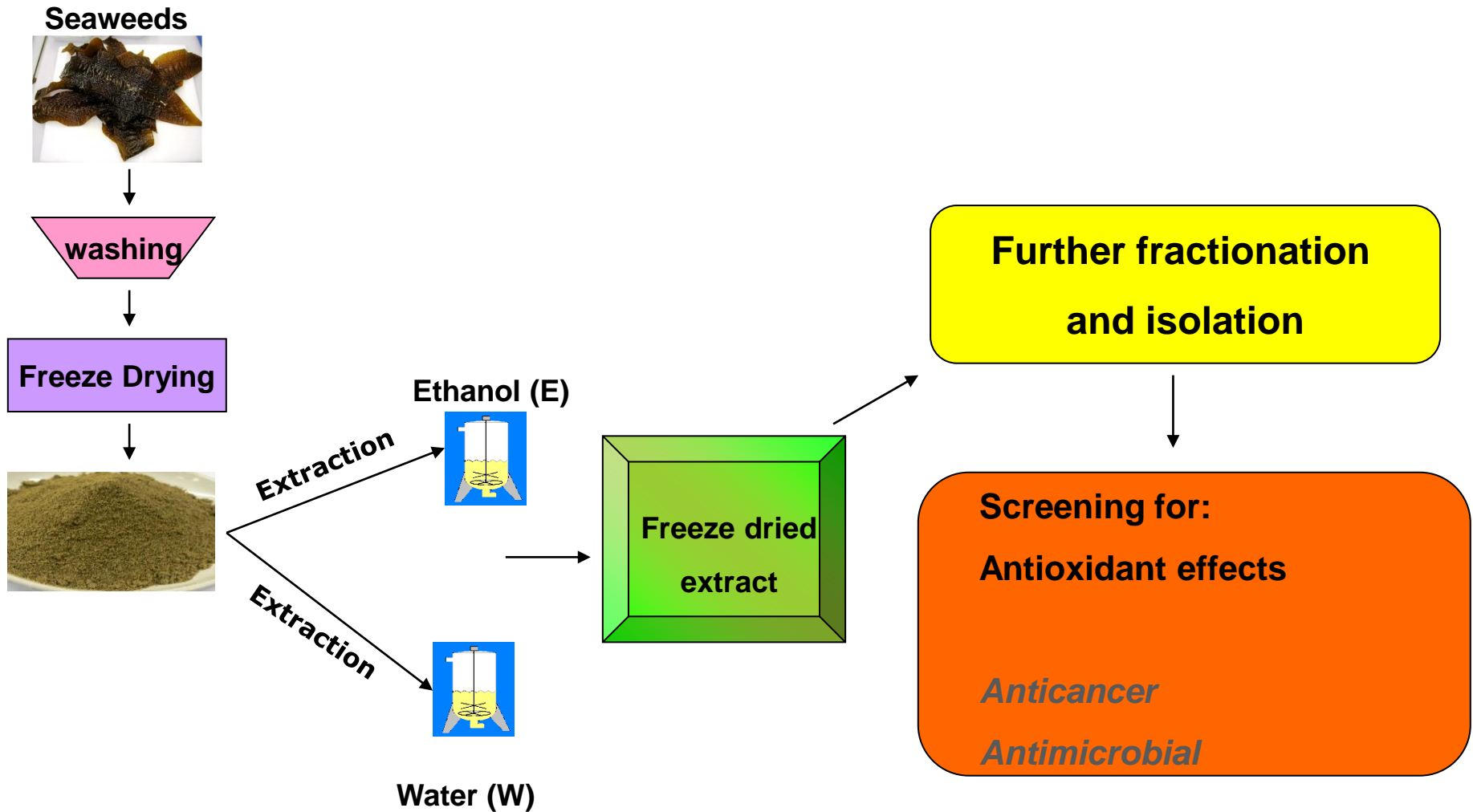


Source: Farvin & Holdt



Source: Farvin & Holdt

# Isolation of new compounds



Source: S. Farvin

# Bioactive peptides from fish proteins



Secondary raw material:  
Intestines, skin  
etc



Primary raw material: Filet



Hydrolysis of proteins with commercial enzymes

## Peptides

Isolation and purification of peptides/proteins using principles of magnetism (magnetic particles)

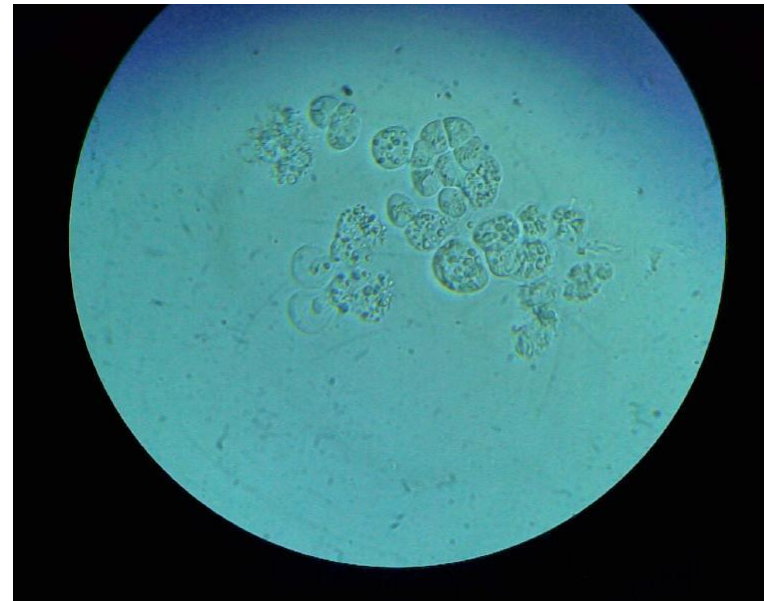
Analysis of bioactive properties

- Antioxidative
- Antidiabetic
- Anticarcinogenic
- Antimicrobial
- Immune stimulating

# Production of omega-3 fatty acids from microalgae

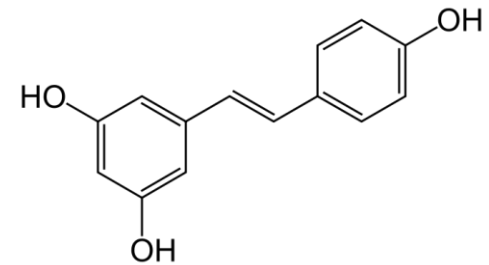


Source: Cambia.org



# Production of existing compounds by fermentation - Resveratrol

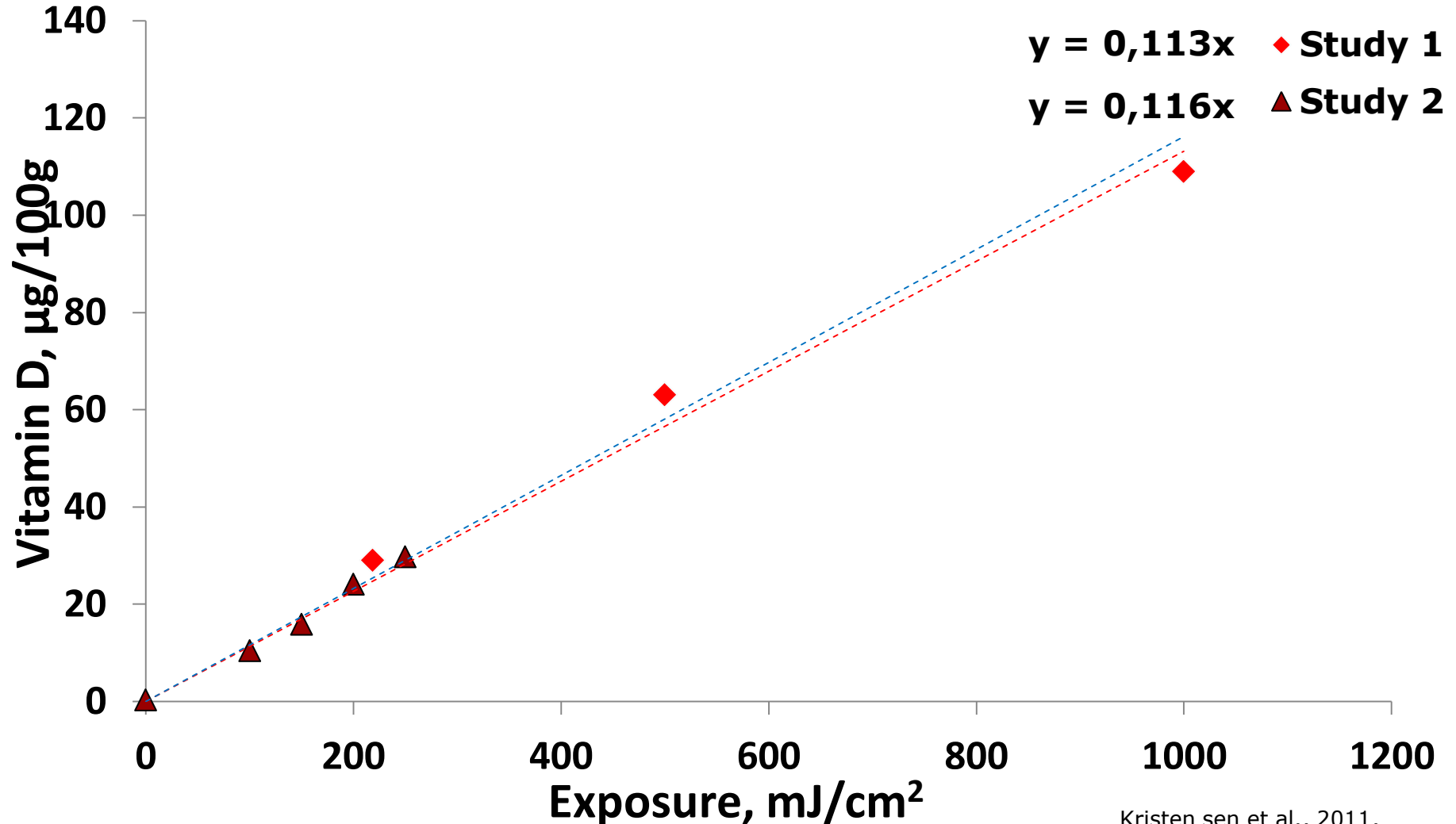
- Found naturally in grapes
- Associated with the French paradox
- Produced by fermentation of bakers yeast
- Reduces risk factors related to aging health conditions
  - Inflammation
  - cardiovascular health



Source: En.wikipedia.org



# Production of vitamin D in mushroom (*Agaricus Bisporus*) by exposure to UV light



# Vitamin D biofortified mushrooms – Contribution to dietary intake in DK

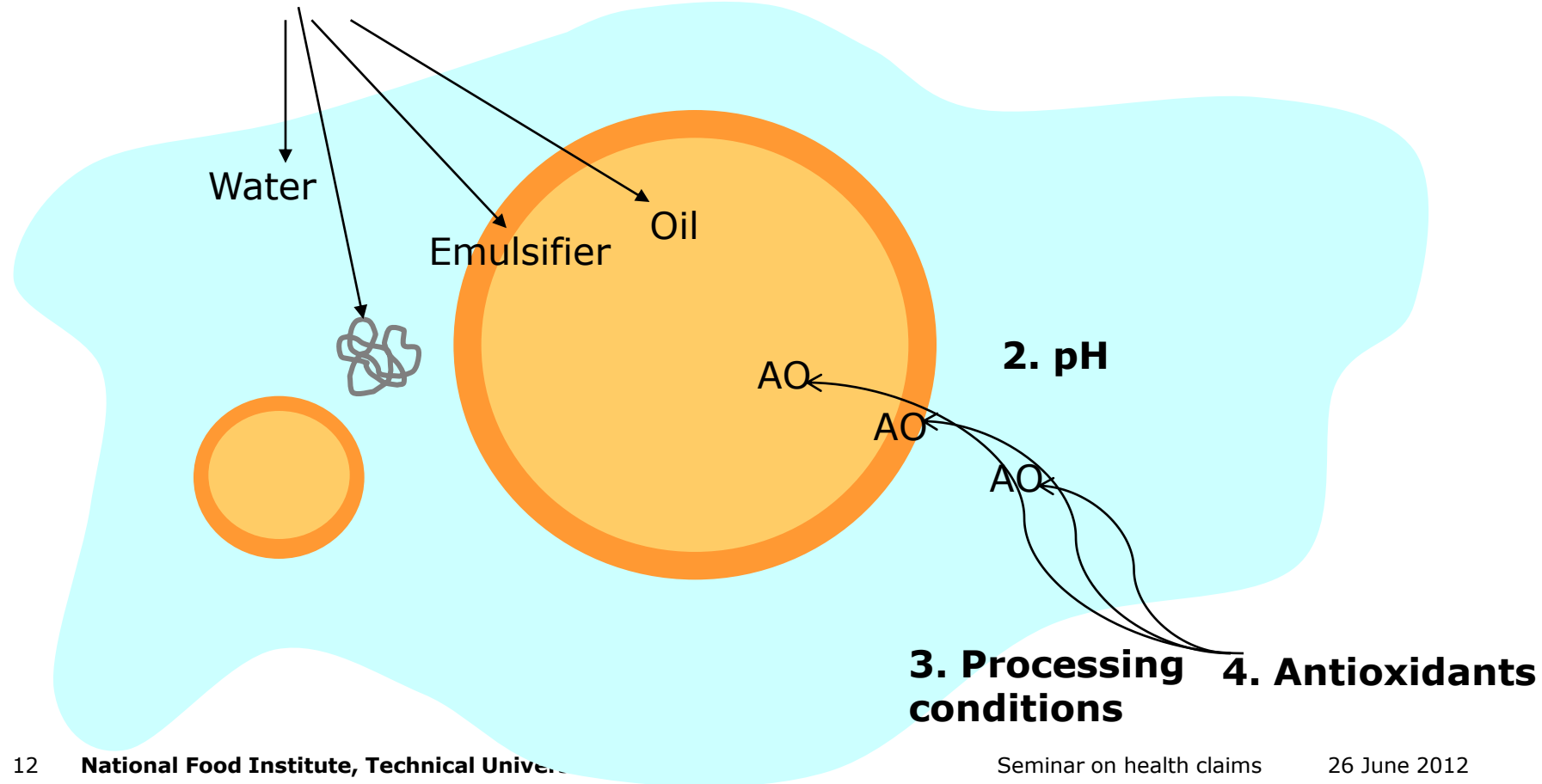
- Dietary contribution of vitamin D from mushrooms:
  - 24  $\mu\text{g}$  vitamin D/100 g mushrooms
  - 3 kg mushrooms in average consumed/year
  - 720  $\mu\text{g}$  vitamin D from mushrooms/year
  - 2.0  $\mu\text{g}$  vitamin D from mushrooms/day
- Recommendation for vitamin D
  - Min 7.5  $\mu\text{g}$  and max. 50  $\mu\text{g}$  daily
  - Mushrooms may contribute to 26% of vitamin D

# New technologies to maintain quality of omega-3 fatty acids

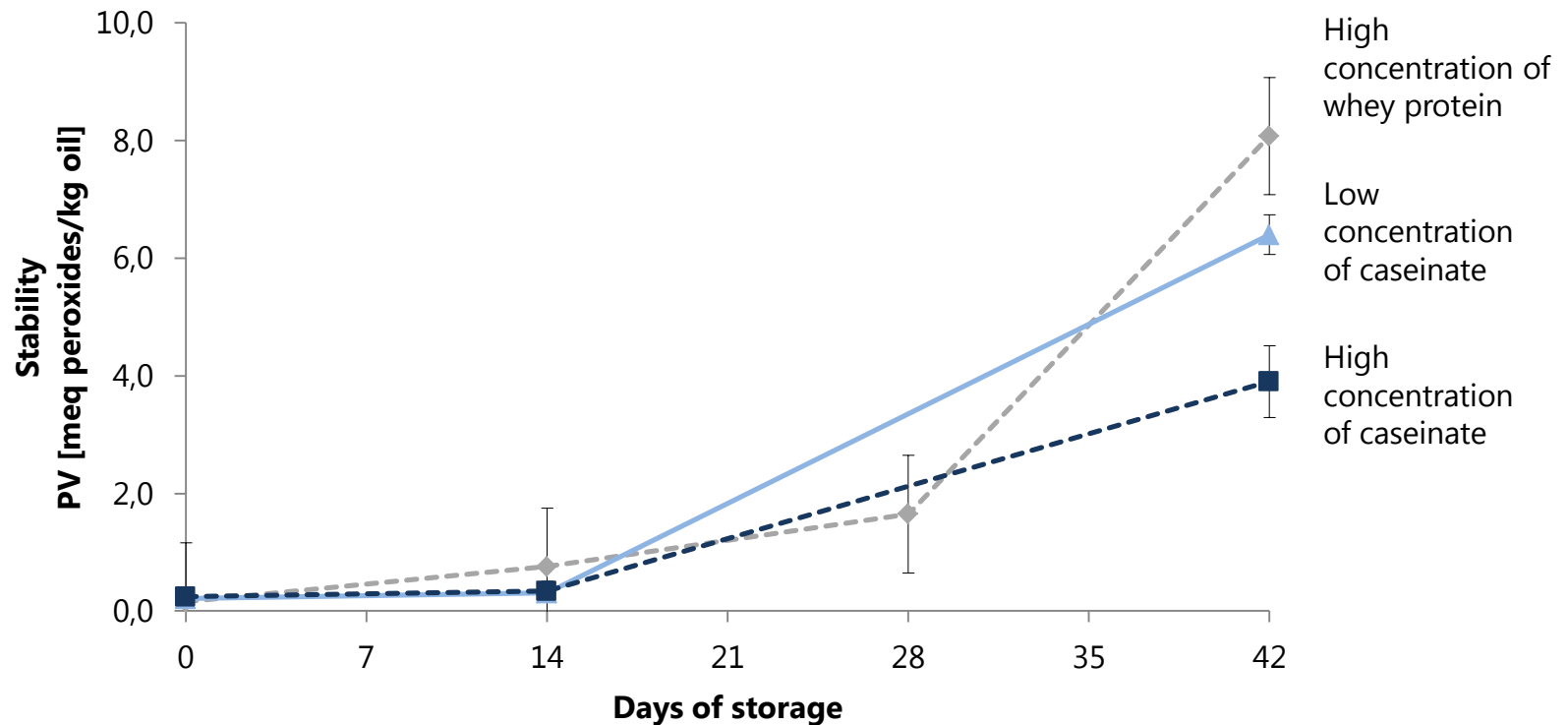
- The health beneficial effects of omega-3 fatty acids are well known
- Omega-3 fatty acids are highly susceptible to lipid oxidation due to high degree of unsaturation
- New technologies can improve oxidative stability
- Examples: Emulsion delivery systems and nanoencapsulation

# Designing emulsions to protect omega-3 fatty acids against oxidation

## 1. Ingredients (Amount, type and quality)



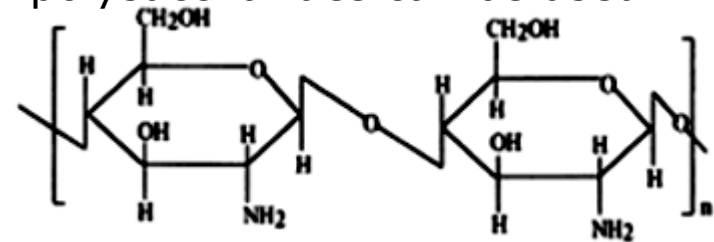
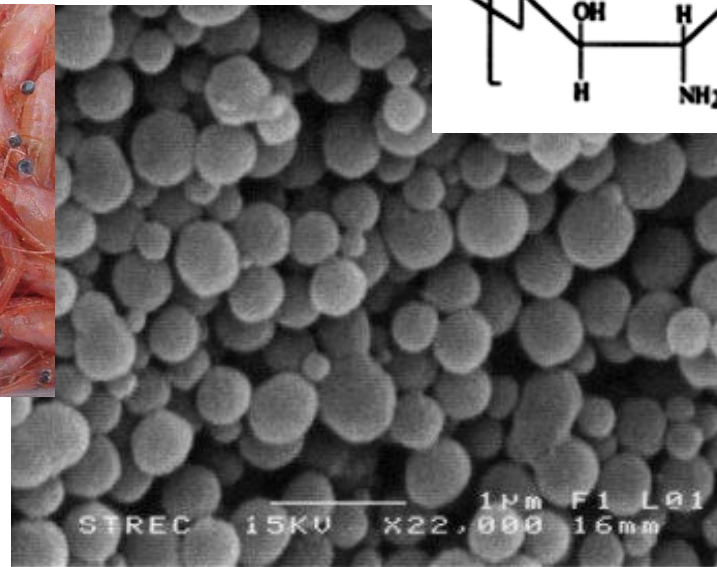
# Effect of different milk proteins on oxidation in 70 % oil-in-water omega-3 emulsions



Horn et al., Eur. J. Lipid Sci. Technol. 2011, 113, 1243–1257

# Nanoparticles produced by electrospinning – Protection of sensitive compounds against degradation

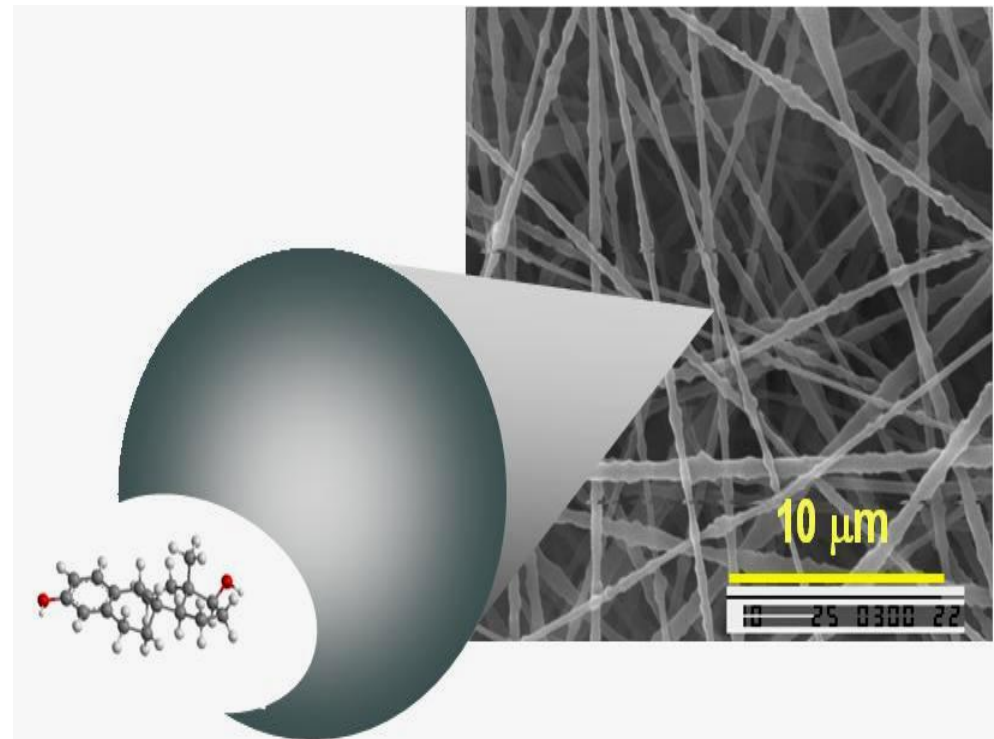
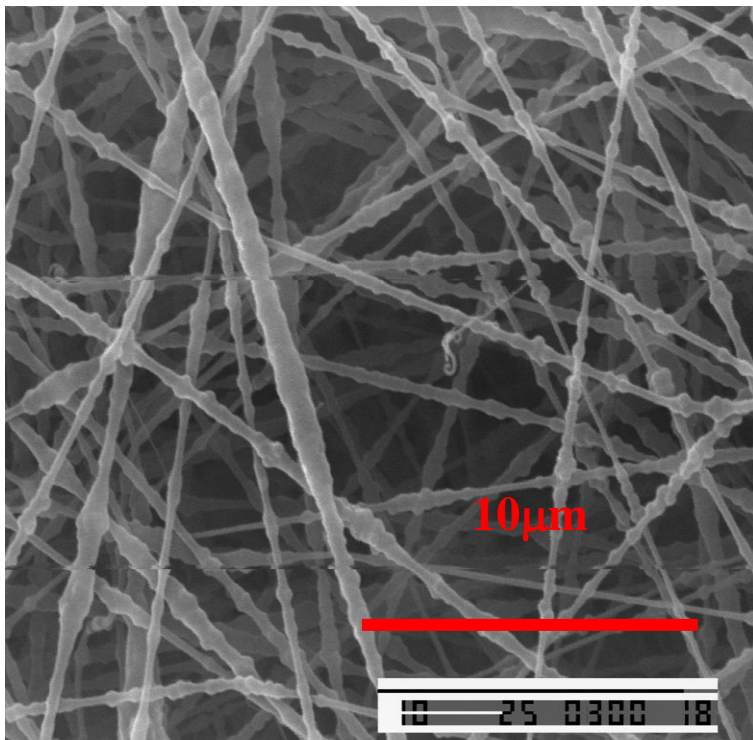
Food-grade biopolymers such as proteins or polysaccharides can be used to develop nanometer-sized particles



Example of Chitosan nanospheres

Various lipid or water soluble health beneficial compounds can be encapsulated to protect them against degradation

**Nanofibers can encapsulate omega-3 fatty acids and nutrients such as vitamins, antioxidants to protect them against degradation**



# Conclusions

- Many new potential health beneficial compounds are currently under development
- Some of these products will be launched as dietary supplements, some may be used for food applications – new health claim applications?
- New technologies are available/under development for producing well known compounds in large scale and under controlled conditions
- Some of these compounds will fall under current health claim regulation
- New technologies are under development to encapsulate existing health beneficial compounds. May require specific permission before addition to food can be allowed



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