

# **Facing an ageing society: The need of innovations in Medical Technology**

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# Demographic change in Northern Europe

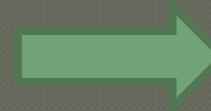


# Europe 1950-2050

Increasing life expectancy  
Declining or stagnating fertility



Growing number of ageing people &  
Young people move to cities



Empty  
Regions

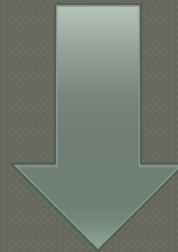
**Europe**  
Life expectancy at birth by sex (years)  
Medium variant  
1950-2050

Period	Both sexes combined	Male	Female
1950-1955	65.6	63.0	68.0
1955-1960	68.0	65.2	70.6
1960-1965	69.7	66.6	72.5
1965-1970	70.4	67.0	73.5
1970-1975	70.8	67.2	74.2
1975-1980	71.2	67.3	74.9
1980-1985	71.7	67.7	75.5
1985-1990	72.8	69.0	76.5
1990-1995	72.6	68.3	76.8
1995-2000	73.1	68.9	77.3
2000-2005	73.8	69.6	78.0
2005-2010	75.1	71.1	79.1
2010-2015	76.1	72.3	79.9
2015-2020	77.1	73.5	80.7
2020-2025	78.1	74.6	81.4
2025-2030	78.9	75.6	82.1
2030-2035	79.6	76.4	82.7
2035-2040	80.2	77.1	83.3
2040-2045	80.9	77.8	83.9
2045-2050	81.5	78.5	84.5

## Baltic Sea Region 2000-2050: Percentage of active working people of 65+

	<b>2000</b>	<b>2005</b>	<b>2025</b>	<b>2050</b>
<b>Denmark</b>	22,2	22,6	33,8	40,0
<b>Estonia</b>	22,4	24,1	31,3	43,1
<b>Finland</b>	22,2	23,7	41,4	46,7
<b>Latvia</b>	22,1	24,1	30,7	44,1
<b>Lithuania</b>	20,8	22,5	29,2	44,9
<b>Poland</b>	17,6	18,7	32,8	51,0
<b>Sweden</b>	26,9	26,4	36,5	40,9

# How to survive in empty regions?



Initiate migration of young people to low populated areas  
(new jobs)

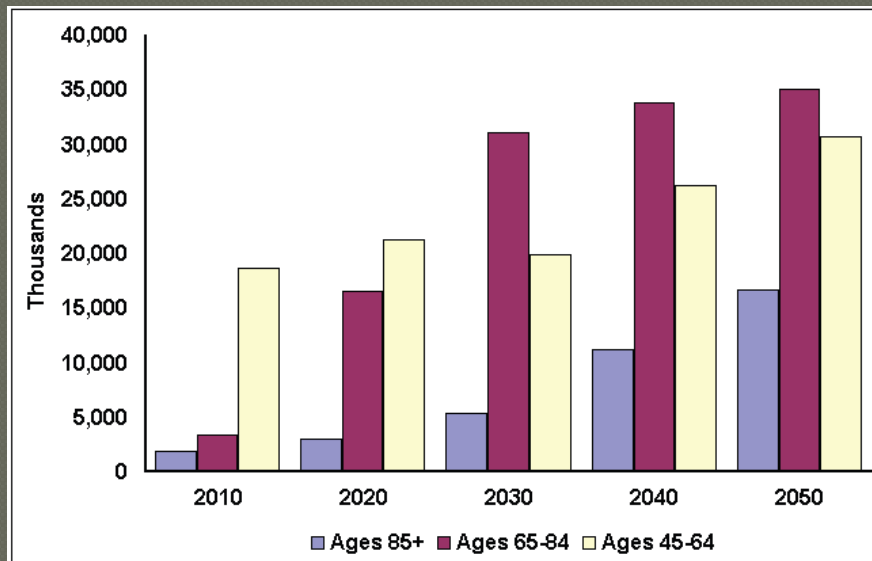
**or**

Stimulate technological innovations in health care  
(work longer)

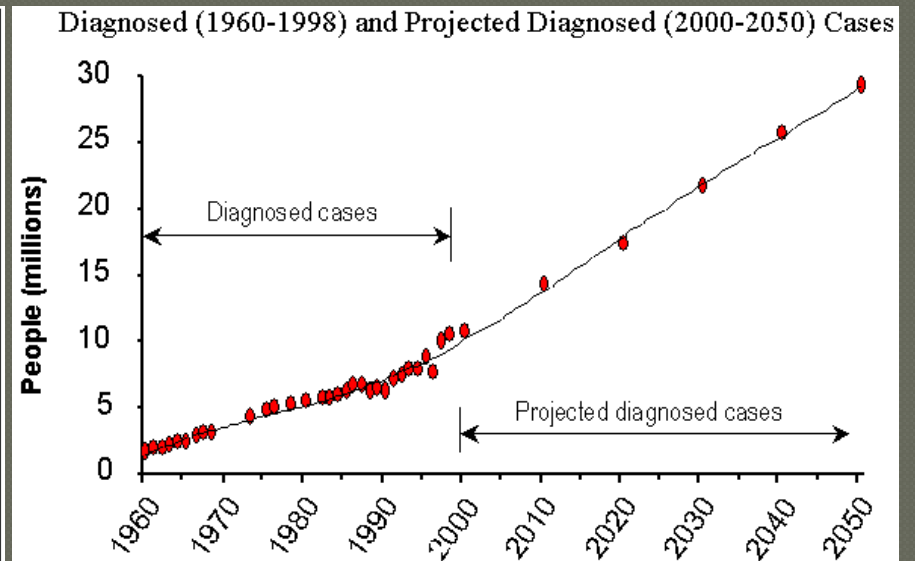


# Projected age and chronic disease numbers in the USA (period 2000-2050)

## Cumulative Change in Population by Age Groups, 2000 – 2050



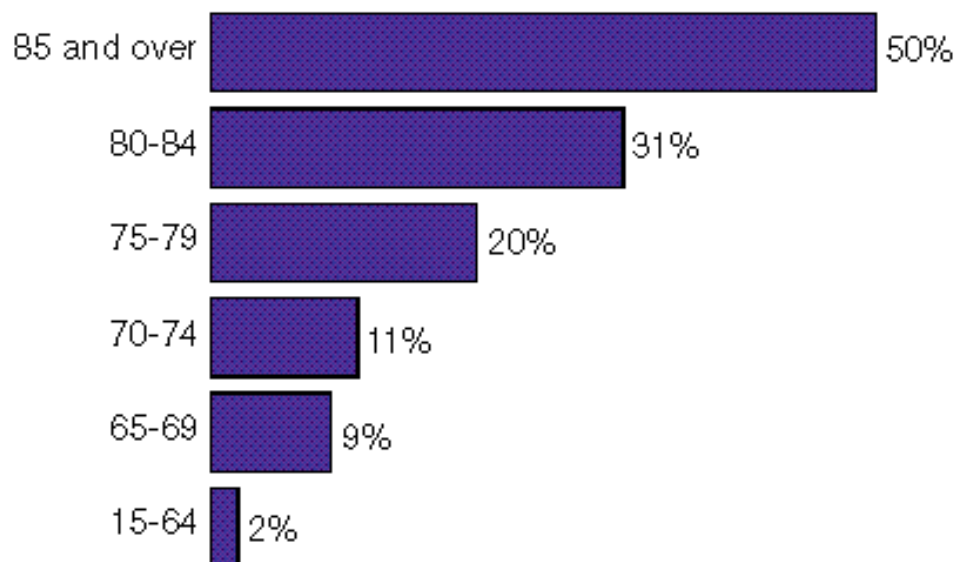
## Prevalence of Diagnosed Diabetes in the United States



## Ageing people need more often personal assistance

### The Need for Personal Assistance With Everyday Activities Increases With Age

Percentage of persons needing assistance with everyday activities, by age: 1990-91  
(Civilian noninstitutional population)



# Requirements for ageing people to survive in “empty” regions

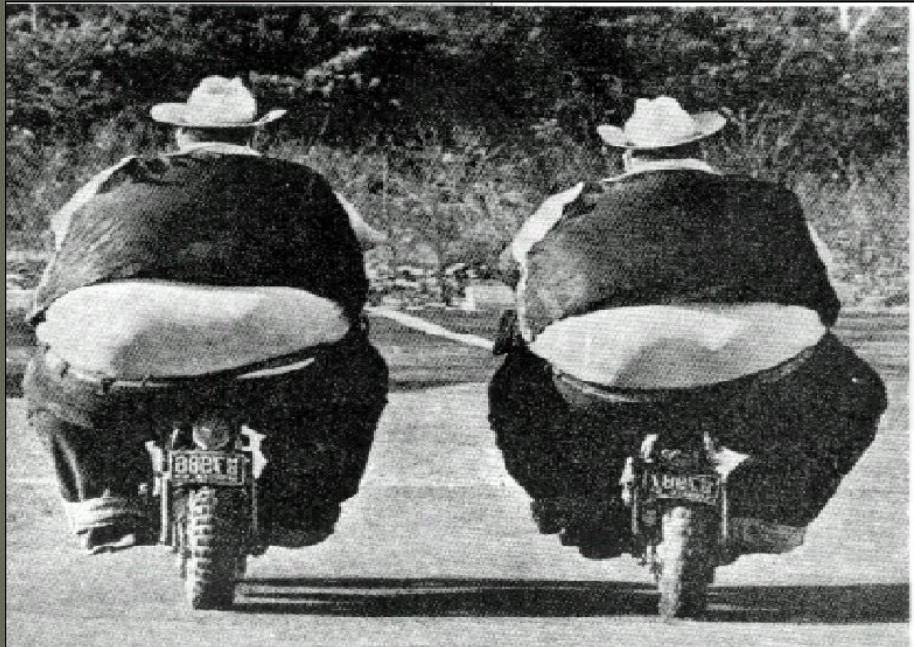
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- Safe place to live
- Easy access to health care
- Mobility and public transportation
- Recreation
- Money



# Obesitas and ageing

Obesitas at young age influences health at older age:  
How to treat obesitas in a stimulating way?



# Requirements for the society to enable ageing people to survive in “empty” regions

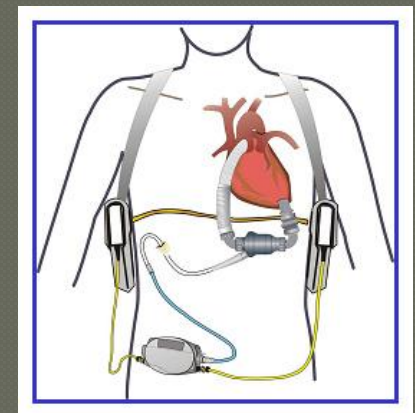
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- Promotion of healthy life style: fall prevention, healthy food, etc.
- Initiate innovative medical and technological research and education
- Better use of innovations in Medical Technology and ICT

# Possibilities of Modern Medical Technology

New (bio)materials, nanotechnology, hybrid techniques, etc. make development of miniaturized complex systems and custom build devices possible

MT can facilitate independent living of disabled and chronically ill patients (bionic arm, artificial pancreas, portable dialysis, implantable blood pumps)



# Limitations of modern MT

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- Most home care devices are too technical to handle for elderly
- Physiology of ageing patients differs from “average” patients (stiffening)
- Use of medical implants much longer than expected
- MT Assessment is performed after the market introduction of a product



# Hemodialysis an unhealthy but life saving therapy

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## Complications of HD:

Low blood pressure

Muscle cramps

Itching

Sleep problems

Anemia

Bone disease

High blood pressure

Fluid overload

Inflammation

Access site complications

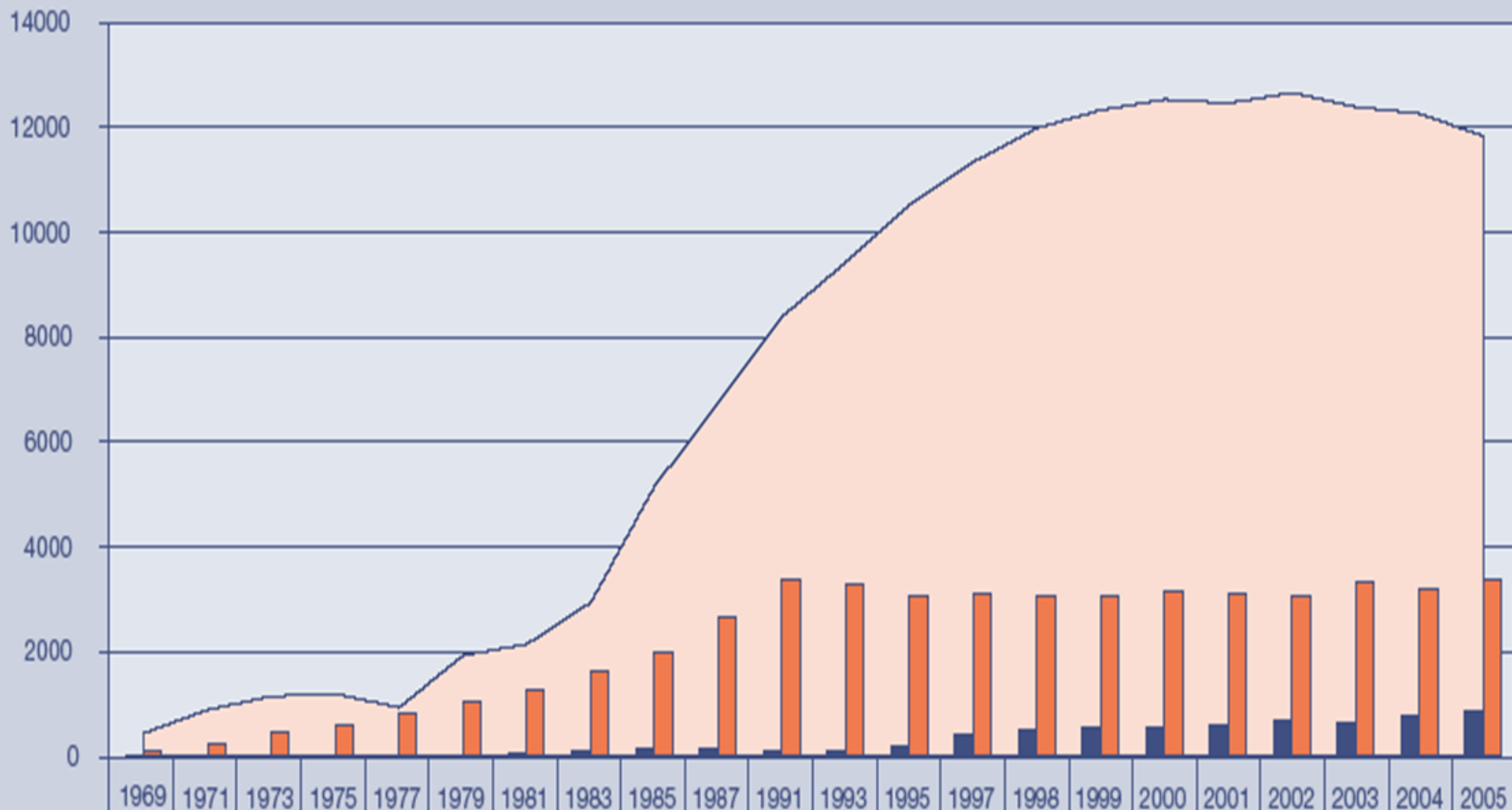
Amyloidoses

Depression



# Waiting list kidney transplantation

## Eurotransplant



Kidney waiting list	450	892	1147	1200	934	1929	2135	2928	5150	6740	8376	9418	10510	11324	11975	12313	12524	12450	12653	12382	12251	11814
Living donor transplants	9	5	11	33	33	33	53	108	150	161	129	127	212	411	526	579	569	617	697	646	796	864
Cadaveric donor transplants	102	228	454	583	800	1050	1263	1645	1965	2665	3395	3293	3064	3110	3068	3050	3145	3121	3047	3352	3185	3383



# Organ Transplantation

## Preservation – hypothermic conditions

### Cold Storage (CS)



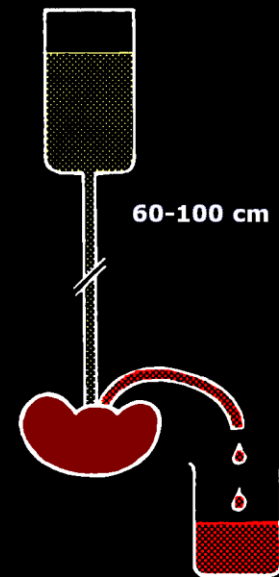
### Machine Perfusion (MP)



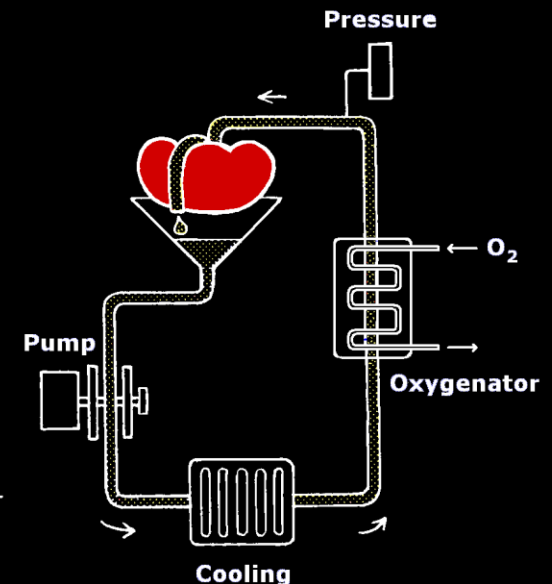
### Advantages of MP:

- longer preservation time
- better post Tx organ function
- cost effective
- Administration of nutrients and oxygen during preservation
- Biochemical analysis graft function

Flush out blood  
Wash out solution  
Cool to 0-4°C



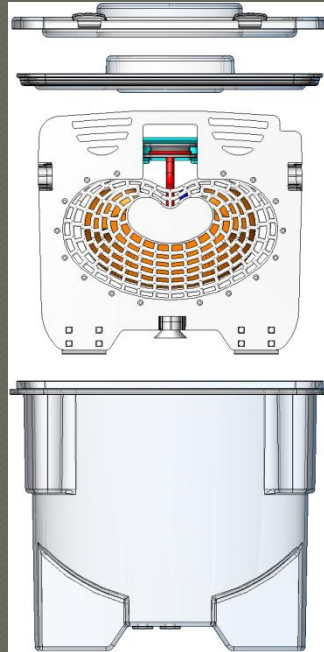
Machine Perfusion  
5-10°C



Transportable kidney perfusion machine (Belzer 1970, USA)

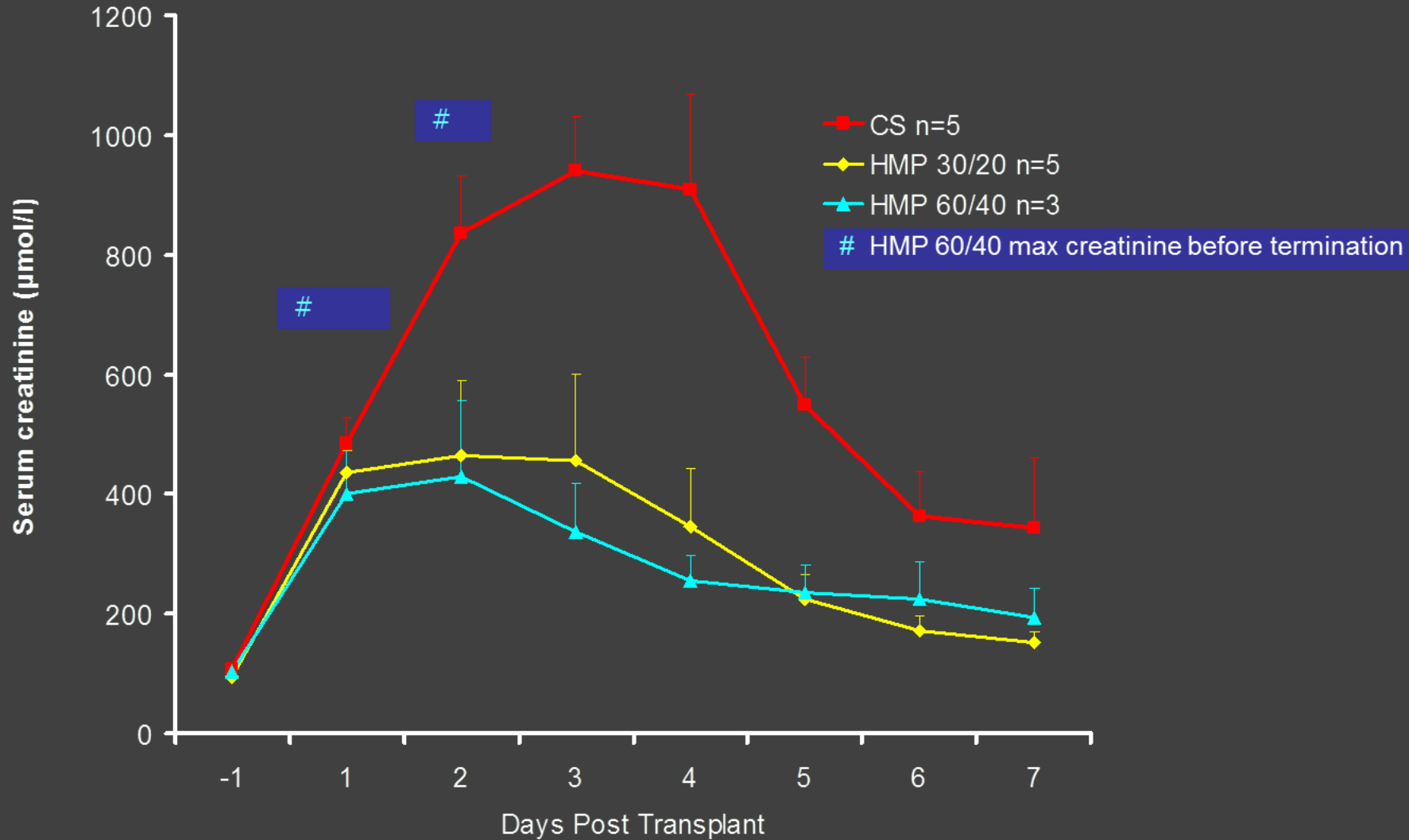


# Organ-support and organ transplantation



TE & RM: Organ Repair

# Machinale Perfusie versus Cold Storage



# MT and the ageing society

What to do?

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**MT 2050**

**Create awareness of the physiology and  
needs of ageing people**

# Learn from mistakes: Practice of an e-Diabetes pilot project

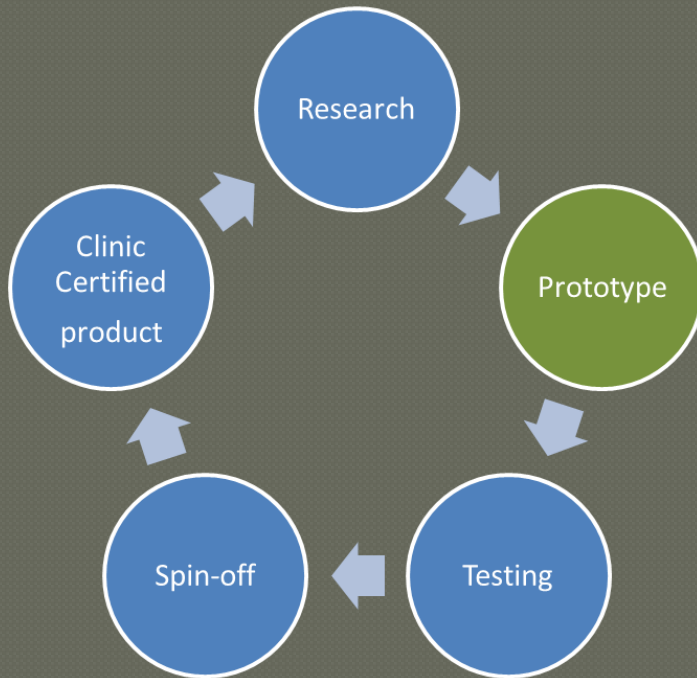
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- No WIFI available
- Elderly are afraid to store and transfer their own medical data
- Doctors receive too many data
- Doctors need too much time to analyze all data adequately
- Electronic patient files differ per practice
- Difficult to maintain privacy
- Both doctors and patients prefer forms instead of e-mail

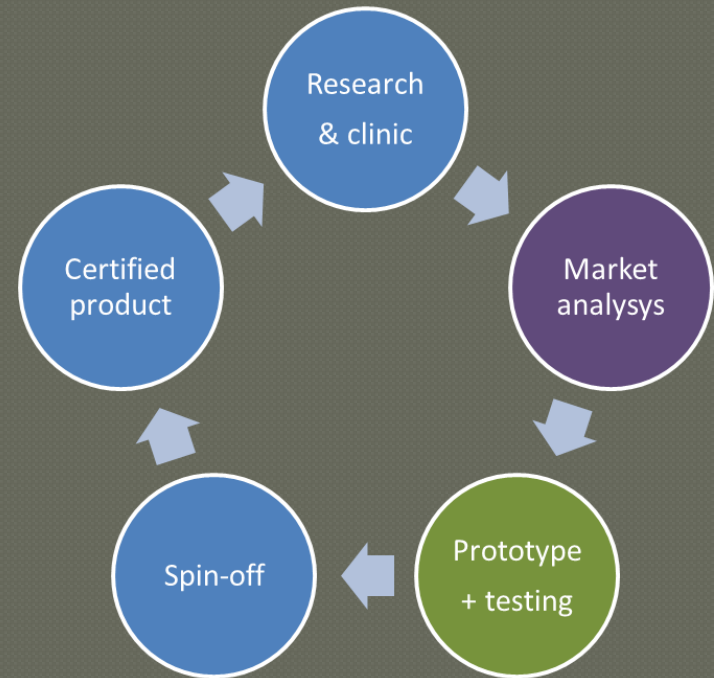


# Medical product development

## Traditional



## Stanford Biodesign concept



# EU long term vision: MT 2050

Multidisciplinary fundamental and applied research focused at the ageing society

Deliverables:

Affordable medical devices

Increased life cycle of medical devices

Personalised medicine: custom made medical devices, use of MT by elderly people

Technical nurse practitioners that assist doctors and patients



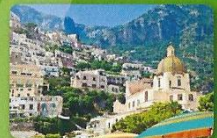
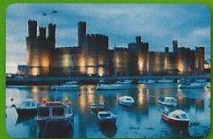
This certifies that

THE NORTHERN NETHERLANDS PROVINCES ALLIANCE

is a



Reference Site of the European Innovation Partnership  
on Active and Healthy Ageing



Brussels, 1st July 2013

**Neelie Kroes**

Vice President of the European Commission  
responsible for the Digital Agenda for Europe

**Tonio Borg**

European Commissioner for Health

# MT 2050: Innovations guaranteed

Thank you for your attention