Specialized gero-dietetic product meat-based VITASTIMULIN for nutrition of elderly and aged people

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The analysis of scientific publications, patent and publicity materials shows that at present the assortment of specialized nutritional products which belong to the group of gero-dietetic ones is rather limited, practically all of them are products vegetable- or milk based. Specialized gero-dietetic products meat-based are practically not produced. Such a situation shows that the problem of developing gero-dietetic products meat-based for the nutrition of elderly and aged people is rather topical one, deserving the most serious attention of scientists and specialists of meat industry.

In this connection, authors of the present report carried out formalization of special medico-biological requirements to which specialized gero-dietetic products must satisfy. This formalization was made on the basis of up-to-date conceptions of gerodietetics, which follow from principles of balanced nutrition developed by academician A.A.Pokrovsky, these principles being developed as applied to metabolism in elderly and aged people in Nutrition Institute and Gerontology Institute of the Academy of Medical Sciences of the USSR.

In a formalized form these requirements as applied to the main macronutrients are as follows: - the ratio of mass quotas of protein and fat $\approx$ I:0,8; - the ratio of mass quotas of lysin and sulphur-containing amino acids $\rightarrow$ I, lysin scor, concerning FAO/WHO standard, having to be changed to decreasing /$S_{Lys} <$ I00 %/, methionin+cystin scor having to be changed to increasing /$S_{Met+Cys} >$ I00 %/; - the mass quota of tryptophan must be less than I g/I00 g of protein; - the ratio of mass quotas of saturated, monounsaturated and polyunsaturated fatty acids must correspond to the following series of numbers: 3:6:I, a set of polyunsaturated fatty acids having to contain polyunsaturated fatty acids concerning to ω 3 group; - the energy value of the finished product must be in limits of 600-650 kJ/I00 g.

In addition, the product must contain thermostabil components which are able to inhibit oxidation processes of lipid membranes in the organism and to stimulate peristalsis, to favour the regulation of cholesterol metabolism, as well as it must possess a high protein digestion under the influence of enzym systems in digestive tract.

For grounding preferable ingredients for designing formulations of specialized gero-dietetic products with taking into account the formalized requirements above-mentioned 83 varieties of protein-, fat-, carbohydrate-containing raw materials of animal and vegetable origin were estimated. This estimation showed that from the position of amino acid composition the following varieties are preferable: from animal raw material - beef of top-quality, beef trimmings, horse-meat, beef jowl, dried bone broth, chicken eggs; from cereals - corn meal, oat flour, ricemeal, millet, buckwheat, porridge oats; from vegetables - carrot, cab-

bage. Just these varieties of raw materials were used for computer modelling the amino acid composition of protein module of gero-dietetic products.

On the results of this stage of modelling near 2500 variants of the ratio of ingredients above-mentioned were analyzed. The use of the criterion, proposed by authors on the basis of formalization of special requirements to the protein amino acid composition of gero-dietetic products:

$$K = \alpha \frac{m_{Met} + Cys}{m_{Lys} \cdot m_{Trp}} \qquad (I)$$

allowed to choose the preferable formulating composition of a protein module, whose amino acid composition differs to a large extent from FAO/WHO standard, but at the same time meets to the greatest degree the specificity of gero-dietetic nutrition. The formulation of a protein module includes the following components: top-quality beef, beef trimmings, oat flour, corn meal, dried bone broth. Their ratio is "know-how"(USSR patent).

In the formula (I) the following signs are accepted: K - coefficient of amino acid correspondence, fraction of unity; α = I - coefficient of proportionality, g/I00 g of protein; m_{Lys}, $m_{Met+Cys}$, m_{Trp} - mass quotas of lysin, methionin+cystin, tryptophan, g/I00 g of protein.

For approaching the composition of a product designed to the gero-dietetic requirements, concerning the set of fatty acids, computer designing of a balancing fat module was carried out taking into account that ingredients to be included in the formulation of a protein module, such as top-quality beef and beef trimmings, contain a considerable quantity of fat with excessive mass quotas of saturated fatty acids.

The analysis of results of computer designing of the fatty acid composition of a fat module showed that the best approach to the gero-dietetics requirements was ensured in the case when in its formulation salted pork backbone fat and soy-bean oil, taken in strictly determined proportions, were used, a fat module having to be added to a protein one in the ratio of 0,II:0,89. Calculated fatty acid composition of a gero-dietetic product designed corresponding to these conditions is characterized by the following values of fatty acid mass quotas (% to fat).

Σ of saturated fatty acids	Σ of monounsaturated fatty acids	Σ of polyunsaturated fatty acids	linoleic acid	linolenic acid	arachidonic acid
35,78	52,63	II,59	9,I4	2,25	0,20

The final variant of the formulation of gero-dietetic product designed (VITASTIMULIN), taking into account the need of salt and spices addition, includes the following components:

Top-quality beef
Beef trimmings
Oat flour
Corn meal
Dried bone broth
Salted pork backbone fat
Soy-bean oil
Sodium chloride
Onions
Carrot
Black pepper

Taking into account the individual characteristics of formulation components of VITASTIMULIN, for developing a product,which combines the high degree of readiness, the possibility of use as the only supplier of nutrients, the adequate biological value, good organoleptics and prolonged storage, the scheme of canned pastes manufacture was chosen as a basic technology for its production.

Together with traditional technological operations in this scheme additional ones were included connected with the pre-treatment of corn meal, oat flour and dried bone broth for the next preparing the stuffing mix. When grounding conditions of making these operations, it was taken into account that in the process of traditional pre-treatment of non-salted meat raw materials for preparing the stuffing mix, e.g. during cooking, about 25 %mass of the broth, into which a great quantity of fat and protein is extracted, is accumulated.

By means of sufficiently simple technological experiments and organoleptic estimation it was established that for the complete use of broth and ensuring the delicate consistency characteristics of paste produced the cooking operation of beef trimmings, top-quality beef and pork backbone fat must be carried out in double quantity of water to their total mass.

Experimental data obtained characterising the complex of qualitative properties of the sterilised specialized gero-dietetic product VITASTIMULIN which was manufactured in accordance with the technological scheme developed by authors are given below (Table I).

Table I

Mass quotas of macronutrients and their components:

Moisture, %	73,7 ± I,8	Protein, %	I0,I ± 0,7
Fat, %	7,3 ± 0,5	Amino acids, g/I00 g of protein	
Fatty acids, % to fat		Iso	4,I5-4,27
saturated	35,78	Leu	8,45-8,65
monounsaturated	52,63	Lys	6,I5-6,28
polyunsaturated	II,59	Met+Cys	3,56-3,60
Carbohydrates (total), %	9,I ± 0,4	Phen+Tyr	6,83-6,97
hydrolyzed	8,2I± 0,38	Tre	3,6I-3,67
Ballast matters, %	0,9I± 0,02	Trp	0,94-0,96
Minerals, %	I,7 ± 0,I	Val	5,39-5,48
Sodium chloride, %	0,8 ± 0,03	Coefficient of amino acid correspondence	$K = (I,65)^{-I}$

Mass quota of vitamins,* mk g/I00 g of product

Vitamin A	I6,0	Thiamin /B_I/	42,0
Vitamin C	I92,0	Riboflavin /B_2/	6,0
Tocopherol /E/	980,0	Niacin /PP/	I64,0

Protein digestion "in vitro", % to tyrosin - 79,5

Energy value of I00 g of product: 625 ± I0 kJ

*Were determined by calculating (with regard for coefficients of thermodegradation) according to recommendations of Nutrition Institute of the USSR Academy of Medical Sciences

Clinical trials of paste-like product VITASTIMULIN were carried out at the department of cardio-vascular pathology of Nutrition Institute under the direct guidance of Head Dietitian of the USSR, Corresponding Member of the USSR Academy of Medical Sciences M.A. Samsonov.

This product was included into the ration of patients at the age of 60-70 every day during 20 days. All the patients without exception estimated taste properties of the product as excellent ones on five-point system. The biochemical analysis showed that as a result of this product consumption the lipid spectrum of blood showed a tendency which is characteristic for hypolipemic effect with antisclerotic trend:true decreasing of cholesterol content was established, arterial blood pressure became normal. Decreasing of antitrypsin in patients' blood serum observed indicates that dietary therapy with the gero-dietetic product developed influenced normally on the enzym function of pancreas.

As a whole, clinical trials, as specialists of Nutrition Institute concluded, proved promising use of this paste-like product meat-based for nutrition of elderly and aged people.