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Journal of Spanish Society of Anti-Aging Medicine and Longevity

Special Issue
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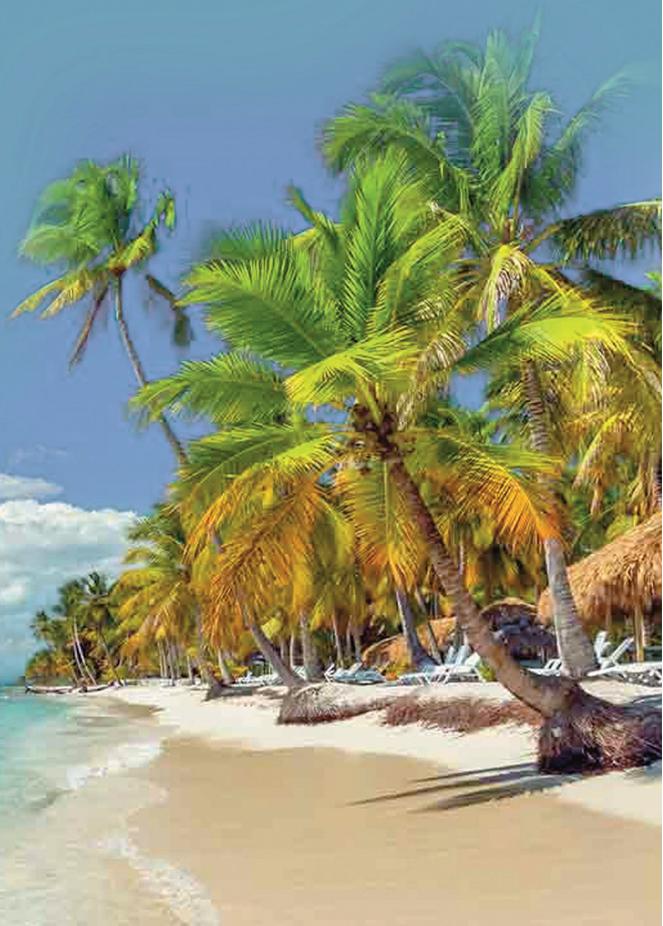
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THE SPANISH SOCIETY OF MEDICINE ANTI-AGING AND LONGEVITY

The aim and purpose of this Society is to promote and carry out, in the public interest and non-profit, the Antiaging Medicine as a therapeutic procedure, seeking cooperation and the union of medical specialties and all medical professionals: pharmacists, psychologists, biologists, odontologists, etc ..., who for their activities and dedication expressly state their interest in Anti-Aging Medicine. The Anti-Aging Medicine is basically an integral preventive and curative system based on the study of natural aging, which discards harmful factors that produce premature aging, proposing a life system of health promotion, applying corrective techniques of aesthetic and organic signs of corporal decay.

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Editorial

Es un honor para la Sociedad Española de Medicina Antienvjecimiento (SEMAL) y la Federación de Sociedades Latinoamericanas de Medicina Antienvjecimiento (FISMAL), invitarle a participar en el I Congreso Intercontinental de Medicina Antienvjecimiento y Longevidad, que se celebrará del 28 al 31 de marzo de 2019 en el Hotel Palladium de Punta Cana, en la República Dominicana.

La República Dominicana es uno de los principales destinos turísticos del mundo, con hermosas playas, gente amable, alegre y hospitalaria, que harán su estadía memorable e inolvidable.

El comité organizador y científico de la SEMAL, ha empeñado todo su esfuerzo y colaboración, para crear un programa científico innovador y diverso, que servirá de marco para intercambio de ideas, aprendizaje, presentación de los últimos avances en diferentes ámbitos de la salud, educación y mejora de la calidad de vida y longevidad a nivel mundial, contando con la participación de más de 40 ponentes intercontinentales, en sesiones conjuntas.

Este congreso está dirigido tanto a académicos, profesionales de la Medicina, residentes en formación, estudiantes, enfermeras, interesados en compartir experiencias y conocimientos.

Nos complace darles la bienvenida bajo el sol de esta hermosa tierra, patrimonio de la humanidad, a todos los doctores latinoamericanos, profesores invitados, patrocinadores generales y profesionales relacionados con la salud.

Agradecer de nuestra parte, a la comunidad médica que nos acompañará, en este magno evento, que sin dudas será el más prometedor de toda Latinoamérica.

Les espero en Punta Cana 2019,

Dr. Jose Serres MD.PhD.

Presidente SEMAL



Geron-innovation: A multidisciplinary approach based on the free radical theory of aging and innovation.

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Abstract

In this study, Geron-innovation is defined as a new concept and approach and it is aimed to contribute to the gerontology by a multidisciplinary research based on the free radical theory of aging and innovation. It has been determined that service innovation behavior, innovation, gerontechnology and free radical issues together with joint studies will provide significant contributions to gerontology. As a result of the literature review, it has been determined that the necessary precautions should be taken to prevent oxidative damage and related mutations, the time period at which the damage and mutations begin to have a high impact on the aging process, the timely diagnosis of the agents causing these interactions and appropriate treatment modalities. It is proposed to develop multidisciplinary studies towards the development of the free radical theory of aging by increasing innovation-focused researches for future studies.

Key words: Gerontology, gerontechnology, geron-innovation, integrated aging approach, free radicals

Introduction

Innovation and psychological capital constitute the dynamic of today's world economy, affecting many fields of life. Emerging technology has made it necessary for the changing social construction enterprises to create differences in service, even in the production sector, and differences between customers and consumers. The concept of service innovation emerged from this point, where significant developments were made for new entrepreneurial and innovation-oriented ideas. The ideas that management scholars put forward that the economy is not only limited with production, but also the importance of customer and service. Along with these ideas, behavioral sciences have been developed, aside the idea that human beings appear to be a machine in increasing productivity [1].

In parallel with these developments, aging has started to be clarified according to developing technology and changing social environment, innovations in the field of healthcare have provided considerable prolongation of aging process. These developments have been made possible through studies carried out in the field of health, based on technology and innovation. In addition, it has been determined through researches that the positive and negative effects of social events on the elderly have a significant effect on aging [2-3].



However, the fact that the studies were carried out in general, rather than multidisciplinary, predominantly related to the researchers' own fields, led to the emergence of many views on gerontology. Social events, technology and innovation affect the aging process with its positive effects on the elderly, and it is also the source of many unexplained reasons for medical and health care [4].

In the field of gerontology, which deals with social sciences, medical, technology and health fields, the lack of researches made with multidisciplinary approaches and the fact that the opinions put forward in this area are mostly multidisciplinary, show the importance of our work. This study should contribute to the literature by developing a multidisciplinary approach and considering the integrated approach to research in this context, which should be considered together with innovation and free radical theory.

Theories of Aging in the Context of Social Gerontology

Active aging theory was developed by Robert Havighurst in 1960. This theory is based on regular activities, social roles, and social work. Robert Havighurst has inferred from "The more activity, the more success" with the study of s Kansas City Studies of Adult Life (1963, 1968). According to this theory, contrary to withdrawal from life, individuals can be active and enjoy life. This theory, which encourages active involvement in the search for individual activism, is driven by the idea that age differences are not a prelude and that activity will contribute to the individual's life [5].

The theory of social conflict in aging emphasizes the influence of aging or negative opinions about aging and prejudice and discrimination towards the elderly. According to this view, some harmful consequences arise as a result of the work of the elderly individuals. In terms of healthcare, elderly have more problems

than younger workers and they are obliged to pay higher compensation for their employers due to their seniority. In addition, their physical, psychological and mental stresses make them less productive than younger occupations. For this reason, significant differences between the young and the elderly population bring about conflict. The theory of conflict also emphasizes inequality in issues of ethnicity, gender and social class [6].

Aging is a phenomenon that results in a functional deficit in cognition. It is an important shortcoming in terms of aging that the functioning of memory is gradually decreasing [7]. The deficit theory is divided into the main theories, which are also called the classical cognitive theories of aging, in the form of emotional deficit theory [8], source deficit theory [9], feedback deficit and memory deficit theory [10], environmental support hypothesis [9], stimulus deficit theory [11-12].

The theory of disengagement is that societies assume that the authority of the elderly needs to find out how to inform young people and that elderly people should play a role appropriate to their physical and mental retardation, separated from their pre-elder roles. In this way, the elderly will have a smoother transition from prehistoric life to new life. In addition, the roles of older people in their earlier ages are undertaken by a younger generation and the role exchange takes place. This theory assumes that aging preserves the stability of a society, emphasizes the functioning of the aging process, presuming that role cycles have provided sophistication in society [13].

The aging population has been the subject of research from an interdisciplinary academic perspective on individual and social issues. Aging is a demographic phenomenon from a global perspective and is a political research topic [14]. Quality of life and successful aging, psychological, social and physical reasons



are the issues that need to be investigated [15-16]. Marketing researches about the consumer; has led to an increase in the number of people working with the aging population. [17]. Emerging technology and unstable social life are also causing changes in the perceptions of quality of life [18]. The alteration in the perceptions of the elderly, changing environment, developing medical and social facilities show that subjective well-being and successful aging have a multi-dimensional structure [19-20].

The Free Radical Theory of Aging

Reactive oxygen and nitrogen species formed by oxygen produced in mitochondria cause oxidative damage to cells due to oxidant substances [21]. With aging, the redox balance deteriorates over time and thus the free radical circulation shows a systematic increase. Free radicals enter the body by feeding and inhalation. Reactive oxygen metabolites arising during converting nutrients from food into energy, damage to cellular components as protein, deoxyribonucleic acid (DNA). This is essentially a consequence of the incubation of hydrogen peroxide with cells. Thus, calcium ion release occurs.

Electrons in atoms occupy regions of space (orbitals). These orbitals which spin in opposite directions, can hold a maximum of 2 electrons. Free radical contains one or more unpaired electrons. A radical might take an electron from another molecule in order to pair. Besides, a radical might donate its unpaired electron to another molecule. [22]. Catalase and glutathione peroxidase remove H_2O_2 in human cells. Superoxide dismutase removes $O_2^{\cdot-}$ by catalysing a dismutation reaction. [23].

The increase in reactive oxygen metabolite production is common in aging-prone organisms. Increased lipid peroxidation provides lipofuscin production. Membrane damage occurs by the separation of hydrogen bonds between phospholipids and glycerol,

with the production of these pigments in the pericardium increasing in number with aging and lipoperoxidation. The progression of these events is the reporter of the cytotoxicity state. The control of free radical formation in aerobic organisms is possible with antioxidant defense [24].

Lacks many antioxidant enzyme systems: glutathione peroxidase, catalase, glutathione reductase, glucose-6-phosphate dehydrogenase. The increase in the formation of free radicals may not always be controlled. In such cases, oxidative stress is inevitable. Alcohol, cigarettes, radiation, ultra violet rays provide a suitable environment for free radical formation. When the amount of circulating free radicals increases with oxidative stress, degenerative disorders due to aging can also cause many health problems. This theory, which was put forward by Denham Harman in 1956, has provided theoretical solutions for the systematic reinterpretation of the investigation of the effect of free radicals on aging and healthy life [25]. However, in order to stabilize and prevent the production of reactive oxygen metabolites, which increase with aging, the solution of the theory to practice has not been developed. For example, the recommendation of regular exercises that increase oxidative stress but improve antioxidant defense will only reduce the production of reactive oxygen metabolites and will not affect the source of the increase in aging. We can also say the same situation for the recommendation of avoiding situations and positions that provide a favorable environment for antioxidant food consumption or free radical formation. Increase in lipid peroxidation due to aging; it is necessary to emphasize the possibility that it may be due to such factors as the increase in oxygen metabolite production, the decrease of antioxidant without cause, the decrease of activities of compounds or enzymes such as superoxide dismutase [21-23].



Mitochondria is the main source of Reactive oxygen species (ROS) and also target of possible attack by reactive oxygen species. Miquel et al. (1980) supported the view that; aging process, diminished energy production, and oxiradical in mitochondria resulting in cell death. Briefly, it has been argued that oxidative damage and related mutations lead to the aging process [26-29].

Gerontechnology

Gerontechnology, consisting of gerontology and technology words is a multidisciplinary approach that includes topics such as improving geriatrics daily activities, helping active participation of elderly people in life with technological tools, innovating in healthcare field and seeing elderly patient care and contributing to the treatment process, securing their safety and assist to engage with social life [30]. This approach has been proposed by Graafmans & Brouwers (1989).

The gerontechnology approach, which includes the use of assistive technology for the elderly, the adoption and use of technology by the elderly, the improvement of the quality of life of the elderly, the improvement of the current situation of the elderly, has made important contributions to social services and gerontology [31]. The fact that gerontology is multidisciplinary requires gerontechnology to be developed

in such fields as ergonomics, production, marketing, consumption, innovation [30-31].

Technological tools help elderly individuals to increase their participation in life and to adapt to the social environment, helping to prolong the aging. The gerontological approach, which is also important for successful aging, aims to eliminate the negative effects of aging. Innovations in the field of health aims to develop gerontechnological techniques, improve the quality of life of the elderly and achieve successful aging [32]. In particular, the elaboration of the ideas raised by the free radical theory of aging and its delivery to tangible solutions depends on the innovations to be made and the emphasis on social researches.

GeronInnovation

It is not enough in today's world that the basic reasons for the aging of individuals are based on biological basis, positive psychology, technology, innovation and social effect are important. The disengagement model of human's mental, sensory, mobility functions is based on age-dependent regressions, as suggested by Smith (1990) [33]. With the increase in age, people experience a decline in their life activities. The events and anticipations that develop around them require people to remain dynamic against increasing age [34]. For this reason, the role of ergonomics is to improve the accommodation between human demand and environmental demands. The most basic way of achieving improvement is business analysis [35]. In aging, a second model called disengagement of life, which emphasizes the total developmental process, is suggested. Although this model is subject to disengagement, it is not limited to this [36]. Being sensitive to psychological necessities as much as the performance requirement, it is important to adapt to disengagement, in aging. Smith (1990) links the applicability of these models to research, guidance and training [33]. The common point of both models is that the

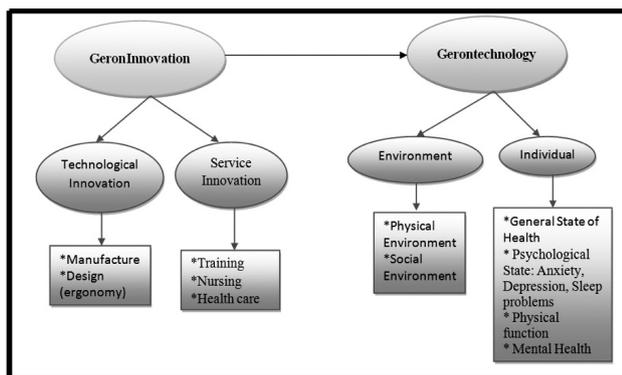


Figure 1. The Relationship between GeronInnovation and Gerontechnology Scheme



human element is centralized. In addition, the most important way to maximize system performance is to achieve optimal benefits in human and machine competence. The connection between aging and ergonomics in a harmonious process is important in terms of technology and safety [37].

In the context of all these explanations, GeronInnovation is a multidisciplinary concept involving the creation, promotion, implementation and research of social, technological, healthcare and medical innovations in gerontology. GeronInnovation is an approach that enables the development of innovation behaviors by revealing the trends of aging as a consumer, as well as the service trends of elderly and gerontechnology businesses. In this approach, researches for elderly people should be aimed at increasing the quality of life according to the present conditions of the elderly, and should focus on innovation-oriented subjects that may be useful for aging and gerontology related elderly people. On the other hand, service- providing for elderly and products-producing businesses, ergonomics, gerontology, medical, medical, healthcare, welfare services and all other fields of innovation-focused issues should be included in the research.

The fact that technological tools are ergonomic depends on the compatibility between the individual and the technological tool. This adaptation may be possible by integrating the design of anthropometric (dimensional) measurements of individuals. There is a need for anthropometric measures to improve elderly well-being, their adoption to the environment, and their life style [38]. In places such as kitchen, bedroom, living room, bathroom, toilet, balcony; safe and technological products that can make the daily lives of the elderly in places such as toilets, study rooms and guest rooms in office and working environments are among the areas where this measurement is most beneficial [33-39]. When it is thought that the fields of activity of the elderly are public, social and private

areas; banks, public institutions and organizations, and service units where social services are seen, ergonomics of the elderly should be considered, product and interior design should be realized [38-40].

Service Innovation Behavior

Service innovation behavior is individual and institutional action carried out in the process of producing and implementing new ideas. This process begins with the diagnosis and presentation of the problem and continues with the introduction of new ideas to solve the problem [41]. Topics such as organizational processes and systems, project management skills, organizational culture and vision are important issues in developing service innovation behavior [42].

As a result of the bibliographic analysis carried out by Ferraz, Melo & Santos (2016), 61 researches on service innovation issues in organizational researches were found to concentrate on the issues of market adaptation, performance management and product management from the sub-headings of the strategy [43]. Service innovation is fundamentally explored on three theoretical approaches:

- a) Technology-based approach: Taking into account the issue of technological developments, which affect the service sector, outside the organization.
- b) Service-based approach: Based on features and innovations that differentiate the service sector from the manufacturing sector.
- c) Integrative approach: It is based on tangible / intangible, technological / non-technological issues that suggest a broad perspective on innovation in the similarities in service and production [43-44].



Hu, Horng & Sun (2009) conducted a survey on 621 employee in hotels operating in the international tourism sector; information sharing, team culture and service innovation performance. Hu, Horng & Sun (2009) formed service innovation measure in two dimensions [45]. They have taken the dimension of new service development from Matear, Gray & Garrett (2004) and the dimension of employee service innovation behavior from Scott & Bruce (1994). Scott & Bruce (1994) developed an operational service innovation behavior scale in response to interviews with senior executives of businesses. Managers exemplify the success of those who have been recognized as leaders in the hospitality industry [45-46].

The Relationship between GeronInnovation and Gerontechnology

Technology and innovation help many fields of gerontology in the aging process. It is an important issue to reveal the relationship between gerontechnology and GeronInnovation. This relationship is shown in Figure 1.

Technological innovation is related to the environment and the individual. Because, technological innovation concerns many issues that concern manufacture and design. Innovations as traffic lights and signs produced for the handicapped, disabled lift, disabled toilet and developments in the healthcare field are influenced by technological innovations. However, a direct relationship between service innovation and the environment is not conceivable in this way. Because the physical and social environment can not be considered as providing a direct contribution to the aging on service innovation. The physical and social environment does not change depending on the innovative behavior of the people. The individual is affected by his or her own decisions, the physical and social environment. It can be said that there is a direct relationship between the service innovation

and the individual. Since the general state of health, psychological factors, physical function and mental health fields including services and products can be improved with innovations. However, the level of significance in these relationship situations need to be proven by quantitative studies.

In the literature, there is no study to measure service innovation behavior in gerontology. In gerontology and gerontechnology researches, it is a topic to be investigated that innovation oriented and service innovation behavior can provide important innovations for the elderly and that the elderly individual can make important contributions in terms of the quality of the services offered. On the other hand, research on innovation behaviors and technology usage behaviors in social activities to ensure the active participation of elderly people in life will also contribute to the gerontology.

Psychological Capital

Psychological capital, to have sufficient effort to successfully complete difficult tasks and to have confidence to take responsibility (self-efficacy); to develop a positive perspective (optimism) about being successful now or in the future; to be perseverance for the goals and to find new ways to achieve the goals (hope); in order to achieve success when problems and difficulties are encountered (psychological resistance) [3].

Kim, Karatepe & Lee (2017) found that the breach of psychological contracts with the work of "service innovation behavior with breach of psychological contract: psychological capital as a mediator" worsened the psychological capital of occupants and frustrated service innovation behaviors. In addition, it has been demonstrated that psychological capital acts on service innovation behaviors of employee with the same study, breach of psychological contract is medi-



ated by psychological capital on the effect of service innovation behavior. In this sense, it should not be forgotten that psychological capital is important for the development of innovation-oriented entrepreneurs in the personal development and social tendencies of elderly individuals, as well as gerontology, together with service innovation behavior [47].

Discussion

Aging is the whole of events that result in a complex process of events that results in a certain process and results in death. The Free Radical Theory of Aging helped to find the factors affecting this process, but has not been able to detect any signs of extinguishing or preventing the process. On the other hand, free radical theory has provided us with information on the proposals and lifestyle that contribute to healthy life.

The Free Radical Theory of Aging can not give a complete answer to one of the basic research questions of gerontology which is "How can basic factors be taken to prevent or halt the elderly?". For this reason, Mitochondrial DNA, which is a target of possible attack by reactive oxygen species, should be examined more thoroughly, and ways to avoid the factors that make it easier to take part in the possible attack target should be sought. The oxiradical attack in mitochondria should be investigated more extensively, and should be revealed their relation with energy production and cell death. It should be determined how to take precautions to prevent oxidative damage and related mutations, when the damage and mutations begin to have a high impact on the aging process as explained in the mitochondrial theory of aging, the time should be determined and the appropriate treatment modalities should be applied. The loss in mtDNA integrity and mitochondrial function are the factors that have the potential affect on aging process. Respiratory dysfunction, mtDNA mutations

and apoptosis could result from oxidative damage to mitochondrial macromolecules and accelerate the aging process [48-50]. It should not be forgotten in the light of these developments that technological developments can lead to the identification of factors that accelerate this damage and aging process. An example is microarray technology. This technology has shown that a number of genes related to oxidative stress reaction are altered in aging animals [51]. This alteration supports the idea that new researches must be done to develop the innovation-focused development of free radical theory.

On the way to eternity, the necessity of the interaction of biological systems with chemical components of all living things that share destiny as a vital consequence should be considered. However, the prolongation of the aging process that will cause this necessity, will be possible by virtue of collective studies in medical and social sciences. This research has led us to the conclusion that there is a lack of multidisciplinary research on aging in the literature and that a new trend has to be emerged in terms of aging because of the reasons that innovation oriented approaches can not be theorised in terms of providing elderly individuals and services / products.

The consideration that reacting cells with free radicals will have an effect on aging, will come to a more meaningful position by resolving the mysterious structure of the brain. Because the brain is one of the most important orders of the organism. Rather than point to other theories by telling the theory of free radical theory to be dead [52], it would be more suitable to suggest that those which contribute to the gerontology by taking positive aspects of existing theories should be included in the research methodology to be conducted in future studies. Because gerontology is a multidisciplinary field, where the contributions of all fields can exist. For this reason,



every view and approach is important for the development of aging studies.

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