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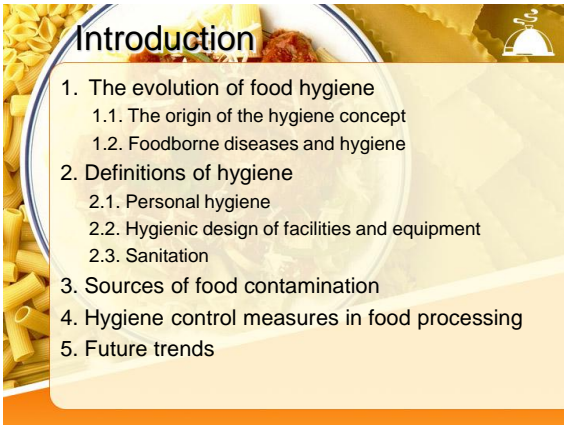
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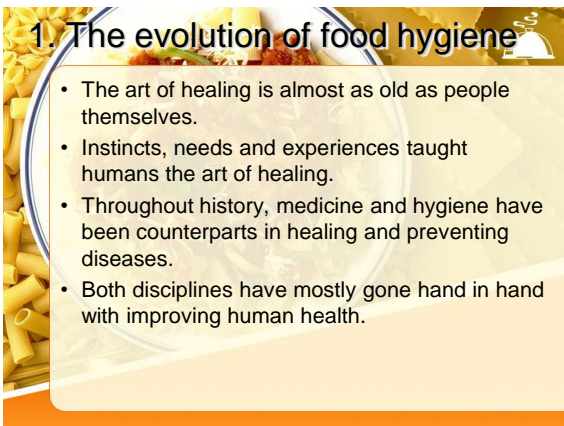
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### 1.1. The origin of the hygiene concept

- Hygeia, the goddess of health
- Hippocrates (460±377 BC)
- Other hygiene measures
- The re-emergence of hygiene
- The 'Natural Hygiene' concept
- Hygienic developments in Europe

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### Hygeia, the goddess of health

- In Greek mythology, Asclepius, son of Apollo and referred to as the god of medicine or healing, was a healer who became a Greek demigod, and was a famous physician.
- He was the most important among the Greek gods and heroes who were associated with health and curing disease.
- Shrines and temples of healing, known as Asclepieia, were erected throughout Greece where the sick came to worship and sought cures for their ills.
- Among the children of Asclepius the best known are his daughters Hygeia and Panacea.
- Hygeia became the goddess of healing and she focused on the healing power of cleanliness. She introduced and promoted the idea of washing patients with soap and water.

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### Hippocrates (460 - 377 BC)

- Hippocrates, the most famous doctor in ancient Greece, was called the Father of Medicine.
- Hippocrates based medicine on objective observation and deductive reasoning.
- His medical school and sanatorium on the island of Kos developed principles and methods in curing that have been used ever since.
- Hippocrates and his followers elaborated an entirely rational system that was based on the classification of the symptoms of different diseases.
- He taught that medicine should build the patient's strength through diet and hygiene, resorting to more drastic treatment only when necessary.

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### Other hygiene measures

- Over many millennia, humankind has learned how to select edible plant and animal species, and how to produce, harvest and prepare them for food purposes.
- This was mostly done on the basis of trial and error and from long experience.
- Many of the lessons learned, especially those relating to adverse effects on human health are reflected in various religious taboos, which include a ban on eating specific items, such as pork, in the Jewish and Muslim religions
- In India, for example, religious laws prohibited the consumption of certain 'unclean' foods, such as meat cut with a sword, or sniffed by a dog or cat, and meat obtained from carnivorous animals

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### The re-emergence of hygiene

- In the Middle Ages folk-medicine developed rapidly. Medicinal plants, animal parts and minerals were used to get rid of disease symptoms.
- Later, surgery was used as a cure. At the beginning of the 1800s the excesses of doctors and the cottage industry of drugs led to general loathing and ridicule of the medical profession by the public in the USA and Europe.
- For at least a century strychnine was the best remedy the profession had for palsy and paralysis. It was used to kill rats, cats and dogs.
- Alcohol was a foundation of the many bitters that were sold to the people as tonics, as it was the chief ingredient in many of the patent nostrums sold

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### The 'Natural Hygiene' concept

- The truths proclaimed by Jennings and Graham found immediate and widespread acceptance. After becoming fully convinced of the correctness of his 'Do-Nothing Cure' and the 'No-Medicine Plan', Jennings announced his discovery to the world, but he was misunderstood.
- Hygiene became so popular, that traditional medicine finally had to adopt parts of the 'Natural Hygiene' concept.
- Later, when it became clear that 'germs' were the cause of many diseases, the new 'hygiene' was incorporated with the drug usage of medicine and the word hygiene got the meaning it has today.

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### Hygienic developments in Europe

- Ignac Fulop Semmelweis (1818-1865) was a Hungarian physician who demonstrated that puerperal fever (also known as 'childbed fever') was contagious and that its incidence could be drastically reduced by enforcing appropriate hand-washing behaviour by medical care-givers.
- Joseph Lister (Lord Lister, 1827±1912) introduced antiseptic surgery. By the middle of the 19th century, post-operative sepsis infection accounted for the death of almost half of patients undergoing major surgery.

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### Foodborne diseases and hygiene

- Foodborne diseases
  - Public health concern with foodborne diseases emerged around the 1880s. This was after microorganisms had been found to be infectious agents. Koch and his assistants devised the techniques for culturing bacteria outside the body, and formulated the rules for showing whether or not a bacterium is the cause of a disease
  - The late of 1880s that the generic term 'food poisoning'
  - Typhoid emerged in the UK as a major urban hazard in the 1830s and was largely water-borne.
  - The term encompasses infant diarrhoea, the condition responsible for some 30% of infant mortality before 1901.

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### Foodborne diseases and hygiene

- Foodborne diseases
  - Later milestones in this category included the recognition of *Clostridium perfringens* as a foodborne pathogen in 1943 (McClane, 1979) and *Bacillus cereus* in the 1950s (Kramer and Gilbert, 1989). Human infections with *Listeria monocytogenes* were well known by the 1940s and foodborne transmission was suspected
  - Around 1980 -1985 *Salmonella enteritidis* reemerged via the internal contamination of chicken eggs. At the same time a new emerging pathogenic started to emerge: *Escherichia coli* O157: H7

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**Foodborne diseases and hygiene**

- Hygiene
  - Following the discovery, around 1880, that food can be an important source of disease-causing organisms, investigations started to concentrate on the reservoirs and routes of transmission of pathogens. The research of Buchanan (cited by Oddy and Millar, 1985) revealed an association between infant diarrhoea, re
  - Savage (1909) observed that faecal contamination of food must be very common. Milk, in particular, was suspected to be a vehicle of infection. Theodor Escherich, a German paediatrician, who devoted his efforts to improving childcare, particularly in relation to infant hygiene and nutrition, was the first to make a plea for heat-processing of milk to prevent infant diarrhoea fuse tips and flies.

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**Foodborne diseases and hygiene**

- Hygiene
  - Real progress was made when Esty and Meyer (1922) developed the concept of process-performance criteria for heat treatment of low-acid, canned food-products to reduce the risk of botulism
  - Food and Drug Act was introduced in the UK in 1938, was it necessary to use hygienic conditions and practices in handling, wrapping and delivering food, and adequate hand-washing facilities were required for food handlers.

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**Definitions of hygiene**

- The first definitions of 'hygiene' are derived from the work of the goddess Hygeia:
  - 'healing through cleanliness';
  - 'the science dealing with the preservation and promotion of health'.
- However, because of the many failures during the 18th and 19th centuries, hygiene re-emerged as the key discipline.
- Natural Hygiene addresses all aspects of living: the environment, food, work, home, economics, spirituality, psychology, politics, etc. and those other factors that positively influence health and well-being.

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### Definitions of food hygiene in current use.

- Conditions and practices that preserve the quality of food to prevent contamination and foodborne illnesses.
- All measures necessary to ensure the safety and wholesomeness of foodstuffs. EU's General Food Hygiene Directive
- All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain. Codex Alimentarius Commission
- The measures and conditions necessary to control hazards and ensure fitness for human consumption of a foodstuff,

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### Sources of food contamination

- microbiological;
- chemical;
- Physical

Foods can become contaminated during growth and harvesting of raw materials, storage and transport to the factory, and processing into finished products.

The final product may then become (re-)contaminated during subsequent storage and transport to shops, and during storage and preparation by the consumer.

The main sources of contamination are the environment, animals and people.

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### Sources of food contamination

- Animals are important reservoirs of microorganisms, and slaughter animals introduce large numbers of microorganisms into the processing plant.
- Air can be a significant medium for the transfer (vector) of contaminants to food products
- Water is used in the food industry as an ingredient, a processing aid and for cleaning. Its use as an ingredient or processing aid can give rise to both microbial and chemical contamination, so it is important to use water of a high microbiological and chemical quality
- Water used in hand-washing facilities poses a potential problem, as does that from condensation of steam or water vapour, leaking pipes and drains, and rainwater.

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### Sources of food contamination

- Pests, such as birds, insects and rodents, are potentially a major contamination problem, and particular care needs to be taken to prevent their entry into food production areas.
- Buildings must be designed to keep them out.
- Floors, ceilings and walls should not allow insects and other invertebrates the chance to live and breed.

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### Hygiene control measures in food processing

- Hygiene in food processing started with the introduction of general measures, including cleaning and disinfection, prevention of recontamination and treatment of food products to kill any microbial pathogens present.
- Heat treatment was introduced into food processing even before the underlying causes of foodborne illness were known.

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### General hygiene practices

- Design of premises and equipment.
- Control of the production process.
- Plant maintenance and cleaning.
- Personal hygiene.
- Transportation
- Product information and consumer awareness.
- Staff training.

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### Future trends

- Improving information on foodborne diseases
- Assessment of process performance
- Further development of hygiene control
- Changing pattern of microbial hazards
- Building hygiene into the system

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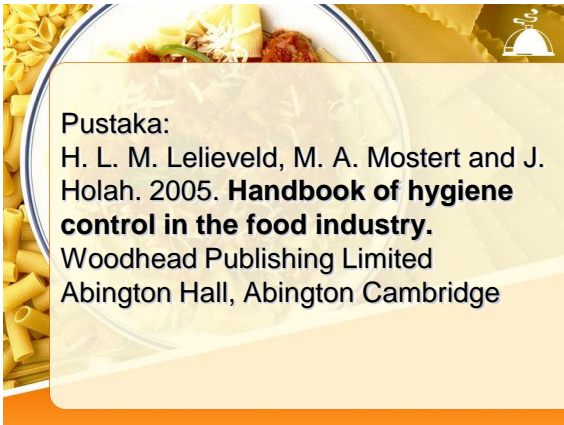
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Pustaka:  
H. L. M. Lelieveld, M. A. Mostert and J. Holah. 2005. **Handbook of hygiene control in the food industry.**  
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