FUTURAGE

A Road Map *for* Ageing Research

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Welcome to the second newsletter of the FUTURAGE project, which summarises the research priorities contained in the Road Map for ageing research in Europe. The complete Road Map (available from **www.futurage.group.shef.ac.uk**) is the collective product of the most extensive consultation ever undertaken on this topic, which spanned two years and involved the major stakeholder groups in ageing research and policy among Member States and Associate Countries. These included scientists (from a wide range of disciplines), policy makers, practitioners, product developers and producers, carers and older people and their organisations. A high level of consensus was achieved about the research priorities contained in the Road Map

Everyone involved in the production of this Road Map is agreed not only on the main research priorities and the universal organising principals and methods but, also much more fundamentally, on the necessity for a new vision of ageing and innovative ways to develop the science of ageing. A new vision of ageing is required because the present dominant paradigm is now a relic of a previous socio-demographic era in which retirement took place for a majority at state pension ages and post-retirement years were relatively short. Changes in the labour market and social

behaviour coupled with a remarkable extension in longevity, associated in some countries with a pushing further up the age range (or 'compression') of morbidity, have transformed the experience of later life. Commercially too, the new old are no longer ignored, as in the previous era, but routinely regarded as targets for a diverse range of products from cosmetics to package holidays. The boundaries of frailty are being pushed back and, for a growing number of older Europeans, 70 **is** the new 50.

Unfortunately however there continues to be a 'structural lag' between this socio-demographic leap and societal institutions and attitudes, for example in the labour market and media. Hence the need for a new vision. This has to be a positive vision in which all older people, regardless of competence and capability, are included as full citizens, expected to contribute and participate and in which they feel empowered. The reality of the plasticity and diversity of old age must replace the outdated model of inevitable decline and disability. Later life is but one part of a life course which is characterised by lifelong development. Although there are well known problems with terminology, the concept that best captures this life course perspective is 'active ageing', an inclusive paradigm which does not exclude inactive or frail older persons.

Alongside this new vision of ageing there should also be new scientific approaches. More multi-disciplinary perspectives are required in order to reflect the fact that the ageing process and its experience are holistic. But research funding regimes have not always been open to such multi-disciplinarity, again with important exceptions that have blazed the trail in this respect. This new science of ageing also includes a life course perspective, pays attention to person-environment interaction and is user engaged. Moreover the changing demographic context increases the need for a greater focus on chronic conditions.

The priority of active ageing

During the Road Map development process active ageing quickly emerged as a major multi-disciplinary theme. Rather than being one among several priority themes, moreover, it is the red thread that links all of them. In scientific terms active ageing is used as a helpful umbrella term to encompass various combinations of quality of life essentials such as continuous labour market participation, active contribution to domestic labour (caring, housework), active participation in community life and active leisure. It is valuable too in being able to synthesise strands of research on ageing and developmental science which traditionally have not had much in common. For example the need to combine research able to drive social policy or cultural investments with that concerning the individual level of ageing, such as in regard to health, cognitive functioning and motivation.

Fundamental Assumptions

The FUTURAGE project was conceived with eight key assumptions in mind, several of which have been discussed already. They function as overarching, or vertical, assumptions that run through each of the priority themes.

- Multi-disciplinarity
- User Engagement
- Life Course Perspective
- Person-environment Perspective
- Diversities
- Intergenerational Relationships
- Knowledge Exchange
- Technological Innovation

The Seven Major Priorities for European Ageing Research

The large scale collective effort that has created the Road Map has been distilled into seven major priority themes:

- Healthy Ageing for More Life in Years
- Maintaining and Regaining Mental Capacity
- Inclusion and Participation in the Community and in the Labour Market
- Guaranteeing the Quality and Sustainability of Social Protection Systems
- Ageing Well at Home and in Community Environments
- Unequal Ageing and Age-Related Inequalities
- Biogerontology: from Mechanisms to Interventions

The main priority research topics within each of the major themes, and examples of specific research questions, are contained in the rest of this document.

For more information

This summary document is, by necessity, a highly abridged version of the complete Road Map document, which is available from **www.futurage.group.shef.ac.uk/road-map.html**. The complete Road Map includes full descriptions of the demographic context, policy priorities, the Road Map creation and production process, and significantly greater description and explanation of the seven major research priorities and key implementation priorities identified during the process.

Acknowledgements

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For more information on the FUTURAGE project and all its activities, please visit the website **www.futurage.group.shef.ac.uk**.

HEALTHY AGEING FOR MORE LIFE IN YEARS

Seven challenges and the main research questions relating to future European ageing research in the area of healthy ageing for more life in years are listed below.

Healthy ageing and frailty – understanding the process and defining the concepts

- What do older people understand by healthy ageing and does this vary between the young and old-old, between men and women and between different European cultures?
- Can we agree a definition of healthy ageing and its relevant dimensions that cross cultures and societies?
- What is frailty? How does it progress and can we identify biomarkers of frailty to intervene earlier?

See also: Unequal Ageing and Age-Related Inequalities, and; Biogerontology: from Mechanisms to Interventions

Organising and delivering interventions for health promotion

- Is the timing of physical activity/exercise over the life course important for healthy ageing?
- Are there gender differences in the way physical activity influences healthy ageing?
- What are the relative merits of different forms of physical activity (habitual exercise, sustained aerobic exercise, strength and balance training) on specific domains of healthy ageing such as cognitive functioning?
- Can we use the immune risk profile (IRP) to personalise nutritional interventions?
- How do lifestyle, behavioural and pharmacological interventions interact to increase healthy ageing?
- How do socio-economic factors inhibit healthy lifestyles and can this knowledge be harnessed to improve interventions?

See also: Ageing Well at Home and in Community Environments.

The ageing process and early markers of ill health

- How do the molecular, biochemical, morphological and functional aspects of vascular ageing interact and how does this play out in different subclinical and clinical events?
- Are markers of ageing in midlife different from those which become apparent in late life?

- Are different markers of ageing interrelated or do they progress in parallel to each other?
- Are markers of ageing the same in men and women and do they have the same consequences?

See also: Biogerontology: from Mechanisms to Interventions.

Modelling links between disease and functioning over the life course

- What drives increasing disability?
- Can we identify different population subgroups whose progress through disease to mental and physical functioning and through to participation in society, is slower than others?
- What role does the environment play in delaying progress through the disablement process?

See also: Ageing Well at Home and in Community Environments and Maintaining and Regaining Mental Capacity across the Life Course.

Effectiveness and efficiency of clinical care and social care

- What are the barriers to implementing the best models of inter-disciplinary care that are effective in many European countries in all the European countries?
- How should clinical trial design be best adapted to include all patients who may receive the therapeutic intervention?

See also: Ageing Well at Home and in Community Environments (end-of-life and places of dying); Guaranteeing the Quality and Sustainability of Social Protection Systems (sustainability of informal support networks and long-term care needs of people with multiple chronic conditions), and; Ageing Well at Home and in Community Environments (use of technology).

Education and lifelong learning

Main research questions for the future include:

- How are older measures of education and more recent and wider measures of lifelong learning interrelated with other socio-economic measures (occupation, income and material circumstances) and do they have an additive or multiplicative effect on healthy ageing?
- To what extent can education and lifelong learning mitigate the impact of key life events?

See also: Inclusion and Participation in the Community and in the Labour Market.

Maintaining And Regaining Mental Capacity

Environmental conditions for ageing well

- How does the interrelation between the person and their environment affect mental, physical and psychological health and their trajectories with ageing?

- To what extent do these relationships differ by generation, culture, society or political context?

See also: Ageing Well at Home and in Community Environments.

MAINTAINING AND REGAINING MENTAL CAPACITY

Eight challenges and the main research questions related to future European ageing research in the area of maintaining and regaining mental capacity across the lifespan are listed below.

Research on the outcome of cognitive training and physical exercise

- How far can training, particularly multi-component training including cognitive and physical exercise components, take the ageing system in different stages of the lifespan (middle adulthood, young-old age, oldest age)?

- What are the most efficient training and psycho-educative approaches and how can they become implemented most successfully in everyday life of older adults?

- How is healthy life expectancy affected by effective training models and how can better sustainability of training net effects be achieved?

Role of context for enhancing cognitive engagement

- How strong is the effect size of social and physical environments as compared to person factors related to mental capacity development?

- Can improvements in the work environment lead to the maintenance or enhancement of mental capacity of ageing employees?

- How are older adults dealing with cognitive decline in everyday life? What are efficient compensatory and optimising strategies and what can we learn from such real world analysis for maintaining mental capacity at large?

Role of the motivational-emotional, personality and self-related system for the development and maintenance of mental capacity

- How far does the positivity effect in terms of cognitive processing lead and what are the potentials and limitations for older people?

- What are the relations between personality and self processes and the course and outcome of mental capacity?

- Can there be new synergies between the declining cognitive apparatus and the relatively stable personality and self system that could be better used for the improvement of healthy life expectancy?

Better considerations of life course dynamics of mental capacity

- How strong is the effect of life-span precursors on the course and outcome of mental capacity trajectories in later life (in particular: middle adulthood, but also very early periods of life, even those before birth)?

- Is there an effect of major person-environment transitions as people age on mental functioning?

- How can the lifespan-based potential toward prevention of mental capacity decline be used to the maximum effect possible in order to extend healthy life years?

See also: Ageing Well at Home and in Community Environments.

Better consideration of transitions from normal to pathological processes related to mental capacity

- How far can a more fine-tuned differentiation between normal and pathological ageing go?

- What are the major markers of transitions from normal to pathological cognitive processes and how similar or dissimilar are these across countries?

- Can such new knowledge be efficiently used for prevention purposes and the extension of healthy life expectancy?

Research on how societies are dealing with mental capacity

- How strong is the effect of stereotyping and age discrimination on trajectories of mental capacity?

- Is there evidence that the reduction of negative stereotyping is serving the maintenance of mental capacity?

- How frequently are dementia fears in European societies, what differences may exist between countries and how are such fears affecting ageing people in their everyday lives?

Research on challenges related to mental capacity in advanced old age

- How great is the potential to maintain mental capacity to the largest degree possible for very old individuals?

- How can very old individuals be psychosocially supported when their meaning-making processes are under threat and when coping with multi-morbidity and the accumulation of loss experiences become a life priority?

- How can society and social institutions support the required educational processes (in a wide understanding) that can help cope with the challenges of a very long life?

Better consideration of inter-disciplinary synergies

- What are the most synergy-rich combinations of disciplines in order to better understand the malleability and plasticity of human ageing?

- How can core issues of ageing and healthy life expectancy be furthered by focusing innovative health and cognition, physical exercise and biogerontology, or affect / personality and neuro-imaging linkages?

- How can early-stage researchers be brought together as efficiently as possible to explore and establish such synergies?

See also: Biogerontology: from Mechanisms to Interventions.

INCLUSION AND PARTICIPATION IN THE COMMUNITY AND IN THE LABOUR MARKET

The first challenges are over-arching issues for promoting participation and inclusion in its widest sense, cutting across all social relationships and socio-economic activities. A further set of more specific key priorities can furthermore be distinguished between barriers or enablers experienced in the community and those in the labour market. The challenges and main research questions are listed below:

Ageism

- What are the attitudes to ageing as a process? How are they formed and evolved? How can they be altered?

- What are the gaps between perceptions and realities of older people's skills, abilities and contributions to society?

- How can the current social perceptions of age and ageing be effectively influenced in order to eliminate prejudicial attitudes? Which role can the media play in this respect?

- What interventions at the micro, meso and macro level can be successful in changing perceptions towards older people?

- To what extent is discrimination 'institutionalised' through legislation and regulations (e.g. in limiting access to health and social care services) across European countries?

Lifelong Learning

- What are the most appropriate non-formal and informal learning forms for older people?

- What are the barriers faced by older people in accessing formal training and educational opportunities? How can they be best overcome? And what is the role of educational institutions (e.g. the University sector or technical colleges) in supporting older learners?

- What are the specific needs of older women, migrants and disabled older people in this field, as well as of people living in rural or remote areas?

- How can knowledge transfer among generations be promoted to ensure the most benefits to all involved parties?

Migration

- Which policies and practical strategies can most appropriately tackle the challenges raised by migration for integration and social cohesion?

- How migration can contribute to the challenges associated with the ageing of our society?

- What role can the ageing process play, on the other hand, for migration-related phenomena?

See also: Guaranteeing the Quality and Sustainability of Social Protection Systems.

Overcoming the digital divide

- What role can ICT and virtual networks play in facilitating social inclusion?

- What are the effects of ICT-tools in terms of intra- and intergenerational relationships?

- Which measures are most effective in reducing or preventing the digital divide in using new technologies? And this especially in fields like long-term care, where they represent a crucial support tool for both formal and informal care providers?

See also: Guaranteeing the Quality and Sustainability of Social Protection Systems.

Inclusion and Participation in the Community and in the Labour Market

Inclusion and Participation in the Community and in the Labour Market

Mobility and accessibility

- How can we achieve an optimal balance between physical mobility and accessible environments to enable maximum participation and inclusion among all age groups?

- What are the health and economic outcomes of interventions designed to facilitate accessibility?

- What role can assistive technologies play in facilitating accessibility for those with limited physical mobility?

- How do mobility limitations impact on social relations in different, very old age groups (e.g. very old couples or singles)? And what kind of differentiated solutions are needed to overcome them?

See also: Healthy Ageing for More Life in Years (on delaying and preventing frailty), and; Ageing Well at Home and in Community Environments (on the role of supportive environments).

Ageing and spirituality

- What is the role of spirituality in facilitating social participation at an individual level?

- Which role does spirituality plays in promoting or hindering social inclusion and an active contribution of ageing individuals in different societal sectors?

- How does spirituality affect intergenerational relations?

- How can research on spirituality contribute to the ethical debate on 'conditions of living and dying', also in the light of current and future technological developments?

Volunteering

- Which measures and initiatives can improve the match between demand and supply of ageing volunteers, especially in sectors which are traditionally 'off-limits' for them? How can a better image of volunteering in older age be promoted to this purpose?

- Under which circumstances can volunteering represent a source of fulfilment and social inclusion for ageing individuals with poor health and socio-economic status?

- How are informal caregiving and volunteering reciprocally related? Is there a trade-off between the two activities?

- How can investments in volunteers' human capital be ensured along the whole life course through appropriate programmes?

Participation as consumer or user

- How can businesses and service providers be effectively incentivised to mainstream the principles of 'Design for All' in the development of products, goods and services?

- What role does age based discrimination play in exclusion of older people from service use and consumer markets?

- How do consumption and expenditure patterns vary between age groups and across the life course?

- To what extent are variations in consumption and expenditure patterns between age groups a function of demand (different needs and preferences based on age) or supply (markets failing to supply goods and services equally effectively for all age groups)?

Discrimination in the labour market

- What are the different types of direct and indirect age discrimination at play in the labour market?

- What is the economic and social impact of age discrimination in the labour market?

- Which measures are most effective in preventing work-related age discrimination?

Enabling a longer working life

- What regulations on pensions and labour laws are most effective in supporting those who wish to work longer?

- What incentives for employers are most effective in retaining and hiring older workers?

- What is the optimal balance between social protection and labour market policies in the promotion of older worker employment?

- How can employers effectively adjust to the ageing workforce?

- What is the role of volunteering in helping older workers remain or re-enter in the labour market?

- What further healthcare and employment measures should be introduced to better preserve the employability of the workforce?

- What lessons can be learnt from the application of the 'workability' approach in various settings?

Reconciliation of paid work and informal care

- What are the barriers that informal carers face to remain in employment? What are the specific barriers faced by caregiving women and migrants?

- What employment, tax and social protection policies and measures are more effective in ensuring various adequate working arrangements for reconciliation and adequate minimum income for both men and women?

- What services are more effective and should be developed to support informal carers? What is the role of the information and communication technologies in this field?

- How can we ensure a better sharing of caring and work responsibilities at a micro (individual) and macro (societal) level between women and men?

- How can informal carers be empowered in decision-making that affects their lives, in order to ensure their participation?

GUARANTEEING THE QUALITY AND SUSTAINABILITY OF SOCIAL PROTECTION SYSTEMS

Six challenges and the main research questions related to future European ageing research in the area of the quality and sustainability of social protection systems are listed below.

Sustainability of social security systems

- Which measures can make current pension, health, social and long-term care systems more sustainable over time? What are the most effective social and economic policy models in this respect, and how are they interrelated?

- Which role do education and training play, as 'non-material resources of social protection', in improving the sustainability of social security systems?

- Which impacts would banning the mandatory retirement age have at micro, meso and macro level?

- How can an adequate level of service quality be achieved, in times of budget constraints with an ever-growing population in need of long-term care?

- Which trade-offs and alternatives pathways exist between the urgent need to reform and modernise current social protection systems and their long-term sustainability, especially in countries with most traditional welfare traditions?

- Which role are the current trends of economic globalisation playing with regard to the sustainability of existing social security systems?

Supporting informal carers

- How can family carers and private care workers become better integrated within the formal support system?

- How can formal services support informal carers in their tasks and prevent them from stressful situations and burn-out?

- To what extent can the support from formal services allow carers to remain in paid employment which has beneficial effects both from a social inclusion perspective as well as for the public purse?

- How is migrant work in the elder care sector changing traditional formal and informal care patterns? And which measures can contribute to solve the problem of widespread undeclared work in this area?

Improving access to services

- How can access to health and social care services be improved and better integrated, especially in deprived and sparsely populated areas?

- How can formal public services support hard-to-reach segments of the older population?

- Can ICT improve knowledge about the services available, and to some degree can it release some of the burden on social and health services?

See also: Inclusion and Participation in the Community and in the Labour Market.

Efficiency, cost-effectiveness and quality of interventions

- How can improved transparency be achieved regarding the use of resources made within the public welfare systems? How can the value-for-money in this sector be maximised?

- Which strategies can increase the quality (from a user's perspective) and cost-effectiveness (from a provider's perspective) of interventions?

- What are the most promising intervention in the field of preventive care and integrated care?

- Which are the innovative interventions to support people coping with chronic diseases?

- What is the potential of the '–omics' technologies in developing new approaches for diagnosis and treatment of diseases?

ICT-supported informal caregiving

- How can ICT-based tools support informal caregiving?

- What is the role of ICT-based solutions in improving the quality of long-term care provided by informal carers, as well as their quality of life?

- Which impact can ICT have in reducing the direct and indirect costs attached to informal caregiving?

- Which ICT-solutions are most easily transferrable and implementable on a large scale, also in contexts in which no strong tradition nor digital competences exist in using ICT?

Guaranteeing the Quality and Sustainability of Social Protection Systems

Ageing Well at Home and in Community Environments

Reviewing and strengthening intergenerational solidarity and cooperation

- Which changes are needed to ensure that today's social and demographic context will not weaken solidarity between generations in the long-term?
- How can the contribution given by retired people to society be measured though their unwaged activities like grand-parenting and volunteering?
- What are the good practices aimed at increasing older people participation to such activities after their retirement?

See also: Inclusion and Participation in the Community and in the Labour Market.

AGEING WELL AT HOME AND IN COMMUNITY ENVIRONMENTS

Seven challenges and the main research questions related to future European ageing research in the area of physical-spatial-technical (PST) aspects of home and community environments are listed below:

Generation of differentiated knowledge on the enabling and constraining characteristics of PST environments at the home and community level

- What are the key enabling and constraining characteristics of PST environments for older adults, for example in terms of maintaining autonomy, well-being and identity?
- How important is the role of home characteristics including home adaptation as compared to person factors such as multi-morbidity and functional limitations?
- What role do major differentiating variables such as age, gender, ethnicity, mental status, functional impairment, region and culture play when it comes to the impact of PST environments on healthy ageing?
- What are the effects of implementing an as focussed as possible policy 'to stay in your own home as long as possible' to the ageing individual, to the care services, and to society at large?

Better understanding of the meanings of PST environments of older adults' lives

- What do home environments and neighbourhoods mean for current cohorts of older adults, for example in terms of cognitive and affective ties to the home, place attachment and their possible role of maintaining the ageing self and identity?

- How does meaning of home and neighbourhood vary when it comes to the diversity of older adults, including mental status and ethnicity? Can such evidence be efficiently used for intervention purposes?
- Is there evidence for cohort-related changes in what home environments and neighbourhoods mean to older adults?
- Will technology, for example home-based robotic systems, be accepted better by future older adults as a means to support and enrich quality of life?
- What meaning do specific places (e.g. kitchen, garden) hold as people age, and is there a change of the role and function of such places over time?

More research on the relationship between transport and ageing well

- What are the transportation needs of the future ageing population of Europe, and how are these needs related to health and quality of life?
- How can the needs in terms of out-of-home mobility of older adults with cognitive impairments be supported in optimal ways?
- What kind of technology is needed to serve the transportation needs of older adults in optimal ways, and how can such technology be implemented most efficiently?

Work environments as key PST environments for ageing societies

- What are the key elements of designing work environments in order to release older employees' potential in the best way possible (e.g. in terms of health, cognitive functioning)?
- What kind of role can technology play in order to optimally serve the needs and capabilities of older employees?
- Is there a relation between the characteristics of the work environment and older adults' innovativeness? How can such a linkage be optimised in the future?

See also: Inclusion and Participation in the Community and in the Labour Market.

Long-term care environments for vulnerable and frail older adults

- How can long-term care environments be designed in the future to support optimal ageing in old and very old age even in the situation of much reduced resources (such as dementia)?
- What synergies and possible risks are coming with future alliances between long-term care institutions and technology?

- What are the most convincing alternatives to traditional long-term care solutions for older adults with different degrees of frailty? What potential and limits do they have?

PST environments as supporting healthy ageing and increased life expectancy

- How can we create environments that optimise the exertion of physical activity in later?
- How do we create mobilising environments that support health promotion and serve empowerment of older adults?
- What are the implications of and what elements and resources are needed to create age-friendly communities within urban and rural areas?
- What kind of PST environments do best serve the maintenance and possibly the enhancement of cognitive functioning in old age?
- Can virtual environments be used to stimulate healthy ageing, and in which ways?

Healthy home and community environments for very old age

- What are key synergies between the characteristics of PST environments and older adults with dementia? Can such synergies be used better in the future and what is the potential?
- How can places counteract the pronounced vulnerabilities of extreme old age? What can different European countries learn from each other in terms of the creation and designing of such places?
- How can optimal places for death and dying be created for old and very old adults and how can such environments support a possible new culture of death and dying in Europe at large?

UNEQUAL AGEING AND AGE-RELATED INEQUALITIES

There is considerable overlap between disciplines and research themes on the priorities for inequalities research. This is illustrated with reference to six broad research challenges and main research questions listed below:

Monitoring inequalities

- How cumulative advantages and disadvantages shape opportunities and risks, which ultimately influence health and other outcomes in older age?
- Do adverse circumstances in younger age have irreversible effects, or can early drawbacks be overcome at a later stage during the ageing process?

- What are the compensatory mechanisms along the life course that reduce the adverse impact of risks and disadvantages?
- What is the role of human agency and the impact of structural factors on inequalities in older age?
- What factors can strengthen resilience to potential stressors and disadvantages?

Health in work and retirement

- Can the workplace be considered as a suitable setting to develop effective healthy ageing interventions?
- How can work-related health inequalities be prevented? And those accumulated during the working life be reversed or compensated after retirement?
- Is there a link between inequalities in pension scheme and health status after retirement?
- How does retirement affect health? Are there commonalities/differences between social groups and occupations?

See also: Inclusion and Participation in the Community and in the Labour Market.

Inequalities and discrimination in the labour market

The research priorities in this field are covered in the section on: Inclusion and Participation in the Community and in the Labour Market.

Inequalities and discrimination on health

- In what ways does discrimination on the grounds of age have an impact on inequalities on health?
- What are the prevailing norms within the health and care sectors that potentially contribute to negative attitudes towards older people and inequalities? How do these attitudes deter effective health care interventions?
- How does the financial capacity of older people impact on the access to health care? Is there age discrimination within the financing of health care provision?
- Which are the prevailing risk factors for the exclusion of older people from health care provision? Are there any good practices addressing these risks?
- Are there age limits in clinical trials and pharmaceutical trials? Do such practices respond to the needs of the ageing population? Are there risks for older people's health care provision?

Unequal Ageing and Age-Related Inequalities

Biogerontology: from Mechanisms to Interventions

Ageing and migration

- What is the impact of migration trajectories in determining inequalities over the individual life course and within society?

- Which initiatives are most successful at national and regional level to address in a culturally sensible way the needs of migrants and minority ethnic elders?

- How can barriers of access to quality care services care for migrants and minority ethnic elders be prevented? And what the role played by professionals in this area?

- How can the collaboration between researchers, policy makers, practitioners and older migrants (organisations) be improved to inform ageing research, policies and practice, thus reducing migration-related disadvantages and increasing migrants' contribution to society?

Focus on the very old

- What methodological approaches allow achievement of a better inclusion of frail and dependent older people into clinical and socio-economic investigations?

- To what extent does the lack of representativeness of research samples in terms of older population limit the generalisability of results?

- To what extent do the very old population in Eastern Europe resemble or differ from its Western European counterparts? What are the similarities and specificities which can be found across countries?

- How prevalent is elder abuse and neglect across the EU27? What are the different kinds of abuse and neglect? How are they related?

- How is neglect and abuse experienced at the micro level? Do individual characteristics of the victim play a role in the detection, acknowledgement, prevention and tackling of elder abuse?

- What evidence is there for abuse and neglect within hospitals and long-term care settings?

- What are the features of the long-term care systems that have an impact on the prevalence of elder abuse and neglect?

- What is the link between the quality of care and the quality of the work of the healthcare workforce and elder abuse? Is the lack of support to caregivers (informal and professional) a contributory factor to elder abuse?

BIOGERONTOLOGY: FROM MECHANISMS TO INTERVENTIONS

The recently completed EU FP7 project WhyWeAge aimed to identify key elements of a European road map for research in biogerontology. Eleven scientific topics for future European research in the area of biogerontology were identified. These form the biogerontological theme in FUTURAGE and are summarised as follows (greater detail can be found in the WhyWeAge final report):

Biomarkers of ageing

- Can we identify a practically useful set of biomarkers of ageing capable of predicting future health and longevity in individual humans?

- Can we identify similar markers for non-human models that will facilitate translation of research on interventions from models to humans?

- How can we deliver the most effective infrastructure to underpin ageing biomarker research and development within Europe?

Telomere erosion, DNA damage and mitochondrial dysfunction

- What are the exact mechanisms by which telomere erosion, DNA damage and mitochondrial dysfunction contribute to cellular ageing?

- How do these mechanisms interact?

- How do the effects of these mechanisms at the cellular level give rise to age-related dysfunction and disease of tissues and organs?

- How can this knowledge be harnessed towards safe and effective intervention at the molecular and cellular level?

Oxidative stress, protein damage and protein maintenance

- Which proteins are most susceptible to damage and why, and how do protein modifications contribute to breakdown in protein homeostasis?

- How extensive are protein modifications in cells during ageing, and can we enhance techniques to detect random modification of proteins as powerful as those which now exist for DNA?

- What factors are responsible for protein aggregation and how exactly do protein aggregates contribute to age-related cellular pathology?

- What factors underlie age-related changes in protein synthesis and degradation and how might these most effectively be targeted?

Systems biology of ageing

- How do the multiple mechanisms of cellular and molecular interact to drive age-related pathobiology?

- How do the multiple maintenance and repair pathways interact to sense and respond to damage of the various kinds?

- How do the above two networks interact and where might be nodes that offer opportunities to target interventions that can improve health in old age?

- How best to configure and implement European infrastructure to support systems biology of ageing?

- How to generate the added value from currently disintegrated research activity by delivering the necessary integration for effective progress in systems biology of ageing?

Inflammation and impaired immune functions

- How does inflammation contribute to age-related pathology and how can these processes be targeted to reduce adverse effects of 'inflammaging'?

- What mechanisms underlie age-related deterioration of immune functions and how can effective function be maintained for as long as possible?

- What is the role of chronic infections such as with cytomegalovirus (CMV) in contributing to immune dysfunction?

- How can immune risk be defined using suitable biomarkers and can the immune risk profile be modified?

Metabolic factors

- How is metabolic homeostasis affected by diet, age and other factors?

- What metabolic sensing and signaling pathways have beneficial effects in animal models and might these exert similar effects in humans?

- How are metabolic gene regulatory networks configured and can systems biology reveal specific targets for effective interventions?

- How and in which organs do effects of metabolism exert their effects on ageing?

- How do neuro-endocrine signals influence and interact with metabolic factors affecting ageing?

- How do fat tissue and associated signals influence and interact with metabolic factors affecting ageing?

- What biological mechanisms contribute to the sex/gender differences in ageing and longevity?

Nuclear receptors

- What is the nature of the cross-talk between nuclear receptor signals and metabolic signalling pathways?

- To what extent do epigenetic modifications affect nuclear receptors and their impacts on ageing and health?

- What are the roles of nuclear receptors in the control of biological rhythms and their dysregulation during ageing?

- What links exist between metabolic signalling through nuclear receptors and homeostatic control of somatic stem cell functions?

Age-related disorders of blood circulatory (vascular) system

- What is the role of known molecular/cellular mechanisms of ageing (e.g. oxidative damage, cell senescence) in the aetiology of vascular stiffness and vascular calcification?

- How to identify protective genetic traits and their relationships to mechanisms of vascular cytoprotection?

Muscle weakness, sarcopenia and physical exercise

- What are the prevalence, causes and functional consequences of sarcopenia?

- What are the roles of muscle protein breakdown, oxidative stress and accumulation of modified proteins in muscle ageing?

- What are the most effective physical, nutritional and pharmacological strategies to combat sarcopenia and sarcopenic obesity?

- What are the effects of exercise, inactivity and inflammation on age-related regulation of skeletal muscle mass and function?

Age-related modifications of skin and elastic tissues

- What causes the changes in extracellular matrix during ageing?

- How does intrinsic ageing affect stem cell functions within skin?

- What are the most effective nutritional and pharmaceutical strategies to combat skin ageing?

- What are the effects of exercise, inactivity and inflammation on age-related regulation of skeletal muscle mass and function?

Connecting biogerontology with clinical ageing research

- Do common ageing mechanisms contribute to multiple age-related diseases?

- How can we explain mechanistically the differential vulnerability to different age-related diseases, including inverse epidemiological associations?

- What mechanisms underlie age-related frailty, and how can this syndrome best be prevented or delayed?

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