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*Food pathogens as the most common cause
of bacterial food poisoning*

The human and animal habitat is associated with various microflora. The microbiological composition of food products is equally varied, both qualitatively and quantitatively depending on the kind of products, materials, thermal methods used and hygiene measures followed before, during and after the production process. The lack of compliance with these principles is likely to lead to bacterial food poisonings. The characteristics of etiological factors which are the most common cause of bacterial food poisonings are presented below.

Salmonella food poisonings and infections. In Poland, similarly to other countries, food borne poisonings and infections in humans caused by *Salmonella* are an extremely important epidemiological problem. Over 94% of cases of mass food poisonings and infections are caused by *Salmonella* type bacteria. Therefore, HACCP system introduced in many food-processing plans lays special emphasis on the dangers related to *Salmonella*. This mainly concerns the processing of poultry meat and eggs. Among farm animals, being the primary reservoirs, the main role is played by poultry followed by swine and cattle. One of the main reasons of an increase in the number of animal infections is their high concentration on small farm areas. The spread of microorganisms is also facilitated by the presence of factors transmitting them, i.e. rodents, insects, birds, equipment. Moreover, these factors include industrial fodders often contaminated by various *Salmonella* rod-like bacteria.

B o t u l i s m. Botulism caused by *Clostridium botulinum* belongs to the most frequent bacterial food poisonings. The studies show that the main reservoir of these bacteria are upper layers of soil, slime of anoxic water reservoirs containing organic substances (lakes, rivers, seas) and sometimes riparian sand. This kind of spread results in a relatively easy infection of vegetables and other crops, fodders, fish and other animals. The main causes of botulism are canned meat, vegetables and fish. Fish poisonings may occur after the consumption of canned products as well as salted or smoked fish. Some poisoning cases were also observed after the consumption of ripening cheese, in which the main sources of infection were the infected straw mats used for cheese ripening.

S t a p h y l o c c o c c a l e n t e r o t o x i n p o i s o n i n g s. Nowadays in many countries staphylococcal poisonings belong to the most common food poisonings. This is associated with an increasingly wider spread of staphylococcal carrier state of potentially pathogenic staphylococci among humans and animals, which facilitates food contamination. Staphylococcal food poisonings may be caused by various products, e.g. meat, fish and dairy products, cookies, salads, etc. The most common sources of staphylococci are carriers and people with purulent changes, infected skin injuries, particularly of hands. The animal-derived food, such as meat or milk, may be originally infected with staphylococci if it comes from the diseased animals. The secondary staphylococcus infections may result from improper washing of equipment and utensils. The pickling cans are extremely important, particularly those

containing oil as in this medium staphylococci are most strongly resistant to high temperature.

Clostridium perfringens poisonings. *Clostridium perfringens* poisonings occur almost exclusively after the consumption of meat meals, especially: jellies, pies, roasts and meat gravy prepared on the previous day, left in big amounts for slow setting and served cold. Due to their high thermoresistance, the *Clostridium perfringens* spores survive cooking processes of meat. Moreover, as the studies have demonstrated, the thermal shock promotes spore germination and in some cases is a prerequisite of activation. An increasingly common cause of poisonings is roast poultry, especially turkey carcasses. The presence of *Clostridium perfringens* in slaughtered animal meal is largely determined by the lack of rest of animals before slaughter.

Vibrio parahaemolyticus poisonings. Such poisonings are almost exclusively related to the consumption of sea fish or "seafood" prepared, according to the Japanese way, from raw or insufficiently heated meat. In the past, *Vibrio parahaemolyticus* was believed to occur only on the seashores of Japan, however, the studies demonstrated its significant spread in various seas and oceans. The bacterium was also found in the Baltic Sea and its fish.

Campylobacter jejuni poisonings. *Campylobacter jejuni* poisonings in humans are mainly caused by poultry meat and its products. During the technological process the carcasses and internal organs often get contaminated by intestinal contents, additionally the moist poultry skin during slaughter creates the conditions suitable for bacterial infections. The infections may also be caused by beef and pork meat, unboiled milk or tap water. The microorganisms may be indirectly transmitted to men through rodents, insects, fertilizers, bedding, slaughter and municipal wastes and faeces.

Listeria monocytogenes poisonings. *Listeria monocytogenes* is an etiological factor of a human and animal disease called listeriosis. The most common food sources of infections include milk and its products. The disease is associated with wide spread of the pathogen in the external environment, improper hygiene during milking and inappropriate milk processing. An additional factor increasing the risk of infection in men is the ability of *Listeria monocytogenes* to grow in the food stored at low temperatures. Moreover, *Listeria monocytogenes* is a microorganism which often occurs in the meat of slaughtered cattle and poultry. Additionally, the infections may be caused by smoked fish, particularly from the *Salmonidae* family.

Yersinia enterocolitica poisonings. Recently an increasingly greater attention is paid to food poisonings caused by *Yersinia* genus, whose reservoir is the soil; the most dangerous is *Yersinia enterocolitica*. In such infections the microorganism is isolated from the ingested food contaminated by faeces or infected water. The *Yersinia enterocolitica* carrier state in animals is varied and reaches 5–55% in swine, 29% in poultry and 11% in cattle.

Bacillus cereus food poisonings. *Bacillus cereus* is widely spread, may be found in soil and on plants. With dust or earth it is likely to get to various food products. Being an aerotolerant bacterium, it may multiply in canned food leading to its spoilage; it is also often found in milk. Its growth is promoted by starch, therefore poisonings occur most frequently after the consumption of starch-containing products, e.g. puddings, vegetable salads, black pudding, cookies, particularly with pudding cream if kept at the ambient temperature. Moreover, the infections are likely to be caused by flour meals, soups, spices, minced meat and sausages.

Dietary recommendations in acute gastrointestinal disorders. In acute gastritis the patients should be subjected to 24–48-hour starvation; unsweetened fluids of moderate temperature such as boiled water, physiologic salt solution, tea without sugar, camomile or mint tea, 100 ml every hour, should be administered. The fluids ought to be slightly salted to supplement the losses of sodium chloride. Once the patient's condition improves, salted rice or barley gruels without fat or sugar are introduced. Moreover, if tolerated by the patient, diluted fruit-vegetable juices may be given with boiled water – 1:4 during first days and 1:1 on the following days. The juices for

children are recommended as they do not contain preservatives. The juices will supplement the deficiency of potassium, other minerals and vitamins. The apple juice is contraindicated since it promotes fermentation processes in the intestines. After 2–3 days the diet should be widened; biscuits, stale rolls, boiled apples, carrot purée, low-fat chicken soup, veal and poultry (boiled or minced), small groats (semi-liquid) or big groats (rubbed) are gradually introduced, followed by small amounts of diluted milk, low-fat cottage cheese, potato puree with butter, sugar, oil. Once the symptoms subside, the patient ought to be put on a protective diet.

REFERENCES

1. Ciborowska H.: *Dietetyka*. PZWL, Warszawa 2000.
2. Ganowiak Z.: Żywność – mikrobiologiczne i pasożytnicze zagrożenia zdrowotne. *Bromat. Chem. Toksykol.*, 30, 231, 1997.
3. Sinell H. J.: Mechanizmy chorobotwórczości drobnoustrojów wywołujących pokarmowe zakażenia i zatrucia. *Med. Wet.*, 47, 3, 1991.
4. Windyga B.: Jakość mikrobiologiczna żywności. *Roczn. PZH*, 66, 247, 1995.
5. Wojtoń B.: Mikrobiologiczne zanieczyszczenia żywności pochodzenia zwierzęcego w Polsce. *Med. Wet.*, 53, 332, 1997.

SUMMARY

The aim of the paper was to characterize the food borne microorganisms, which are the most common causes of bacterial food poisonings in humans. Furthermore, the dietary recommendations in acute gastro-intestinal disorders were presented.

Patogeny żywności – najczęstszą przyczyną zatruc pokarmowych o etiologii bakteryjnej

Celem pracy było scharakteryzowanie drobnoustrojów, będących najczęstszą przyczyną bakteryjnych zatruc pokarmowych, których nośnikiem jest żywność. W pracy podano również zalecenia żywieniowe w przypadku ostrego dolegliwości żołądkowo-jelitowych.