Kingdom of the Netherlands

Dementia in Singapore & innovation mission

A personalized approach to Dementia prevention, treatment and care

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1. Background

Dementia is one of the greatest healthcare challenges of our time, and with an ageing population its prevalence will stand to increase in both the Netherlands and Singapore. The burden on the countries' healthcare systems will be high, making dementia a leading cause of death as well as an expensive health condition. Though a breakthrough cure for Alzheimer's disease, the most common cause for dementia, has not been found, the wide and multidisciplinary research field for dementia has been fast evolving and progressing under the advancement of neuroimaging and blood-based biomarker technologies, big data and computing power but also by past learnings from implementing novel person-centered care concepts to the development of (digital) tools for optimal support of patient, care giver and clinician. Prevention, treatment and care for persons with dementia requires a multifaceted and holistic approach with collaboration across governments, research, industry and borders, whereby Singapore and the Netherlands share a common goal.

In the 2015 Well-being of the Singapore Elderly (WiSE) nation-wide study, the prevalence of diagnosed and undiagnosed dementia was found to be 1 in every 10 Singapore seniors – or around 86,000 – aged 60 years and above. This number is projected to climb to 130,000 by 2030. Professor Chong Siow Ann, vice-chairman of the Institute of Mental Health medical board, who led the WiSE study, said: "The concern is how we can use the study to assess if we have adequate resources to meet the challenges we have right now and those that are going to be emerging." Singapore scored 16th in Lien Foundation's 2020 Dementia Innovation Readiness Index for cities, underlining where these challenges mainly lie and where public and private partners should find and develop innovative solutions: early detection and diagnosis, and access to care. A myriad of barriers can be identified, these include the trade-off between diagnostic costs versus post-diagnosis benefits in the form of MCI treatment, support and subsidy plans, apprehensions relating to shame, part-of-ageing narrative or frugality, limited data sharing between health providers and lack of a fixed family doctor/GP for general screening (there is a push for data sharing and GP pairing starting 2023), 3 to 6 month waiting time between GP referrals and a first clinician consult and general shortage of trained clinicians psychologists.

Dementia as a disease has been slowly gaining an understanding and general awareness in the Singapore community. Though the Singaporean government does not have a publicly available National Dementia Strategy, dementia inclusivity is being supported and implemented through various initiatives such as the Dementia-Friendly Communities, Go-To Points and network of Dementia Friends. The Memory, Ageing and Cognition Centre (MACC), Singapore National Eye Centre, National Neuroscience Institute (NNI) and NTU's Dementia Research Centre (Singapore, DRC) are active in the development of a Singapore-representative cohort with its unique multi-ethnic features and Asian representation in dementia studies in general. The MACC, DRCS and the National University of Singapore's AI Lab are developing AI-driven, digital and language-independent diagnostic tooling, AI-driven neuroimaging diagnostics, whereas Singapore's Urban Redevelopment Authority examines design initiatives for Dementia-Friendly Neighborhoods. Researchers from A*STAR's Genome Institute of Singapore (GIS) and Institute of Molecular and Cell Biology (IMCB) work together with the aforementioned parties and

Duke-NUS Medical School on studies relating to 3D organoids 'midbrains', animal studies and stem cell therapy, diagnostic markers related to nanoparticle technology and microRNAs, and digital cognitive progression assessments.

'Asian dementia' is high on the Singaporean scientific agenda, as Southeast Asia sees an increasing number of people in their 40s and 50s being diagnosed with young onset, vascular dementia. The culprit may lie in their genetic makeup, as well as high burden of chronic cardiovascular risk factors such as hypertension, where patients suffer from multiple mini-strokes in the brain due to a decrease in blood flow. Representation is key in the development and adoption of supporting devices and (eHealth) solutions as well, Singapore being a cultural melting pot, which requires tools to be universal and accessible to anyone. Amongst its many objectives, Singapore's pilot health district Queenstown looks into the use and co-design of technological solutions with the community to improve residents' lives. The district's demographics closely mirror Singapore's projected national demographics by 2030, and its eligible residents join in on SINgapore's GERiatric Intervention Study (SINGER) to reduce the risk of cognitive impairment and dementia. Its Dutch counterpart is called FINGER-NL.

Like Singapore, the Netherlands will see a stark rise in the number of people with dementia in the foreseeable future. Approximately 290,000 Dutch citizens are currently estimated to suffer from dementia (roughly 1 in 8 diagnosed and undiagnosed seniors aged above 65), but prognoses predict that this will increase to 620,000 by 2050. Nearly a year ago the country's 4th dementia plan was presented, the National Dementia Strategy 2021 - 2030, with a 10-year road map focusing on (1) supporting research in pursuit of a world without dementia, (2) improving personalized support for patients and caregivers, and (3) creating a more dementia-friendly society. The Netherlands will double its dementia research budget to 140 million euros over the next ten years, and joins in on international research agendas such as by the EU Joint Programme on Neurodegenerative Diseases Research and takes part in dementia solution projects such as HAAL-AAL with Taiwan, Denmark and Austria. Quality of life, community-based support and person-centered activities (e.g. MEETINGDEM Meeting Centers), 'warm' technology, and a personalized medicine approach to intervention are reoccurring terms in the Dutch research landscape, as opposed to a sole-focus on innovation and technology for cost-efficiency and mitigation of risks. Policy focus areas include the implementation of the 2020 dementia care standard, building long-term consortia with inclusion of non-academic partners, and stimulation and restructuring of health insurances to better include preventive eHealth solutions and apps.

The ABOARD project aims to develop tests that allow for an early and precise diagnosis of Alzheimer's disease, where these tests allow for personalized risk profiles to predict individual disease, lifestyle and medicine trajectories. ABOARD additionally focuses on ensuring the healthcare system is ready to support access to new pharmaceutical innovations. The 5-year national project launched in April 2021 and brings together a consortium of over 30 partners, among which the Dutch patient organization Alzheimer Netherlands, academic and applied research, healthcare, (semi-) private and public organizations, and the five Dutch Alzheimer centers. These centers each have different focus areas, and are located in Amsterdam (young onset dementia, diagnosis & prognosis), Radboud UMC in Nijmegen (effective care, cardiovascular risk management), Erasmus MC in Rotterdam (FTD, rare forms), Limburg (risk and prevention (lifestyle), psychosocial innovations), and Groningen (health maintenance and advancement).

A sixth expertise center was recently recognized by Alzheimer Netherlands that specifically focuses on technology. The Expertise Centre Dementia & Technology (ECDT) is an initiative by Technical University Eindhoven (TU/e), aiming to improve quality of life and well-being of people with dementia with the use of 'Warm Technology'. Warm as opposed to cold, aims to shift technology development towards co-creation and creating feelings of dignity, engagement and comfortability. The Quality of Life by use of Enabling AI in Dementia (QoLEAD) consortium led by TU/e was recently awarded funding by the Dutch Research Council (NWO), and will provide AI-driven solutions in (1) health, safety and quality of care, (2) social participations and social contact, and (3) autonomy, meaningfulness and self-respect. The consortium includes multiple practice locations open to innovation, such as Tante Louise and SVRZ Servicecentrum.

The YOD-MOLECULAR project was also awarded funding support in the same call, focusing on fundamental research and development of diagnostic tools for young onset dementia. The Amsterdam UMC lead consortium will research the mechanisms of selective vulnerability and their contribution to disease presentation.

ABOARD, QoLEAD and YOD-MOLECULAR are exemplary of the strong triple helix approach in the Netherlands, whereby government, industry and research work together towards a common mission. Multidisciplinary research, innovation, product development and market introduction across the knowledge chain and care pathway in health is challenging and necessitates an international stage for showcasing one's expertise to find future partners, to join efforts to fund or work together on new solutions, exchange knowledge and be inspired to consider a different approach or perspective.

Though Amsterdam ranked fifth in Lien Foundation's 2020 Dementia Innovation Readiness Index for cities, the city falls behind (20th) behind Singapore (3rd) for a favorable business environment to catalyze innovation in dementia. Factors like Singapore's favorable business environment, the top-down approach to innovation funding and planning, HDB public housing system, multiculturalism, presence of living-in domestic workers and low number of dedicated dementia nursing beds creates a different setting for dementia solutions than in the Netherlands. The innovation mission 'A Personalized Approach to Dementia Prevention, Treatment and Care' to Singapore will enable Dutch delegation members to experience this setting first hand and explore novel solutions with their Singaporean counterparts, within this multidisciplinary delegation and for their own respective organizations.

2. Mission objectives:

- Showcase: Participants are able to showcase their value, expertise or technology to potential future partners according to identified needs of partners in Singapore, and discuss preliminary solutions that may lead to R&D collaboration
- Knowledge exchange: Participants explore opportunities for structured discussions and strategic exchanges with Singapore-based and Dutch-based counterparts
- Inspiration: Participants formulate ideas for new applications of technologies developed within their respective organization, with Dutch or Singapore-based partners.
- System thinking: Broadly stimulate or renew crossover (across sectors, resources, expertise, goals, methodologies) thinking in participating Dutch and Singaporean actors

3. Target audience and tracks

Engineers, technologists, researchers, clinicians, policy makers, business developers, care delivery strategists: working at scale-ups, midsize companies, research institutes, research hospitals, government and start-ups that possess expertise relevant to either or both tracks:

1. Diagnostics (e.g. neuroimaging, biomarkers), prediction (e.g. big data, risk profiles), prevention (e.g. medicine, lifestyle intervention, and personalized nutrition)
2. Technological solutions
    a. Health, safety and quality of care
    b. Social participation and social contact
    c. Autonomy, meaningfulness and self-respect

Or are active in the dementia field:

- Implementation of care programmes, transformation theory or translational research, knowledge management and dissemination (e.g. assistive technology certification and co-creation)
- Living, community dwelling, activity or caregiving service concepts
- Health care policies and healthcare financing models for prevention of dementia

4. Draft: Potential program outline

The program is under development and will be adapted to meet the needs and interests of both Dutch and Singaporean stakeholders.

The draft program includes:

- A workshop and introductory presentations about the local health-, research and innovation ecosystem, regulation and laws, valorization and market expansion opportunities with relevant Singaporean partners
- Visit to a nursing home, like Peace Haven
- Visit to Pilot Health District Queenstown
- Visit to a general and community hospital
- Visits to R&D centers such as A*Star IMDB and GIS, MACC and DRC
- Closing round table and networking dinner with relevant Singaporean partners
- Options for focused matchmaking