

The rationale for multi-center studies in gerontological nutrition: experience and potential in Latin America

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The nature of aging and aging biology

Aging is normal, but not necessarily *usual* in the majority of animal species. One can, of course, cite the instance of whales, parrots and tortoises, all of which are famous for their longevity; they remain alive well after their capacity to procreate has been exhausted. In general, however, animals do not survive long after their reproductive period is over. For instance, the butterfly passes a year in the larval and pupal stages, but once it emerges in its flight stage, its biological mandate is to mate, to see that eggs are fertilized and deposited, and to await the inevitable deterioration of its gossamer wings. For the male of the black widow spider species or for the preying mantis consort, the relationship between the act of reproduction and the end of the life-cycle is even more proximate.

Moreover, the «law of the jungle» operates in nature. Almost all species are part of a food chain in which they are not only predator for other weaker animals but also prey for stronger creatures. The early *homo sapiens* was an example of an intermediary player in the food-chain, with saber-toothed tigers and other large carnivores (as well as members of other tribes), finding the human organism to be a delicacy. Accidents play a role in the attrition of living organisms, as they do for set of china dishes. Although some dishes of a set may survive for decades, with every use, there is a finite chance that one or another will be broken. And finally, there is disease. For any of you reading this chapter who has had to be operated for appendicitis or gallbladder disease, or who has undergone delivery by Cesarean section, it is likely that you would not have survived to your current age in the era before septic surgery; similarly, those of us who have had to undertake intensive antibiotic treatments to cure an infection, and be assured that we would not likely have survived in the pre-antibiotic era. So, we reiterate: although the life-span of the human organism is about 120 years, throughout most of human evolution only a minute fraction of the population avoided accidents, predation and infectious diseases long enough to even see one-third of that longevity.

In the recent era of technology, during which mankind has conquered serious infections, moved from hunting to agriculture as a way of procuring food, and crafted his external environment, the conditions for a longevity into — and beyond — the reproductive years have been set. It has only been for certain *domesticated* species

that a similar phenomenon of extended longevity has been created, but for wild animals the law of the jungle remains in force with additional strain from the encroachment of human populations. Old age is still not common for deer or rabbits.

Demography of aging in developing countries

The majority of the world's population, that living in Asia, Africa, Latin America and Oceania, as well as certain pockets of indigenous populations in industrialized nations, live in poverty and deprivation. Gerontologic research has not been a major concern in developing countries. This was justified, in part, by the paucity of persons over 60 years, the cut-off age for defining elderly of the World Health Organization (WHO, 1989).

The «life-expectancy» is the median age to which a group of individuals born in a given year would be expected to achieve. Stated another way, it is the interval from birth to a time when only half of those born will still be surviving. In developing countries, this characteristic is generally determined by the number of individuals that die of infectious diseases in early life. Once the hazards of communicable diseases are traversed, and one reaches adulthood, the remaining years of life can be as numerous (or more so) as persons in more affluent lands.

Thus, in recent years, demographers have begun projecting toward the next millennium, the shape of the world-wide age-pyramid. According to the study by Kinsella (1988), a major increase in the percentages of persons 60 years-of-age and older will occur in the Third World. As early as 1985 (PAHO, 1985), the health authority with a view to the Western Hemisphere and Latin America, i.e. the Pan American Health Organization, began to become concerned with an expanding geriatric population.

The difficulties for the study of aging

A series of difficulties and barriers have presented themselves in terms of the study of human aging to gain a better understanding of its nature. The barriers have been both conceptual and practical.

We do not understand the nature of human aging; whether it is a «development process,» that is, programmed by genetics as suggested by some, or simply the accumulation of tissue damage are still being debated. In the study of human aging, one strives to separate the processes that truly represent aging (and are part of the generalizable process) from those that are non-aging (and hence are particular to a subgroup of older persons, but not because of senescence, per se). It must be realized that when one is dealing with an elderly population, the persons are «survivors»; that is, they represent the fraction of the persons born in a given year over 60 years before who have not succumbed to disease or mishap (WHO, 1985). This makes the study of aging processes in epidemiological studies very difficult to interpret,

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especially when a *cross-sectional study*, of distinct age-groups studied at one time, are to be used to provide insights in the process of aging. A *longitudinal study*, i.e. a prospective, serial monitoring of a cohort, is ideal, but it is impractical when studying decades in a lifespan. Investigators familiar with the problems of interpretation of cross-sectional epidemiological studies point to three confounders or caveats to the interpretation with respect to *true* aging. These are: 1) Selective mortality; 2) Secular trends; and 3) differential treatment. With respect to selective mortality (or its converse, selective survival), we must note that, at every decade interval from 20-29 y to 80-89 y, there is a progressive loss of individuals who were part of the original birth-cohorts. The reasons for their deaths were *non-random*. Thus, one is comparing a more select group of individuals in the older decades as compared to the younger one. Since one does not know which of the younger subjects will still be around 60 years later, there is a different constitution of the groups through the intervals. Secular trends represent the changes in conduct or environment that have occurred since the older subject in a study had passed beyond the critical ages of the younger groups. For instance, the introduction of a vaccine may have prevented a communicable disease, such that persons 20-29 y in a comparison might never suffered clinical measles, whereas 100% of those 80-89 y had suffered the disease. One could then, falsely attribute to aging, some sequela of having had measles in one's youth. The final confounder, is differential treatment. This is based on *culture* practices. It works both ways. In some societies, the elderly are venerated to the point that they get favorable treatment, whereas in others they are marginated, being discriminated against in the allocation of attention and resources. We must be careful not to interpret differences between 20-29 year-olds from those 60 years their senior on aging, per se, when it might relate to the way the society treats them in a differential fashion. So, gerontology is acutely aware of the pitfalls of the interpretation of cross-sectional studies, and it looks to other manners to develop valid conclusions about the intrinsic and extrinsic processes of senescence. Multicenter, multi-national and cross-cultural study designs provide an approach to getting a better understanding of true *aging*.

Multicenter studies

An approach that promises more robust conclusions about what is *aging* and what is *non-aging* is the cross-national, multicenter study. This means that an identical protocol of measurements and questions is applied to comparably-selected populations in various geographical regions of the world. The life-experiences of each subject will vary, but the average of exposures to diet and environment, and a predominance of genetic backgrounds will coalesce in at each site.

Table 1 lists three relevant experiences in multicenter studies of nutrition and aging. It is illustrative to examine the aims and conduct of each of them, and to determine what the role and participation of Latin American nations, and Latin investigators has been in each of them.

TABLE 1
List of relevant multicenter, cross-cultural studies
on nutrition and aging

Survey in Europe on Nutrition and the Elderly, a Concerted Action
SENECA - EURONUT

Dietary Habits in Later Life: A Cross-Cultural Study

Cross-National Research on Nutrition in Older Subjects (CRONOS)

The first multicenter study worth of mention is that under the European Concerted Action on Nutrition and Health in the European Community program, financed under the European Community (EURONUT). It was entitled «Survey in Europe on Nutrition and the Elderly, a Concerted Action» (SENECA)(de Groot et al., 1991). It eventually included 19 sites in twelve different European nations from the most northerly latitudes to the Mediterranean coast: Belgium; Denmark; France; Greece; Hungary; Italy; the Netherlands; Norway; Poland; Portugal; Spain; Switzerland.

For a while, in the early planning of SENECA, a series of non-European groups were invited for inclusion. Dr. Lindsay Allen, then at the University of Connecticut, was invited to include a U.S. population. The Center for Studies of Sensory Impairment, Aging and Metabolism (CeSSIAM) in Guatemala was also invited. Neither of these *extra-European* initiatives prospered. The crucial point for the proposed Latin American site was the historically low number of older persons. The minimal protocol called for enrolling 60 persons all born in 1913-14 from a modest-sized town of 10,000 to 20,000, all of whom would have been 75 years of age in 1988-89. With a only 5.6% of Guatemalan's being over 60 years, and perhaps only 3% at 75 years of age or over, we calculated that, in Guatemala, it would require a catchment area of 100,000 individuals to provide the necessary number of exactly 75-year-olds in even proportions of 30 men and 30 women.

Uniformity and standardization were high priorities for the organizers of this project, based at the Wageningen Agricultural University. On September 1-4, 1988, a meeting was held in which the chief investigators for each site were standardized for each of the physical measures and in collection procedures. Moreover, all of the blood tubes was shipped out from a central location in The Netherlands, and all of the labels were pre-coded. Specific central laboratories were responsible for specific biochemical assays of nutritional indices.

«*Dietary Habits in Later Life: A Cross-Cultural Study*» was organized and sponsored by the Committee on Ageing and Nutrition of the International Union of Nutritional Sciences under the leadership of Prof. Mark Walhqvist of Melbourne. It was conceived to describe and analyze the *diversity* of habitual diets upon which populations of elderly survivors have subsisted in diverse parts of the globe. The populations included in the original process were three ethnic groups in Australia: Australians of Anglo-Celtic descent living in Melbourne; Australians of Greek heritage living in Melbourne; and Aboriginal Australians. There were also two European populations: Greeks in Athens and Swedes in Gothenburg. This was complemented by groups from various sites in China, from Japan and from the Philippines. When the process was well underway, Guatemala became a member in the second tier of populations. In 1992, 200 elderly persons in a small, suburban town (Jocotenango), outside of Antigua Guatemala, 50 km from the capital of the Republic, was enrolled into the «Dietary Habits» protocol. Unlike the EURONUT-SENECA process, standardization was based only on a common reading of the instructions, but not on any meeting with investigators physically present. A major two-volume compendium, *Dietary Habits in Later Life: A Cross-Cultural Approach*, edited by members of the IUNS committee, is currently being published by the United Nations University. The data from Guatemala will not be part of this publication.

The IUNS Committee on Urbanisation and Nutrition, of which the two authors are members, also has initiated a call for a multicenter research initiative in gerontological nutrition. Faithful to the central mandate of committee, urbanization was another contrasting issue. This process was begun in Southeast Asia, but Latin America came

to play an important role. Three countries in the region — Brazil, Guatemala, Mexico — were specifically included in the process from the beginning. They joined five Asian nations — China, Indonesia, Malaysia, Philippines, and Thailand — in a submission to the European Economic Commission entitled: «*Nutritional and Food Security Situation of Rural and Urban Elderly from Selected East Asian and Latin American Developing Countries.*» The basic design was a comparison of urban and rural populations, of both genders, young and old in each country, and compared **across countries**. There were 145 individual variables: 104 were questionnaire variables and 17 were measurements, such as anthropometry, blood pressure and hemoglobin. It was not funded for the full budget requested, but only to allow the eight nations to perform a pilot study. The process has been evaluated and refined and the CRONOS study (Table 2) has been designed. Table 3 shows the sampling-frame. As we stand at this SLAN Congress in Caracas, the CRONOS process is looking beyond just Brazil, Guatemala and Mexico, to enroll additional countries in Latin America as participants.

TABLE 2
The stated objectives of the C.R.O.N.O.S. project

- * to identify the nutritional situation (the nature and causes of nutritional problems) of urban and rural elderly in developing countries;
- * to describe the dietary intake of urban and rural elderly and to interpret it in terms of availability and accessibility in terms of modern concepts of food security;
- * to assist developing a rational basis for intervention strategies for elderly as an steadily increasing part of population;
- * to increase national competency and experience in the field of nutrition and its impact upon the elderly within EC-member and developing countries (in particular SEAMEO-TROPMED and University of Bonn);
- * to encourage and enhance networking between the research centres of EC-member countries and the developing countries East Asia and Latin America.

TABLE 3
Sampling-frame matrix for the C.R.O.N.O.S. project

		Urban		Rural	Total
		Low income	Middle income		
60-70 years	Men	50	50	50	150
	Women	50	50	50	150
35-40 years	Men	50	50	50	150
	Women	50	50	50	150
Total		200	200	200	600

CONCLUSION

Life-expectancy is improving in the populations of Latin America, and with it the number of elderly are expanding. Remarkably little is yet known about the nature of biological aging, and the discipline of gerontology has a wide set of challenges before it. Latin American nutritional science faces the challenge of developing competence and experience in the area of gerontological nutrition.

Multicenter, cross-cultural studies offer the potential to elucidate the essence of the aging response. When contrasted for dietary history, genetics, life-experience and environmental exposure, populations that show the same processes are revealing something about the essential features of senescence. A progression of multicenter studies on nutrition and aging have been developed. Latin America is currently included in one of these, the CRONOS project. It behooves the nutritional community of Latin America to continue to deepen its knowledge in gerontological research while trying to identify the resources to organize and execute multicenter, cross-cultural protocols in nutrition and diet of the elderly in the hemisphere.

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