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Review

# Geriatric drug therapy: Neglecting the inevitable majority

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ABSTRACT

Demographic evolution will considerably increase the number of people aged 65 years and beyond in the coming decades. The elderly not only represent the most heterogeneous population, but also are a major user group for prescribed medicines, a predominance that will continue to further increase. Medicines and medication management are much more complex and challenging in the elderly and can only be addressed through a multidisciplinary approach.

There is strong evidence that the elderly are able to properly manage their medication; however, their medications require different features than the standard medications used by adults. The elderly are exposed to several chronic disease conditions and their treatments, as well as experience age-related changes and limitations that need to be reflected in their medication management strategies.

Geriatric drug therapy remains a multidisciplinary task. The health care industry, physicians, pharmacists, nurses and care givers provide and guide the patient's therapy according to individual needs, while the health care system and regulatory authorities build the necessary framework of support and resources.Any realistic and significant enhancement to the elderly patients' medicines and medication management needs to be addressed by all disciplines and stakeholders involved since the absence of any of the stakeholders in the overall process negatively impacts the achievable enhancement in geriatric drug therapy.



## 1. Introduction

Traditionally, the pharmaceutical industry is focusing its research and development on the efficacy, safety and quality of a new drug therapy. With the increasing importance of the health care payers and patients this focus is going to enlarge. The medicinal products of the future will not only be judged on their efficacy to treat a disease conditions, but they will also be judged on their ability to manage the disease by reducing morbidity and mortality (eventually in combination with other drug products), improve the quality of life, safety, ease of use, level of patient compliance and finally reduce the overall caring costs [Jefferys et al., 2008; Palo and Murphy, 2009].

To achieve the aims of an effective drug therapy the drug product needs to be accurately tested, documented and designed as well as prescribed and used appropriately. We therefore use the term "geriatric drug therapy" as a term that includes the entire value chain starting from the product development through utilization of the product by the patient. The objective of this multidisciplinary review is not only to address the challenges of geriatric drug therapy in its various clinical and pharmaceutical aspects, but also from a patient aspect in order to stimulate an interdisciplinary discussion about future geriatric drug therapy.

## 2. The geriatric paradigm

The demographic trend in both developed and developing countries is moving towards a society with an increasing percentage of people above 65 years of age (Table 1) [www.earthtrends.wri.org].

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**Table 1**
Total demographic evolution across all ages and demographic evolution of people >65 years over the next 40 years in developed and developing countries [www.earthtrends.wri.org].

| | 2010 | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|
| Developed countries [people in mio] | | | | | |
| Total population | 1,365,899 | 1,397,353 | 1,411,479 | 1,412,224 | 1,402,753 |
| Population ≥ 65 years | 204,140 | 248,215 | 298,215 | 327,122 | 343,396 |
| % of total population | 14.9 | 17.8 | 21.1 | 23.2 | 24.5 |
| Developing countries [people in mio] | | | | | |
| Total population | 5,539,491 | 6,267,938 | 6,903,864 | 7,408,412 | 7,785,103 |
| Population ≥ 65 years | 323,716 | 467,255 | 671,557 | 919,185 | 1,122,963 |
| % of total population | 5.8 | 7.5 | 9.7 | 12.4 | 14.4 |

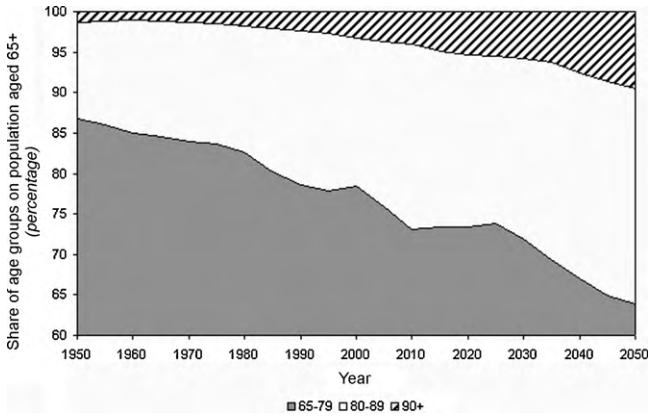


**Fig. 1.** Age composition of people aged 65 or over, by broad age group and development group (more developed countries) [www.un.org/ageing/challenges.html].

More significant will be the shift in composition of the elderly population over the next 4 decades towards more people above 80 years of age, resulting from increased life expectancy and the generation of the baby-boomers passing the age of 65 years (Fig. 1).

The number of people 90 years and older will increase from 8.1 to 37.7 million in the developed countries and from 12.9 to 123.5 million in the developing countries representing an increase of 463% and 954%, respectively (Table 2).

## 3. The impact of the demographic change

This shift in demographic composition is expected to raise the costs of long-term care services in the USA from 195 bio USD in 2000 to 540 bio USD in 2040 [Eskildsen and Price, 2009]. Unfortunately there are very few reports recognizing the valuable contributions the elderly provide to our society (e.g. care giving and charity functions) but these underline the importance of drawing special attention to this generation in terms of their specific health and medication needs [Hoyer, 2008]. The elderly must be seen as a valuable contributor to any flourishing society adding experience, knowledge, diversity and balance that will pay off in various ways to all of our benefit when we are able to maintain their health at an acceptable level.

The use of medicinal drug products is the main intervention when treating and managing medical conditions of people in our society. Safe and effective medicinal drug products have contributed significantly to the increasing health and longevity of mankind. Advances in drug research have led to several new treatment options that have steadily increased the prescription drug spending in all age groups. However, while the prescription drug spending increased from 113 USD to 347 USD between 1987 and 2000 in the under 65 years age group, the spending raised from 482 USD to 1249 USD at the same time for the patients of 65 years and older [Meara et al., 2004].

While a medicinal drug product has a precise definition, as dosage form and dose strength, the patient population represents a vast heterogeneity. With our increasing knowledge on the heterogeneity of disease conditions and patients, the therapeutic approaches that are developed tend to become more specific for patient populations and thus more individualized in terms of drug selection, dose strength, dosage form convenience, drug combinations as well dosing regimen. Consequently, drug product development will have to change its paradigm by including the geriatric patients and heading towards an approach of integrating new medicinal products into a disease management concept.

## 4. Aging

Aging is a gradual change of various physiological, biological, physical and social functions of the human being. Age-related changes are not necessarily of issue unless they are becoming critical for the individual and he/she is no longer able to manage her/his own daily life.

Aging has been considered as the differential process that begins after maturation and becomes prominent in the post reproductive stage [Smith and Gerstorf, 2004; Turnheim, 2005]. The aging process and the consequently occurring functional changes can differ widely between individuals and are not a matter of numerical age. Frailty might develop in the elderly following an incident of acute illness or hospitalization leading to a stepwise decline in various

**Table 2**
Age composition of people aged 65 or over, by broad age group [people in mio] [www.un.org/ageing/challenges.html] and the total increase [in %] corrected by demographic evolution of people aged > 65 years [www.earthtrends.wri.org].

| | 2010 | | 2050 | | % increase |
|---|---|---|---|---|---|
| Developed countries | 204,140 | | 343,396 | | |
| 90 + years | 4% | 8.166 | 11% | 37.774 | 463 |
| 80–89 years | 23% | 46.952 | 25% | 85.849 | 183 |
| 65–79 years | 73% | 149.022 | 64% | 219.773 | 147 |
| Developing countries | 323,716 | | 1,122,963 | | |
| 90 + years | 4% | 12.949 | 11% | 123.526 | 954 |
| 80–89 years | 23% | 74.455 | 25% | 280.741 | 377 |
| 65–79 years | 73% | 236.312 | 64% | 718.696 | 304 |