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DEVELOPMENT OF GERODIETARY MEAT PRODUCTS

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The relevance of the presented research on the development of gerodietary meat products is due to the fact that the relative preferences shown by older people to various protein sources, including animal protein sources such as red meat and poultry, as well as alternative plant-based protein sources, have not yet been identified. The food choices of older adults have not been studied, nor have their preferences and willingness to pay for different carbon tags depending on the protein source. The purpose of the study is to consider the current state and prospects for the development of gerodietary meat products. This article is an exploratory attempt to describe potential pathways for the development of nutritionally balanced gerodietary meat products aimed at helping older adults maintain an active and healthy aging process. The object of the study is age-related changes in the consumption of meat products. Age undoubtedly affects thresholds for recognizing basic tastes, especially sweet and salty. In particular, higher threshold values for sucrose and sodium chloride were found among older people compared to young people. Higher taste recognition thresholds create a natural need to add sugar and salt to food. The research methodology was a qualitative content analysis of the collected material. At the first stage, the texts of publications devoted to the production of gerodietary meat products were read and re-read in their entirety, that is, the so-called naive reading was carried out. Then thoughts were recorded regarding the integrity and relatively important elements of the publications read, arising on the basis of impressions aroused under the influence of naive reading. Further, all parts of publications related to the purpose of researching gerodietary meat products were divided into approximately identical semantic units. Qualitative content analysis involved grouping gerodiet meat products by identifying common characteristics between them, according to production processes and ingredients. At the next stage, the semantic units were subject to codification, and a number of categories with subcategories arose. Finally, after all the texts of the publications had been read, the texts were compared with the results of the undertaken content analysis, which made it possible to verify the reality of the coverage of the content of the publication texts and codes by the selected categories and subcategories in full.

Keywords: health maintenance, metabolic studies, altered texture, appetite stimulation, protein content, diet.

РАЗРАБОТКА ГЕРОДИЕТИЧЕСКИХ МЯСНЫХ ПРОДУКТОВ

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Актуальность представляемого исследования разработки мясных продуктов геродиетического питания обусловлена тем обстоятельством, что до сих пор не выявлены относительные предпочтения, оказываемые пожилыми людьми различным источникам белка, в том числе таким источникам белка животного происхождения, как красное мясо и птица, а также альтернативным источникам белка растительного происхождения. Не исследован выбор продуктов питания пожилыми людьми, не изучены их предпочтения и готовность платить за различные углеводные метки, зависящие от источника белка. Цель исследования состоит в рассмотрении современного состояния и перспектив разработки мясных продуктов геродиетического питания. В настоящей статье предпринята исследовательская попытка описать потенциальные пути разработки сбалансированных по питательным веществам мясных

продуктов геродиетического питания, направленных на оказание помощи пожилым людям в поддержании активного и здорового процесса старения. Объектом исследования выступают возрастные изменения в потреблении мясных продуктов. Возраст, несомненно, влияет на пороги распознавания основных вкусов, особенно сладкого и солёного. В частности, более высокие пороговые значения для сахарозы и хлорида натрия выявлены среди пожилых людей, по сравнению с молодёжью. Более высокие пороги вкусового распознавания вызывают естественную потребность в добавлении сахара и соли в пищу. В качестве методологии исследования применялся качественный контент-анализ собранного материала. На первом этапе тексты публикаций, посвящённых производству мясных продуктов геродиетического питания, читались и перечитывались целиком, то есть осуществлялось так называемое наивное чтение. Затем фиксировались размышления относительно целостности и относительно важных элементов прочитанных публикаций, возникающие на основании впечатлений, возбуждаемых под влиянием наивного чтения. Далее, все части публикаций, относящиеся к цели исследования мясных продуктов геродиетического питания, были разделены на примерно одинаковые смысловые единицы. Качественный контент-анализ включал в себя группировку мясных продуктов геродиетического питания путём выявления общих характеристик между ними, в соответствии с производственными процессами и ингредиентами. На последующем этапе смысловые единицы подвергались кодификации, возник ряд категорий с подкатегориями. Наконец, после того, когда все тексты публикаций оказались прочитаны, проводилось сопоставление текстов с результатами предпринятого контент-анализа, что позволило удостовериться в реальности охвата выделенными категориями и подкатегориями содержания текстов публикаций и кодов в полном объёме.

Ключевые слова: сохранение здоровья, метаболические исследования, изменённая текстура, стимулирование аппетита, содержание белка, рацион питания.

ГЕРОДИЕТИКАЛЫҚ ЕТ ӨНІМДЕРІН ӨЗІРЛЕУ

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Геродиетарлық ет өнімдерін дамыту бойынша ұсынылған зерттеулердің өзектілігі егде жастағы адамдардың әртүрлі ақуыз көздеріне, соның ішінде қызыл ет және құс еті сияқты жануар текті ақуыз көздеріне, сондай-ақ балама өсімдік негізіндегі ақуызға қатысты салыстырмалы артықшылықтарға байланысты. көздері әлі анықталған жоқ. Егде жастағы адамдардың тағам таңдауы зерттелмеген, сондай-ақ олардың артықшылықтары мен ақуыз көзіне байланысты әртүрлі көміртегі белгілерін төлеуге дайындығы жоқ. Зерттеудің мақсаты – геродиетарлық ет өнімдерінің қазіргі жағдайы мен даму болашағын қарастыру. Бұл мақала егде жастағы адамдарға белсенді және салауатты қартаю процесін қолдауға бағытталған тағамдық теңдестірілген геродиетарлық ет өнімдерін дамытудың әлеуетті жолдарын сипаттауға арналған зерттеу әрекеті. Зерттеу объектісі ет өнімдерін тұтынудағы жасқа байланысты өзгерістер болып табылады. Жас негізгі дәмдерді, әсіресе тәтті және тұзды тану шегіне әсер ететіні сөзсіз. Атап айтқанда, сахароза мен натрий хлоридінің шекті мәндері жастармен салыстырғанда егде жастағы адамдарда анықталды. Дәмді танудың жоғары шегі тағамға қант пен тұзды қосудың табиғи қажеттілігін тудырады. Зерттеу әдістемесі жинақталған материалды сапалы мазмұнды талдау болды. Бірінші кезеңде геродиетарлық ет өнімдерін өндіруге арналған басылымдардың мәтіндері толығымен оқылып, қайта оқылды, яғни аңғал оқу деп аталатын жұмыс жүргізілді. Одан кейін аңғал оқу әсерінен туындаған әсерлер негізінде оқылған басылымдардың тұтастығы мен салыстырмалы маңызды элементтері туралы ойлар жазылды. Әрі қарай, геродиетарлық ет өнімдерін зерттеу мақсатына қатысты басылымдардың барлық бөліктері шамамен бірдей мағыналық бірліктерге бөлінді. Мазмұнды сапалы талдау геродиет ет өнімдерін өндіру процесі мен ингредиенттеріне сәйкес олардың арасындағы ортақ сипаттарды анықтау арқылы топтастыруды қамтыды. Келесі кезеңде семантикалық бірліктер кодификацияға ұшырап, ішкі категориялар бар бірқатар категориялар пайда болды. Соңында, жарияланымдардың барлық мәтіндері оқылып болғаннан кейін, мәтіндер жүргізілген контент-талдау нәтижелерімен салыстырылды, бұл таңдалған санаттар бойынша басылым мәтіндері мен кодтарының мазмұнын қамтудың шынайылығын тексеруге мүмкіндік берді.

Негізгі сөздер: денсаулықты сақтау, метаболизмді зерттеу, өзгерген құрылым, тәбетті ынталандыру, ақуыз мөлшері, диета.

Introduction

One of the most significant social and economic problems of the new century in Europe, North America, Japan and Australia is the problem of aging. This demographic shift is expected to lead to new challenges in health care, long-term care for older people, and increased social costs to support the health and well-being of an increasingly large elderly population. A significant number of older people face negative and often irreversible health problems due to protein malnutrition. Ruminant meats, particularly beef, veal and lamb, along with other sources of animal protein such as dairy products, fish and eggs, are important sources of essential nutrients [1]. Adequate protein intake is essential to prevent protein malnutrition and for healthy aging.

The challenging question is how to increase protein intake in older adults to prevent protein malnutrition. The potential for increasing protein intake in older adults remains largely unexplored [2]. Short-term metabolic studies indicate that older adults require higher levels of protein intake than younger adults to maximize muscle protein synthesis [3]. Higher protein intake is associated with less decline in muscle mass and physical performance among older adults, maintaining overall health and quality of life into older age. The purpose of the study is to consider the current state and prospects for the development of gerodietary meat products. This article is an exploratory attempt to describe potential pathways for the development of nutritionally balanced gerodietary meat products aimed at helping older adults maintain an active and healthy aging process. The production of gerodietary meat products with a high content of nutrients, which are characterized by easy availability and chemosensory characteristics such as attractive appearance, size, color, taste, texture and consistency, is becoming important [4]. It is important that meat products targeted at older adults address nutritional deficiencies, improve health status, taste good, and realistically meet current home or hospital consumption conditions [5]. When developing new gerodietary meat products, various factors such as chemosensory appeal, packaging solutions and micronutrient fortification should be considered.

The object of the study is age-related changes in the consumption of meat products. Age undoubtedly affects thresholds for recognizing basic tastes, especially sweet and salty. In particular, higher threshold values for sucrose and sodium chloride were found among older people

compared to young people [6]. Higher taste recognition thresholds create a natural need to add sugar and salt to food [7]. Older people are also less sensitive to odors. Changes in taste and smell require some sensory modification of functional foods for older adults [8]. Flavor enhancers such as spices and herbs, especially natural ones, that mask any extraneous notes of taste and smell, as well as ingredients that improve texture, should be included in gerodietary meat products to enhance their sensory properties.

The relevance of the presented research on the development of gerodietary meat products is due to the fact that the relative preferences shown by older people to various protein sources, including animal protein sources such as red meat and poultry, as well as alternative plant-based protein sources, have not yet been identified. The food choices of older people have not been studied [9], nor have their preferences and willingness to pay for various carbon tags, depending on the protein source, been studied. The novelty of the presented research lies in the fact that the problems of production of gerodietary meat products are considered based on possible chemical interactions [10], not only between nutrients, but also between conventional medicines and dietary supplements and various food products now included in functional food products.

Materials and research methods

Google Scholar citation tracking was conducted to identify new empirical research in the field of gerodiet meat production. It was believed that it is possible, although unlikely, that there may be studies on gerodiet meat production that do not cite Google Scholar scientific literature on the topic of gerodiet meat production, in which case such studies would be missed when using the method. Using the same search term, 417 unique citations were identified in Google Scholar. Filtering these 417 publications identified 26 studies relevant to gerodiet meat production research, namely, a growing body of experimental and intervention research aimed at identifying ways to improve the acceptability of gerodiet meat products, comparing cultured meat with alternative proteins in meat production. gerodiet food products, identification of countries and demographic groups most open to the production of gerodiet meat products, perceived benefits in terms of maintaining the health of the elderly and ensuring the safety of gerodiet meat products, key barriers to the distribution of gerodiet meat products associated with disgust, food neophobia, economic concerns and ethical concerns, including two key variables that greatly influence

consumer perception of gerodiet meat products in the long term, specifically price and taste.

The texts of research publications collected through Google Scholar were inductively analyzed using qualitative content analysis. Qualitative content analysis is carried out at two levels. Explicit content analysis focuses on the content of texts from a surface-level perspective based on the written word. Latent content analysis goes deeper into the content and interprets the deeper meaning embedded in the text. In the presented research on the production of gerodietary meat products, qualitative content analysis is mainly based on the analysis of the explicit content of publications. Qualitative content analysis of the collected material was carried out in several stages. At the first stage, the texts of publications devoted to the production of gerodietary meat products were read and re-read in their entirety, that is, the so-called naive reading was carried out [11]. Then thoughts were recorded regarding the integrity and relatively important elements of the publications read, arising on the basis of impressions aroused under the influence of naive reading. Further, all parts of publications related to the purpose of researching gerodietary meat products were divided into approximately identical semantic units [12]. Qualitative content analysis included grouping gerodiet meat products by identifying common characteristics between them, in accordance with production processes and ingredients [13]. At the next stage, the semantic units were subject to codification, and a number of categories with subcategories arose. Finally, after all the texts of the publications had been read, the texts were compared with the results of the undertaken content analysis, which made it possible to verify the reality of the coverage of the content of the publication texts and codes by the selected categories and subcategories in full.

The final qualitative content analysis data were reviewed and analyzed independently by two researchers using thematic analysis to identify distinct themes. All collected materials and personal data related to respondents were treated confidentially. The study was conducted in accordance with the Declaration of Helsinki Ethical Principles.

Results and discussion

Aging individuals are more susceptible to weight loss and muscle loss, so it is important that gerodiet meat products provide sufficient nutrients for immune function, bone health, and cognitive function. Poor appetite leads to decreased

consumption of meat products, which makes it difficult to achieve recommended intakes of macronutrients, such as protein, and many micronutrients, especially vitamin D, which can lead to loss of body weight and muscle mass. Protein intake in older adults is important for skin healing, maintaining immune integrity, and restoring the body after illness. Increasing protein intake is beneficial to meet the physiological needs of older adults, especially those with chronic diseases [14]. In addition to supplemental protein, it is recommended to take calcium and vitamin D to prevent bone loss and maintain existing bone density, thereby reducing the risk of traumatic injuries from falls and fractures.

Adequate diet in old age plays an important role in maintaining the health and well-being of older people. In the elderly subgroup of the population, energy expenditure often exceeds energy intake, resulting in weight loss, muscle wasting, and increased frailty. Consequently, a decrease in muscle mass and metabolic rate develops, which affects appetite, physical activity, functional abilities and health. Consumption of meat products may decrease. Physical barriers such as limited mobility, limited access to stores, functional limitations in preparing and consuming meat products, and other social and health reasons are factors influencing older people's choice of meat products [15]. Prices for meat products also have an impact on the consumption of meat products by older people. Older people often experience food insecurity due to isolation, dental problems, depression or chronic illness, as well as difficulty swallowing and loss of taste.

Chemosensory problems, coupled with difficulty chewing and swallowing food, contribute to poor nutritional status and decreased appetite among older adults. Older adults are significantly more concerned about food texture than younger adults, as older adults typically have difficulty eating meat products that have a hard, crunchy, dry, or stringy texture [16]. Therefore, older adults' intake of important sources of protein and micronutrients such as red meat may be reduced. Patients with Alzheimer's disease often suffer from sensory loss and decreased sense of taste and smell, which can cause a lack of interest in eating. Many chronic diseases, as well as the lack of visual appeal of high-quality food, can negatively affect appetite. In addition, medications prescribed to older people can cause unpleasant side effects, including not only drowsiness and forgetfulness, but also nausea and changes in taste perception, as well as affect the

digestive tract and, consequently, the diet. In addition to these problems, older people have a decreased appetite, which causes them to consume smaller portions of meat products, making it more difficult for them to meet their micronutrient needs [17]. Early onset of satiety and physiological loss of appetite are common among older people and lead to decreased consumption of meat products.

Reducing the consumption of meat products negatively affects the ability of the elderly body to digest food, since, ultimately, the physiological processes of absorption, transportation and metabolism slow down, leading to insufficient supply of nutrients to the body. Low consumption of meat products in older people leads to energy, protein and micronutrient deficiencies, specific nutritional deficiencies associated with vitamins B, C, D, E and K, as well as zinc, iron, potassium and selenium. Insufficient protein intake leads to decreased muscle mass, limited muscle protein synthesis, and increased oxidative damage to muscle tissue.

Future approaches to the development and production of meat products for gerodietary nutrition should focus on developing new means to meet the special nutritional needs of older people, taking into account the decline in olfactory function, changes in sensory perception of food and preferences in the older socio-age group. This poses a major challenge in developing nutritionally balanced gerodiet meat products that can help older cohorts maintain an active and healthy aging process. It is important that meat products intended for gerodiet nutrition correct nutritional deficiencies, stimulate body function, improve taste and ultimately consumption, taking into account factors such as differences in sensory perception, realistic consumption conditions, and physical condition health. Older people face the problem of loss of chemosensory acuity, which is usually more pronounced in adults over seventy years of age. Eating preferences and consumption of gerodiet meat products are influenced by age-related diseases and medications. In addition, the decline in sensory function is often influenced by habits, traditions, mobility and social environment. Characteristics of gerodiet meat products, such as packaging, consistency, temperature and visual appeal, as well as motivations for choosing gerodiet meat products, such as cost and convenience, also play an important role in the choice of gerodiet meat products. The relationship between aging and taste perception increases with age, influencing

appetite and meat consumption in older adults. When a greater concentration of a stimulus is required, older adults have an increased threshold of sensitivity before the stimulus can be sensed. Thresholds for basic taste qualities in older adults, such as sweeteners, salt, acids, and bitter compounds, appear to be four to five times higher than in younger adults. This decline in older adults' ability to recognize flavors in food can lead to a preference for meat products with more intense flavors, containing higher levels of sugar or salt, which are not always beneficial. However, a number of studies have shown [18] that loss of taste sensitivity in older people does not necessarily lead to a preference for foods with improved taste. Strategies to address the problem of decreased chemosensory in older people include activities aimed at improving the taste and aroma of meat products, enhancing the sense of taste and stimulating appetite. Additives such as MSG or artificial flavors such as roast beef or bacon, spices such as rosemary, garlic, paprika and onion can encourage the consumption of gerodiet meat products.

Poor chewing ability caused by decreased muscle strength, dental problems, and difficulty swallowing may affect the consumption of gerodiet meat products. The need for older people to exert increased effort when chewing meat products for gerodiet nutrition is accompanied by a feeling of fatigue. The creaminess, smoothness, crispness and elasticity of texture of gerodiet meat products are important attributes that determine the overall perception of gerodiet meat products. Elderly people prefer gerodietary meat products that can be consumed without much effort. Manipulating the textural characteristics of gerodiet meat products is beneficial in terms of improving nutritional properties and reducing chewing effort, while simultaneously providing a natural increase in the intake of gerodiet meat products in older adults.

Discussion

With life expectancy increasing in recent decades, older adults are becoming the largest segment of the population suffering from limitations in physical and cognitive functioning. To ensure that older adults not only live longer but also live healthier lives, it is necessary to carefully examine the determinants of physical functioning, especially those that include chronic disease, oxidative stress, and waist circumference.

A prospective study of processed meat, red meat, and poultry consumption combined with self-esteem and lower extremity function among

individuals representative of the noninstitutionalized older population provides researchers with detailed information related to the consumption of gerodietary meat products. On the one hand, the reduction in consumption of meat products by the elderly population is caused by a reduction in the energy needs of the elderly body. On the other hand, it is provoked by information received in the media or from the Internet. In particular, the complete refusal of older people, the so-called vegetarians or ovo-lacto vegans [17], from eating red meat: lamb, pork, beef, veal and horse meat, as well as poultry or meat products in the form of boiled and raw sausages, boiled, dried and dry-cured meat products, or eating them only occasionally, that is, less than once a week, is explained mainly by concerns about the high content of cholesterol, fat and salt in meat products. Meat products generally contain higher amounts of salt and fat than fresh meat. It is also worth mentioning the antibiotics, hormones and dioxins contained in meat products. The problem is multifaceted and difficult to control. The grouping of different types of meat promotes the identification of three mutually exclusive categories of gerodietary meat products, firstly, processed meats, including bacon, salami and sausages, secondly, red meats, including beef, lamb and pork, and thirdly, several varieties poultry and rabbits. High consumption of processed meat products on a gerodiet diet appears to carry an increased risk of impaired mobility and function of the lower extremities. In addition, replacing processed meats with fish, legumes, dairy products or nuts entails a reduced risk of functional impairment.

Red meat appears to be strongly associated with increased mortality. Replacing processed meat with poultry reduces the risk of lower limb dysfunction. Higher intakes of red meat and poultry on a gerodiet diet appear to be associated with higher muscle mass, especially among women [18]. In groups of people who ate large amounts of red meat and chicken, there was no association with muscle mass or muscle strength. There are several potential mechanisms for the association between processed meats and functional impairment. Protein is an important component of meat, but meat, and especially processed meat, also contains significant amounts of saturated fat and trans fat. These types of fats may well lead to decreased levels of physical functioning later on. Additionally, compared to red meat and poultry, the sodium and nitrite content of processed meats is significantly higher. Sodium and nitrites are fraught with an increased risk of

cardiovascular disease due to increased blood pressure and endothelial dysfunction. This suggests that, in a gerodiet diet, the beneficial effects of high-quality protein in meat may be counterbalanced by the high levels of saturated fat and trans fat, sodium and nitrite in processed meat.

This idea is supported by the fact that the risk of impairment of physical function is reduced when a gerodiet diet replaces processed meat with other sources of protein. Fish is a common meat substitute and is an important source of omega-3 fatty acids with anti-inflammatory effects. It is likely that the detrimental health effects of eating processed meat in older adults is caused by not eating enough fish. It is a common belief that beef has the best taste and is the safest of the three meats. The taste of pork meat is less attractive; pork is considered a fattier and less digestible type of meat. Poultry seems to be lean, easy to prepare, and better digestible compared to other types of meat. The factors fat content, digestibility, cooking effort, and education and how important healthy eating is to older adults do not really predict the frequency of gerodiet meat consumption. The same factors were found to predict the frequency of consumption of pork and poultry, and they are difficult to compare because the meat categories are not the same. Meat is an important source of high-quality protein because it contains large amounts of essential amino acids. Thus, among older adults, eating animal protein appears to be directly associated with improved physical functioning, particularly muscle strength, as opposed to muscle weakness. Malnutrition due to aging is a condition resulting from insufficient absorption or consumption of food, leading to changes in body composition, decreased fat-free mass and decreased body cell mass, resulting in decreased physical and mental function and worsening clinical condition. In addition to protein, meat contains other nutrients such as B vitamins, which are also beneficial for physical functioning. On the other hand, meat is relatively high in saturated and trans fatty acids. Reducing the consumption of saturated and trans fatty acids and replacing them with unsaturated fats reduces the incidence of cardiovascular diseases. In addition, eating red meat is associated with an increase in overall, cardiovascular and cancer mortality. Therefore, understanding the impact of meat consumption on the health of older people is of great interest, given the high prevalence of not only cardiometabolic risk factors, but also malnutrition, which leads to muscle loss and disability. Studies of the relationship between

consumption of red and white meat and physical functions reveal the phenomenon [17] that a higher level of consumption of red meat or poultry and fish is associated with a lower risk of developing functional disorders,

Eating food orally throughout the day promotes good health and also relieves the elderly from much of the suffering associated with chronic diseases. There is a connection between chewing and swallowing disorders, on the one hand, and the nutritional status of older people, on the other hand. Fear of suffocation can lead to reluctance to eat and, as a result, inadequate intake of nutrients. Other reasons that negatively affect the motivation to eat in old age, and therefore are possible causes of malnutrition among older people, are, firstly, psychological aspects such as depression, moving to a nursing home, loss of relatives and friends and, accordingly, social interaction. Secondly, physiological factors, such as the inability to prepare food independently, dependence on caregivers, impaired physiological functions, in particular, limited sensory abilities. Thirdly, pathological reasons associated, for example, with taking medications. In this context, guidance systems for the development of gerodietary meat products are receiving increasing attention to help older adults adopt healthy eating habits. It is mainly about offering the right food products based on the individual preferences and health status of older people. However, significant challenges remain in tracking the dietary habits of older adults and providing appropriate recommendations. Older people should be aware of their eating habits in terms of variety and regularity. Instead of focusing on the quantity of food and nutritional value, we should strive to provide variety in the diet of each senior.

Elderly people are vulnerable to the effects of microorganisms and their metabolic products due to the weakness of their own immune system. To avoid exposure to microorganisms and their metabolic products, storage time for gerodietary meat product ingredients should be kept to a minimum [18]. In this regard, in conditions of a relatively limited number of ingredients, there is a real opportunity to provide a varied number of opportunities for eating, while maintaining the attractiveness of the overall menu and without creating a feeling of fullness. Examples include ham on bread for breakfast, pasta sauce for lunch, and a fried egg for dinner. Thanks to the described approach, minimal generation of food waste can actually be achieved, and the risk of microbiological spoilage of meat products for

gerodiet nutrition can be minimized. Drawing up a regular description of the diet of older people over a certain period makes it possible to assess the quality of nutrition, identify foods that should be consumed in smaller quantities, and also explain why and what it is recommended to replace such foods. Personalized solutions tailored for older adults [18] are a psychological tool for behavior change through personality aspects such as self-monitoring, personalized visual feedback, goal setting, self-awareness, and personalized learning. Self-monitoring allows you to track your diet and learn optimal portion sizes. Personalized visual feedback between dietary variety and regularity is illustrated directly on the plate, showing the consumed ratio of protein, carbohydrates and vegetables compared to the optimal ratio. Visual monitoring of older adults' meal times is intended to encourage self-reflection on their eating regularity. Learning to analyze eating habits allows you to set personal goals, such as eating three meals a day, and determine the time frame for achieving your goals. Self-awareness increases awareness of real physical hunger by comparing how you feel before and after each meal. Personalized training ensures that answers to questions that arise in older people during the process of psychological change are always available [18].

In addition, virtually no researchers are considering the development of meat products for gerodiet nutrition, using modified textures adapted to the needs of older people with chewing and swallowing problems. The use of 3D printing in the production of texture-modified products complements the classical procedure based on molding. 3D printing technology represents the first step towards future automation of texture-modified gerodiet meat production systems. The most commonly used technology for 3D printing of texture-modified gerodiet meat products is fused deposition modeling. In the process of implementing fused deposition modeling technology, the extruder creates the selected shape by extruding a certain amount of puree at a certain location, layer by layer. It should be noted that a number of studies have encountered uncertainty in the information provided by older people, as older people tend to forget what they ate. This makes it difficult to develop the right meat products for gerodiet nutrition. In addition, recommendations for the development of meat products for gerodietary nutrition are mainly aimed at reducing malnutrition in the general elderly population, and do not take into account the individual nutritional

needs of older people. It is important that in addition to recommendations for the development of meat products for gerodiet nutrition, there is also a need for the use of psychological methods for changing the eating behavior of older people.

Conclusions

The attitude of older people to the most significant factors determining meat consumption, and, to a significant extent, influencing consumer behavior, is characterized by the attributes of health, safety and taste. Estimation of habitual meat intake based on dietary history, supplemented by repeated measurements combined with observations, allows the calculation of cumulative average gerodiet intake over time, reducing random errors and increasing the accuracy of estimates. However, some misinformation and misclassification of diet cannot be ruled out, even despite reliable and objective measurements.

Finally, in any observational study, some residual confounding may remain. In a gerodiet diet, higher consumption of processed meats, as opposed to red meat or poultry, is associated with an increased risk of impaired mobility and lower limb function in older adults. There is currently no evidence that meat, despite its high protein content, has a protective effect against impairment of physical functioning. These results should be confirmed in future studies in samples with higher intakes of meat and meat products on a gerodiet diet.

Interestingly, concerns about hormones and antibiotics in meat products are quite prominent, outweighing concerns about fat and cholesterol in red meat and poultry. Accordingly, it is advisable for farmers and producers of meat and meat products to take responsibility for transparency of their own production methods to avoid loss of consumer confidence in their own products. Further research will need to clarify the extent to which the media and the Internet influence the consumer behavior of older people in relation to gerodietary meat products. Recommendations regarding cholesterol intake have changed significantly over the past few years, and recommendations regarding fat intake are constantly being updated. As cholesterol guidelines show, it takes a long time for new information to be accepted and gain credibility among consumers. Consequently, the development of new tools to guide healthy consumption behavior of gerodietary meat products among older adults is on the agenda.

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