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The Capacity of Intestinal Staphylococci to Produce Enterotoxin.

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Voprosy Pitaniya (Moscow), 15: 5: 55-86, 1956.

An investigation of the sources of insensitization of food products and prepared food with staphylococci which produce enterotoxin has a great practical importance. It has been established that this source may be humans with impetiginous lesions of a staphylococcal character and animals suffering with mastitides of coccal origin.

According to the opinion of some authors, the infection of food with staphylococci has also been linked to the transmittal of staphylococci to the mucous membrane of the mouth and nose.

There exists data about the possibility of dissemination of staphylococci from the intestinal content of healthy people and from the patients with intestinal illnesses; suppositions have been voiced about the possible role of the staphylococci of such an origin in the genesis of food poisonings. However, the enterotoxic properties of the staphylococci were not investigated in these works. For isolation of the staphylococci from the fecal pellets we used a meat-peptone agar with a 7.5-% sodium-chloride content. This medium suppresses the growth of the bacteria of the intestinal group. The dishes with the inoculations were kept in a thermostat for 48 hours at 37°C. The chromogenesis, hemolytic capacity and plasma coagulation properties of the cultures were studied.

The enterotoxic properties of the staphylococci were ascertained in cats and kittens that were inoculated with filtrates of the staphylococcal cultures grown in CO<sub>2</sub>.

In all, 56 people were checked; staphylococci were isolated from the intestinal contents of 34 - all of the chromogenic varieties were detected: gold-colored in 17 cases, white in 13, and lemon-yellow in only 4 cases.

The positive results in the test for hemolysis (5 % blood agar) gave 25 strains. In addition to this, 7 strains of the staphylococci gave a weak zone of hemolysis. The capacity of coagulating citrated human blood serum was manifested by 6 strains.

The capacity of the isolated strains of staphylococci to produce enterotoxin was investigated in 8 kittens and 14 cats. Filtrates of the cultures were given to the kittens orally in an amount of 10 ml, and injected intravenously into the cats - 2 ml of the filtrate to 1kg of the animals weight. Experimental staphylococcal intoxication was produced in the animals by filtrates of the 13 strains of staphylococci, which were isolated from the intestinal content of the healthy people. Clinically the experimental intoxication in the kittens and cats was manifested by disorders in the gastro-intestinal tract, by vomiting and diarrhea. Some of the filtrates produced a lethal illness.

Thus, of the 34 strains of staphylococci of intestinal origin, 15 were capable of producing enterotoxin. Consequently, the enterotoxic strains are encountered rather frequently in the intestine of healthy individuals. The characteristics of these 15 strains are shown in the attached table.

It is evident from the table that all of the strains, regardless of chromogenesis, have the capacity to produce enterotoxin. Of the 15 enterotoxic strains of staphylococci that were isolated, 6 coagulated plasma, and 13 gave a zone of hemolysis in a blood agar.

Thus, the biochemical tests - the reaction of the dish hemolysis and the plasma coagulation - cannot be adequate criteria for differentiating the enterotoxic strains of the staphylococcus, and cannot supersede the biological test on kittens and cats, which are sensitive to the staphylococcal enterotoxin.

In connection with the discovery of the enterotoxic strains among the staphylococci, isolated from the fecal pellets of healthy humans, there arises a question as to the possibility of an infection of products and food by the staphylococci of intestinal origin, and subsequently, about their role in outbreaks of food intoxication of a staphylococcal etiology.

Characteristics of the enterotoxic strains of the staphylococci of intestinal origin.

No. of Strain	Hemolysis Reaction	Plasma Coagulation Reaction.	Chromogenesis	Reaction of the animals to injection of the filtrate.
956	+	-	Gold-colored	vomiting and diarrhea
19 170/3	+	+	"	same
42 086	+	-	lemon-yellow	vomiting
42 112	+	+	white	diarrhea and vomiting
42 075	+	-	"	vomiting
42 103	+	+	"	diarrhea and vomiting
42 104	+	+	"	same
42 105	-	+	lemon-yellow	diarrhea, death.
42 106	+	-	gold-colored	vomiting
42 109	+	-	white	diarrhea and vomiting
42 110	+	-	"	same
42 117	-	+	gold-colored	diarrhea, vomiting, death
42 118	+	-	"	diarrhea, death
42 120	+	-	"	diarrhea and vomiting
42 123	+	-	"	same