easily and quickly lowered or raised (Fig. 2). Thus, the necessity of a time-consuming prehypothermic state, the shock of surface cooling with the subsequent biological catastrophe of the "stress phenomenon," and the arrhythmia of ventricular fibrillation that are encountered in previously used external cooling methods are eliminated by use of this internal method.

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19 December 1955

Anaphylactic Shock in Guinea Pigs Sensitized to Polytyrosylgelatin

The lack of antigenicity of gelatin has been explained by the deficiency of aromatic groups in this protein. As a matter of fact, the attachment of O-β-glucosido-N-carbobenzoxytyrosine (*1*) or N-carbobenzoxytyrosine (*2*) to gelatin gave substances which elicited the production of antibodies. The finding of Maurer (*3*) that gelatin shows weak antigenic character in man does not seem to invalidate the assumed role of tyrosine in enhancing antigenicity. In this paper, we want to report the sensitization of guinea pigs by repeated injections of a modified gelatin in which L-tyrosine polypeptides are attached to the free amino groups of gelatin through peptide bonds (*4*).

The polytyrosylgelatin was prepared as follows: O-carbobenzoxy-N-carboxy-L-tyrosine anhydride (*5*) was polymerized in aqueous dioxane solution (1 to 1) at *p*H 7.0 (phosphate buffer) and 5°C in the presence of gelatin (*6*), containing less than 1 percent tyrosine. The carbobenzoxy groups of the polycarbobenzoxy-L-tyrosylgelatin obtained were removed with anhydrous hydrogen bromide in glacial acetic acid, and the product formed was dialyzed against water. The polytyrosylgelatin that was obtained contained 16 percent tyrosine as determined spectrophotometrically. Unlike poly-L-tyrosine, which is soluble in water only in the presence of strong alkali (*5*), polytyrosylgelatin is soluble in water, acids, and bases. Since polytyrosine is insoluble at physiological *p*H, a copolymer of L-aspartic acid and L-tyrosine in a residue molar ratio of 9 to 1 was prepared for comparison.

Guinea pigs weighing 200 to 250 g received intra-abdominally three injections of 0.5, 1.0, and 2.0 ml, respectively, of the substance to be tested for its sensitizing potency. Five-percent solutions of gelatin and polytyrosylgelatin and 1-percent solutions of the copolymer of tyrosine and aspartic acid were used, and the injections were given at 3-day intervals. Fifteen days after the last intra-abdominal injection, all the pretreated animals, as well as an equal number of nontreated controls, received intracardial injections of 0.25 ml of solutions of the substances to be tested for their antigenicity.

Two out of five guinea pigs that were sensitized with polytyrosylgelatin exhibited large drops in body temperature after an intracardial injection of a 0.2-percent solution of the homologous substance, while three showed typical anaphylactic shocks and died (see Table 1). No serious symptoms were observed in nonsensitized animals or in animals that were pretreated with the copolymer, even when 2-percent solutions of polytyrosylgelatin were injected. Gelatin injected as a 5-percent solution, or the copolymer as a 1-percent solution, did not produce in sensitized or in untreated animals any significant symptoms except slight drops in temperature.

The results obtained (Table 1) show clearly that polytyrosylgelatin injected intra-abdominally sensitizes guinea pigs against intracardial injection of the same compound. Since no sensitization was observed by a similar treatment with gelatin, or with a copolymer of tyrosine and aspartic acid, it seems plausible to assume that the attachment of tyrosine peptides enhances the antigenicity of gelatin.

Table 1. Anaphylactic reactions in nonsensitized and sensitized guinea pigs. G, gelatin; PTG, poly-L-tyrosylgelatin, containing 16 percent tyrosine; CAT, copolymer of L-aspartic acid and L-tyrosine in a residue molar ratio of 9 to 1.

Previous treatment	Intracardial injection	Animals (No.)	Death (No.)	Avg. temperature decreases (°C)
Nonsensitized	G	5	0	0.68
G	G	6	0	1.35
Nonsensitized	PTG	5	0	0.80
PTG	PTG	5	3	3.60
CAT	PTG	5	0	0.50
Nonsensitized	CAT	5	0	0.80
PTG	CAT	5	0	1.20
CAT	CAT	5	0	0.40

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6 January 1956

Histological Changes Induced in Soybean Roots by 2,4-Dichlorophenoxyacetic Acid

The anomalous structure caused in the hypocotyl of soybean seedlings by treatment with 2,4-dichlorophenoxyacetic acid (2,4-D) has been reported in an earlier paper (*1*). The present investigation (*2*) is concerned with the histological changes in response to treatment with 2,4-D in the primary roots of soybean seedlings. The method used was essentially the same as that described in the earlier paper (*1*).

Retardation of elongation in the root became apparent on the third day after treatment. The tips of the treated roots were slightly larger in diameter than those of the untreated ones. Histological preparations were made of normal roots and of roots treated with 2,4-D.

Before describing the treatment with 2,4-D, it may be well to review briefly the anatomical structure of the soybean root. The root has a unistratose epidermis. The cortex consists of eight to 11 layers of parenchyma limited on the inside by the endodermis. Immediately within the endodermis lies the pericycle, which is one or two cell layers in thickness adjacent to the primary phloem, and two or three cell layers in thickness opposite the protoxylem ridges. The primary phloem consists of four strands of tissue alternating in position with the protoxylem ridges of the tetrarch structure (Fig. 1).

In the 2,4-D-treated roots, the epider-