

MDVSN^{PLUS}

Celebrating our Collaborations

**Cross Network projects
NewMind PLUS: Mental and health
technologies**

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Developing early detection methods to assess the risk of pressure ulcers in individuals with mental illness

NewMind Plus Stage 1 Feasibility Funding

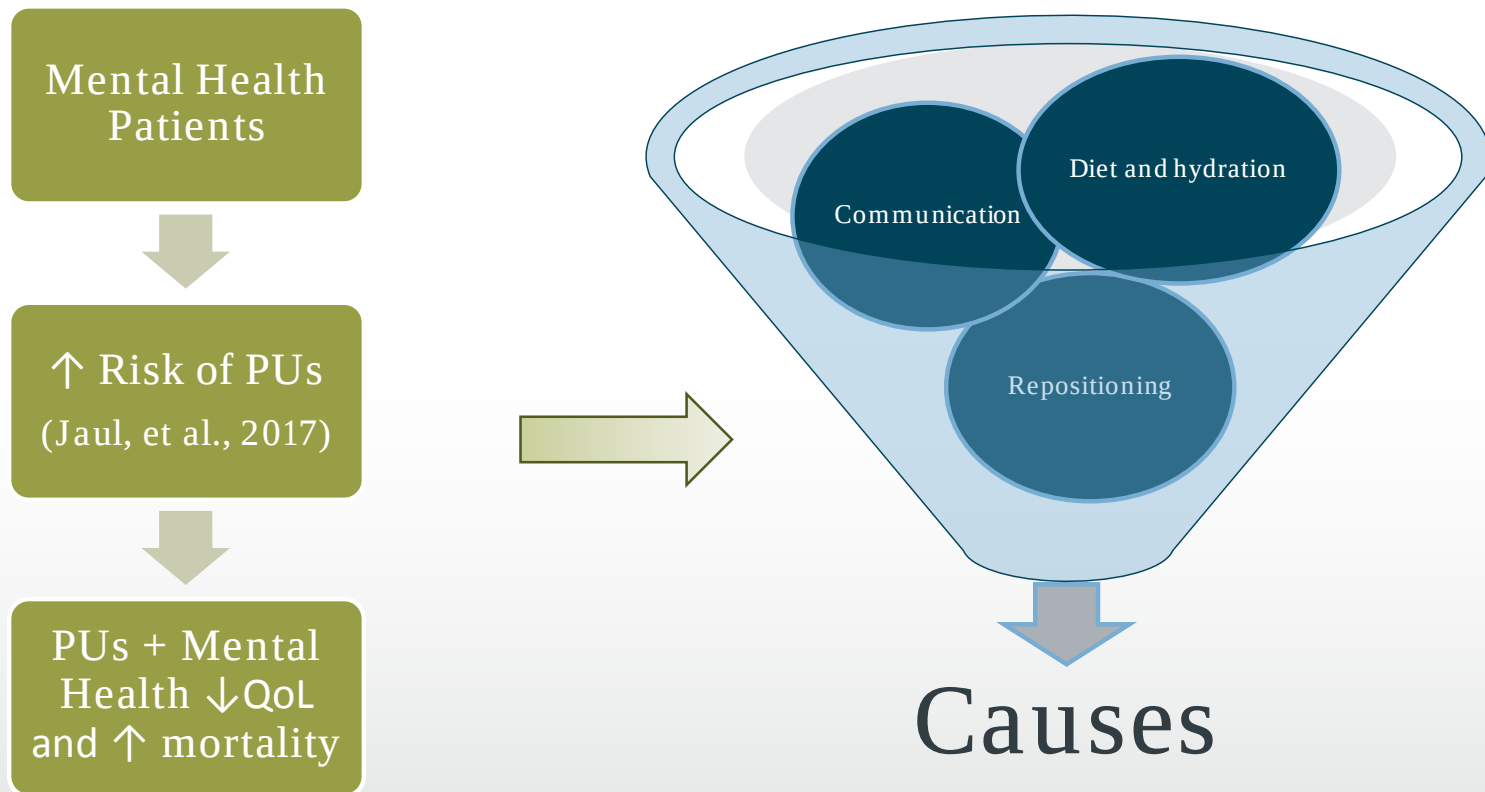


Intelligent sensing to promote self-management within medical devices



Development of technologies for mental health

Pressure Ulcers in Vulnerable populations



Can the clinical management of vulnerable individuals with mental illness benefit from technologies which can evaluate PUs risk?

Feasibility Study

PHASE 1



Sampling biomarkers from vulnerable skin sites in healthy young and elderly individuals.



Monitoring posture and mobility with body worn sensors in healthy young and elderly individuals.

Sampling:

Biomarkers will be collected from the skin surface using Sebutape

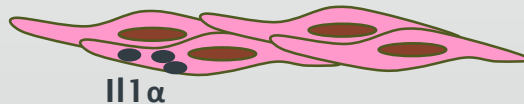
Sebutape



Skin barrier function (Perkins at al., 2001)

Inflammatory cytokines (Perkins et al., 2001)

Signalling molecules - Interleukin 1 family



IL1α

PHASE 2



Feasibility study on the measurement protocol in a small cohort of individuals with dementia.

Monitoring:

Accelerometers (Axivity, AX3)
100Hz, $\pm 8g$

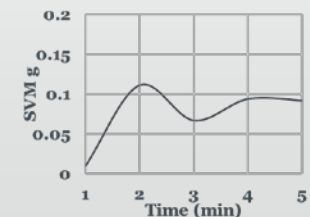
Axivity



Mobility measures

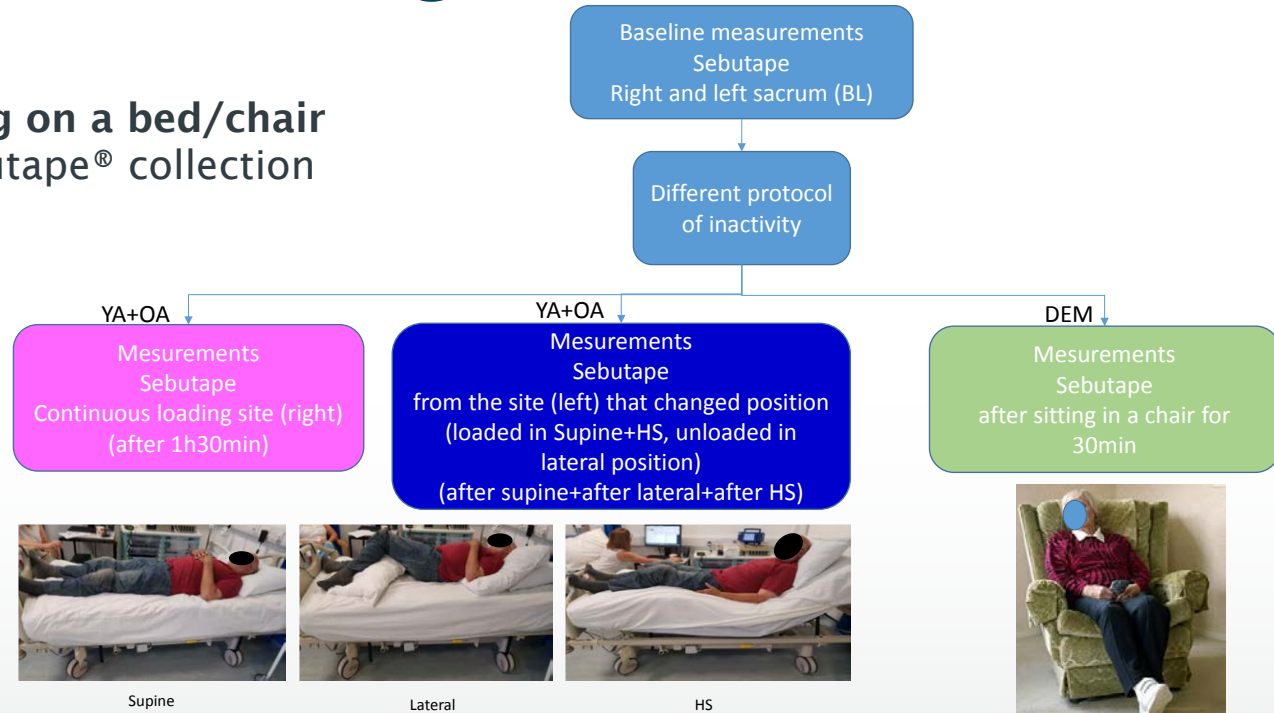
Signal Vector Magnitude (SVM), g

$$r = (x^2 + y^2 + z^2)^{0.5}$$



Experimental Design

Lying on a bed/chair
Sebutape® collection



Walking
AX3 mounted on right hand (1) and ankle (2)

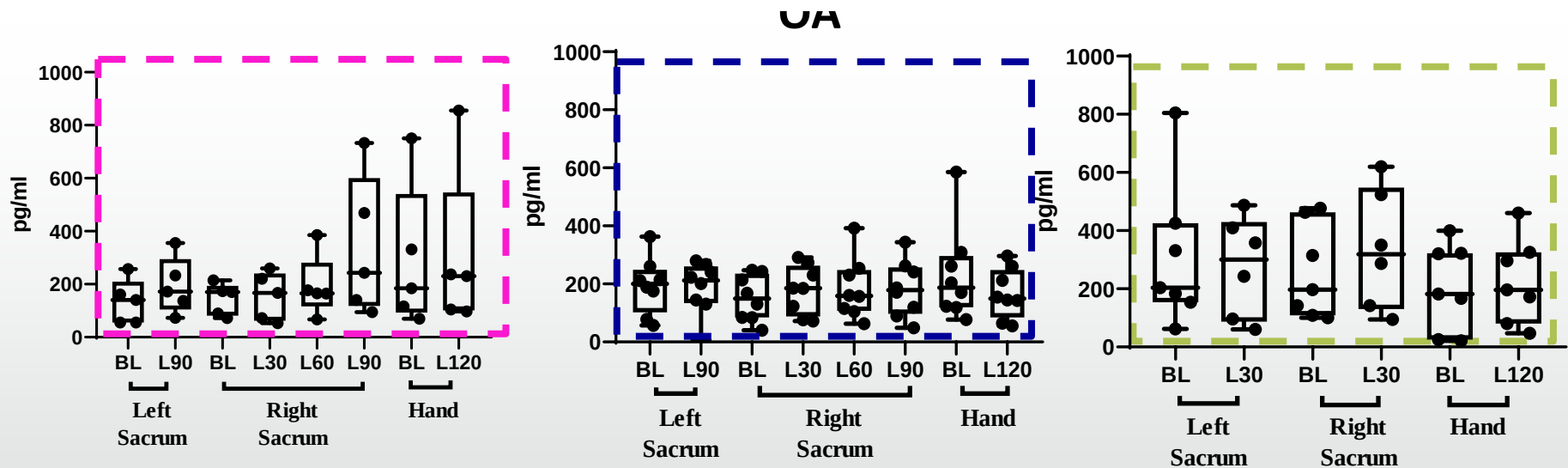


Results - Demographical Data (Ergo-40260)

	Group	Age (years)	Sex	Height (m)	Weight (kg)	BMI (kg/m ²)	Specifications
YA1	Young adult	53	F	1.6	90	35.2	
YA2	Young adult	29	F	1.56	63.5	26.1	
YA3	Young adult	40	F	1.71	65	22.2	
YA4	Young adult	29	M	1.68	74.5	26.4	
YA5	Young adult	44	F	1.76	79	25.5	
OA1	Older adult	60	F	1.51	62.5	27.4	
OA2	Older adult	60	F	1.61	65	25.1	
OA3	Older adult	72	M	1.85	70.5	20.6	
OA4	Older adult	69	M	1.76	87.6	28.3	
OA5	Older adult	61	F	1.64	62.9	23.4	
OA6	Older adult	66	F	1.64	62.1	23.1	
OA7	Older adult	77	M	1.95	106	27.9	
OA8	Older adult	73	F	1.85	70	20.5	
DEM1	Dementia cohort	92	F	1.37	49.7	26.5	Walking frame
DEM2	Dementia cohort	85	F	1.74	92.7	30.6	Walking string
DEM3	Dementia cohort	71	F	1.7	51.6	17.9	Very active
DEM4	Dementia cohort	93	F	1.62	78.1	29.8	Walking stick
DEM5	Dementia cohort	98	F	1.24	54.6	35.5	Walking stick
DEM6	Dementia cohort	88	F	1.4	55.7	28.4	Immobile
DEM7	Dementia cohort	93	M	1.27	60.9	37.8	Immobile

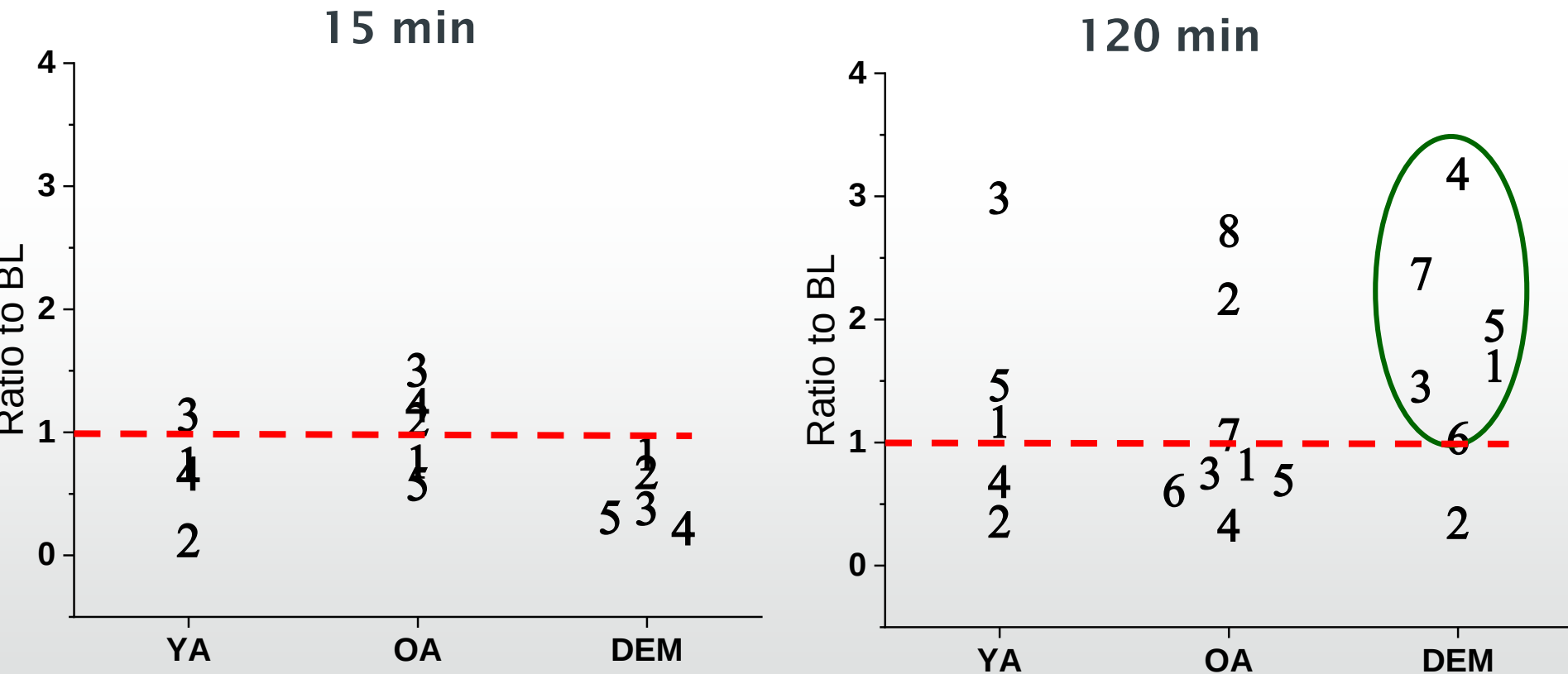
Results

It was feasible to detect inflammatory biomarkers within the limits of detection (8-1000 pg/ml) for all cohorts.



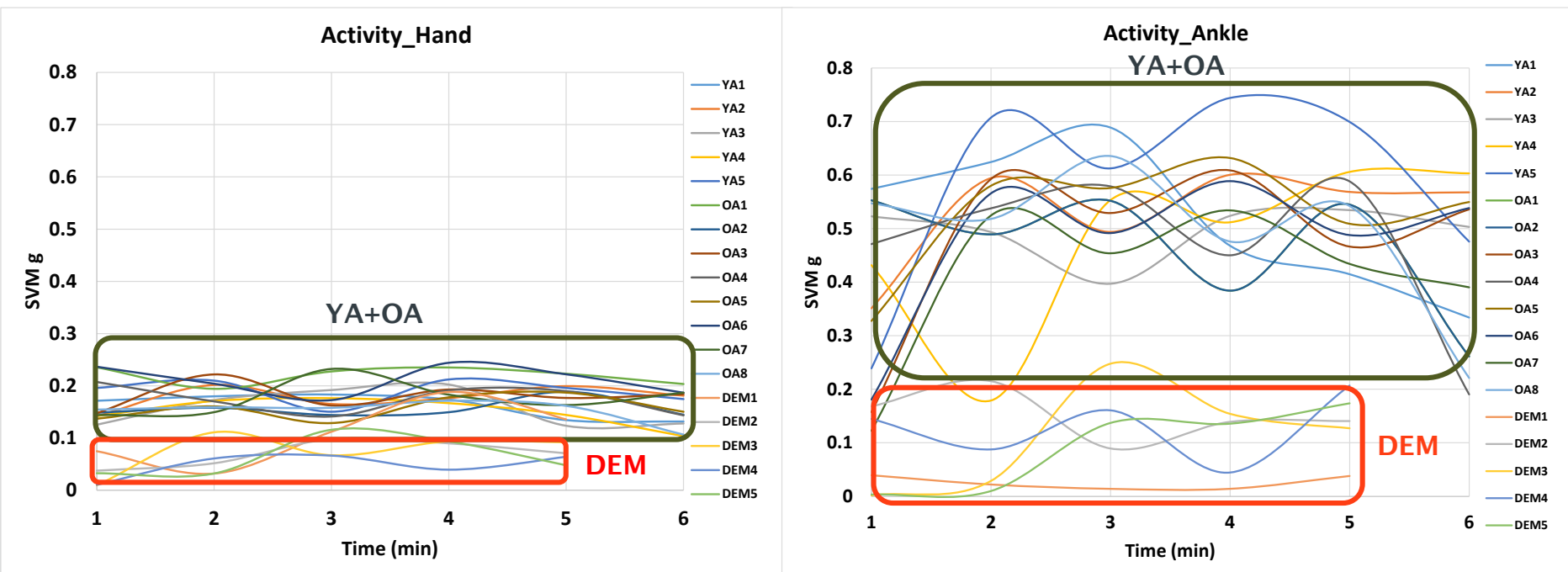
Results

Long term effect of wearing the actimetry device



Results

Accelerometer mounted on the ankle level is more reflective of the activity level in the early dementia cohort.



Discussion

- Sebutape method was successfully applied to three distinct cohorts, including those with dementia
- Actimetry is useful in monitoring mobility
- **Device positioning is critical**



Acknowledgements



Questions?