



Centre for
Inflammation
Research



Speckled Healthcare

COPD and Activity Monitoring

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Chronic Obstructive Pulmonary Disease

Definition

- Chronic Obstructive Pulmonary Disease is a preventable and treatable state characterized by airflow limitation that is not fully reversible
- The airflow limitation is usually progressive and is associated with an abnormal inflammatory response of the lungs to noxious particles and gases, primarily caused by cigarette smoking
- Although COPD affects the lungs, it also produces significant systemic consequences

Chronic Obstructive Pulmonary Disease

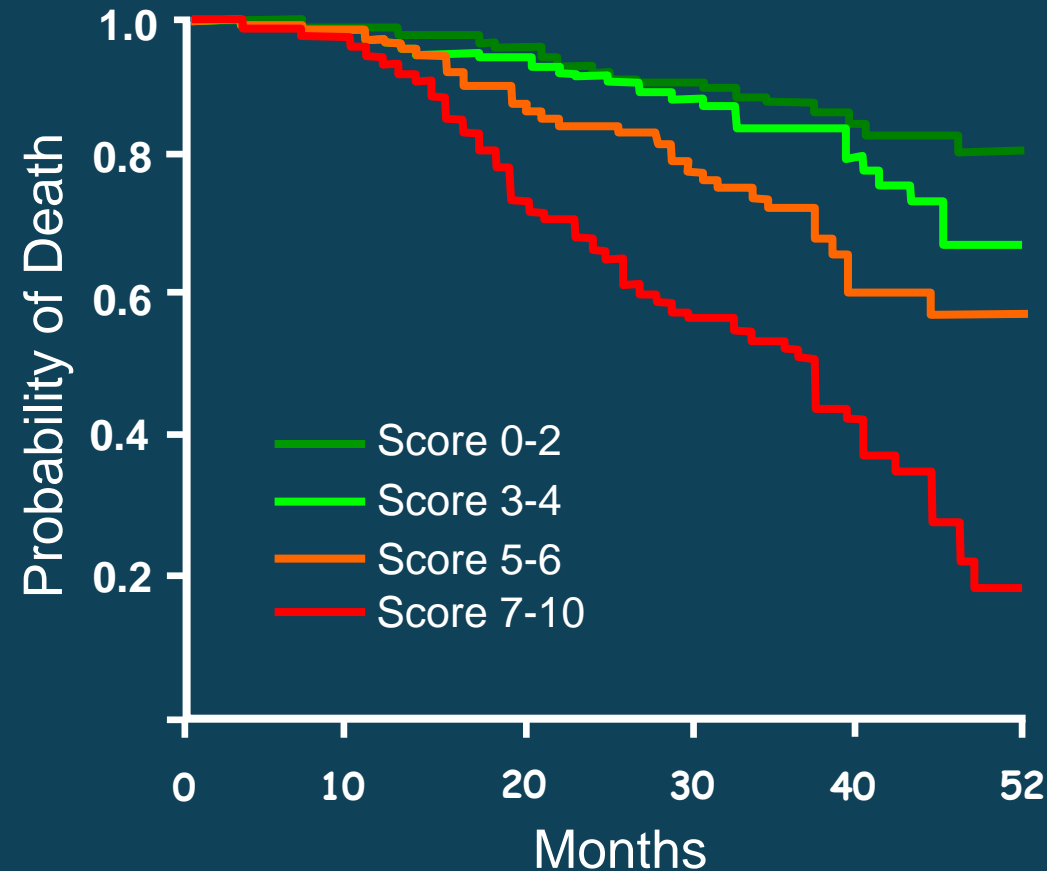
Classification

ATS/ERS Severity	GOLD	Post Bd FEV ₁ /FVC	FEV ₁ % pred
At risk	0	> 70 Cough and sputum	> 80
Mild	I	< 70	> 80
Moderate	II	< 70	50-80
Severe	III	< 70	30-50
Very severe		< 70	< 30
	IV	< 70	< 30 0 < 50 plus CRF

Chronic Obstructive Pulmonary Disease

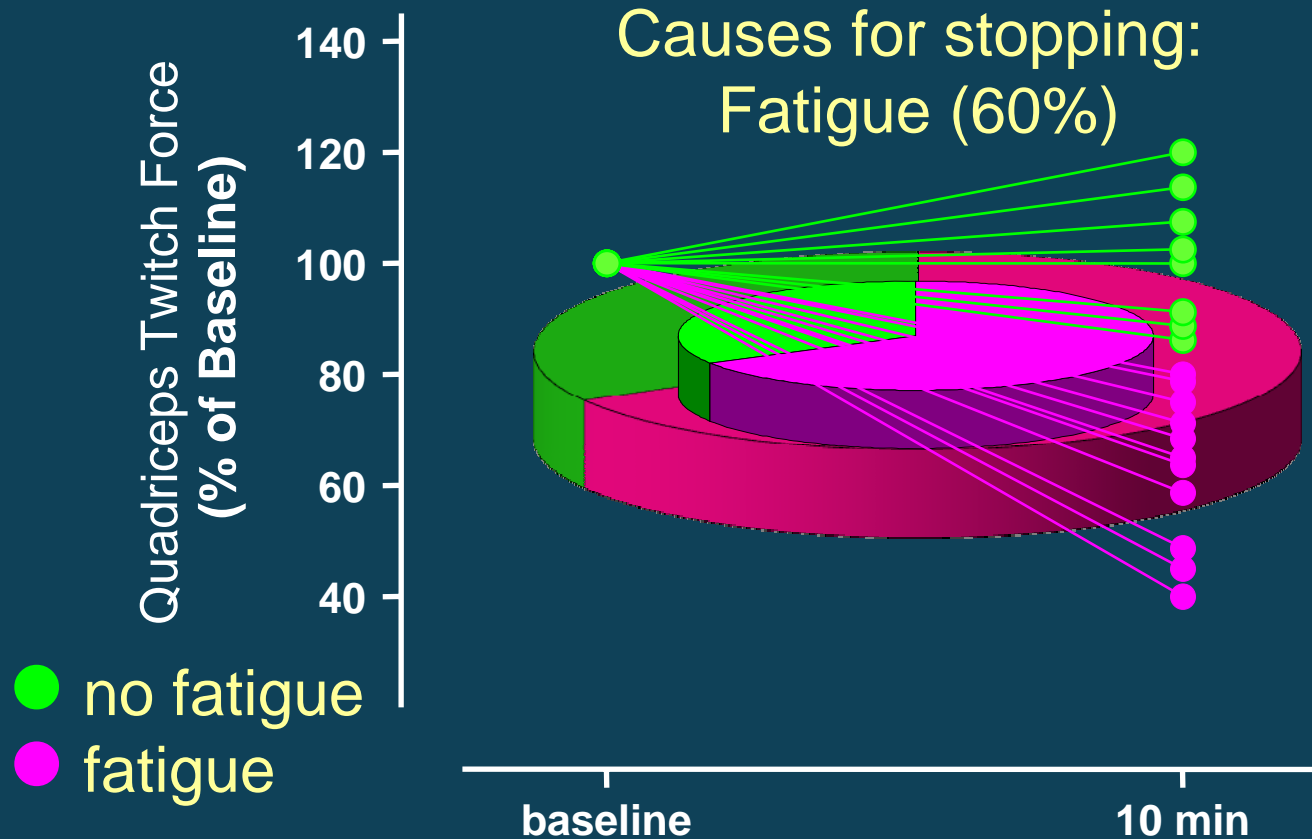
Phenotypes

Variable	BODE Index Score			
	0	1	2	3
FEV₁	≥65	50-65	36-49	≤35
6MWD	≥ 350	250-349	150-249	≤ 149
MRC	0-1	2	3	4
BMI	>21	<21		



Exercise Tolerance in COPD

More than lung function



Chronic Obstructive Pulmonary Disease

Muscle dysfunction



Functional
disorders

Strength
Resistance
Fatigue

Physio-pathological
Changes

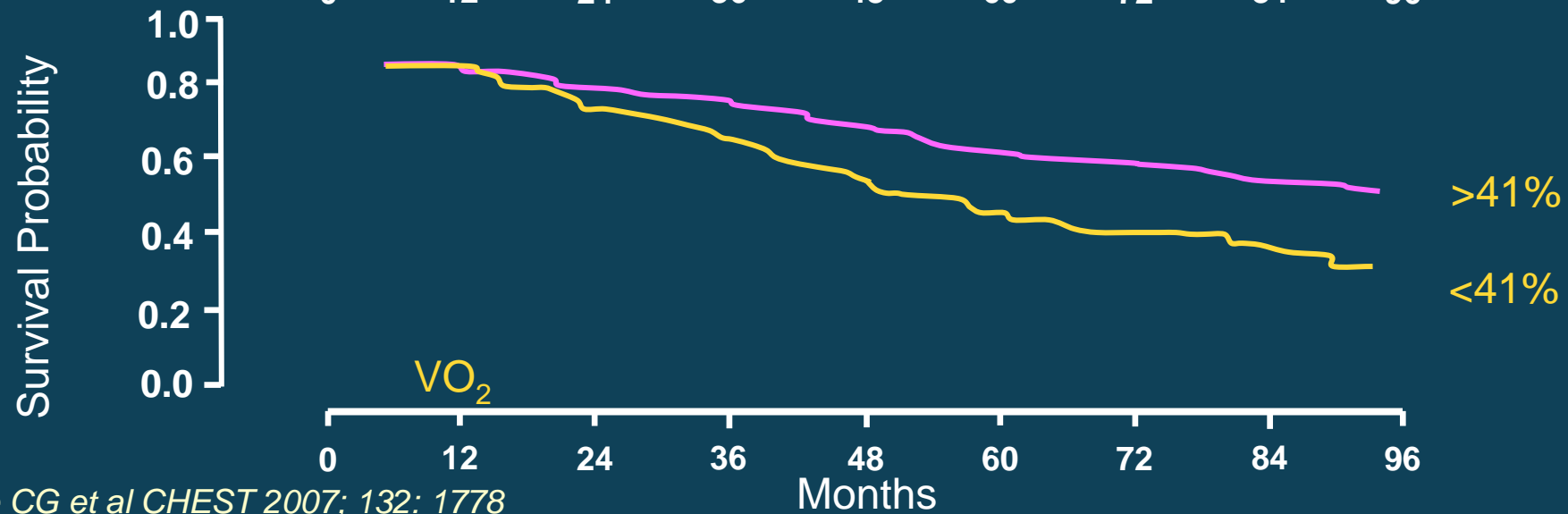
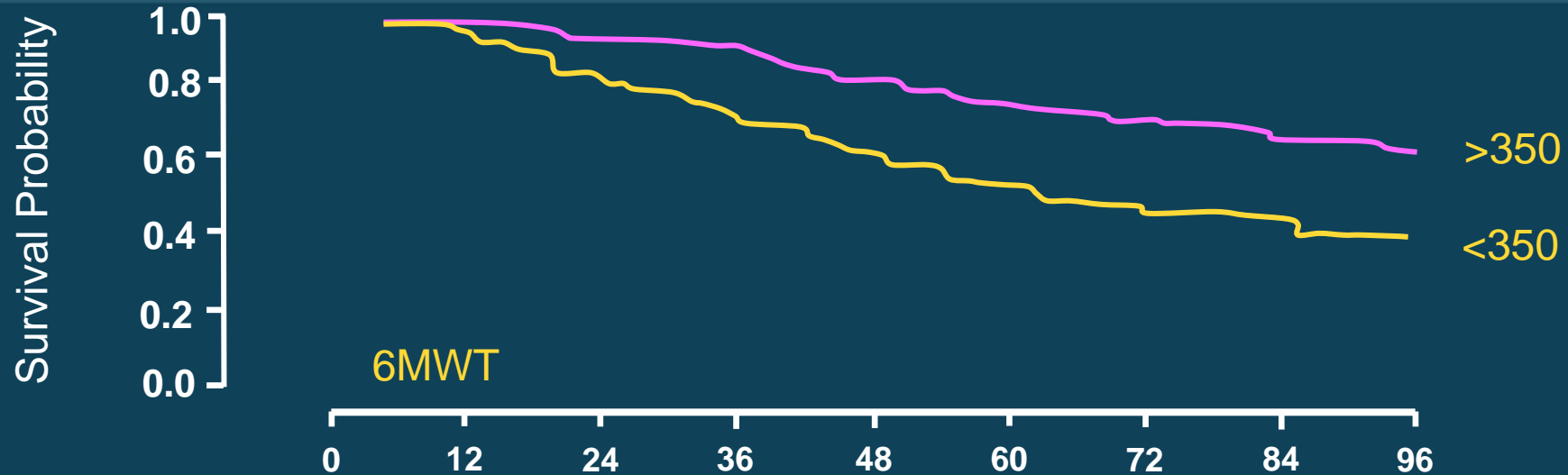
Bioenergetics
Fiber type distribution
Capillarization and O₂ delivery
Muscle mass

It is characterized by two different, but possibly related, phenomena:

- Muscle wasting
- Malfunction of the remaining muscle

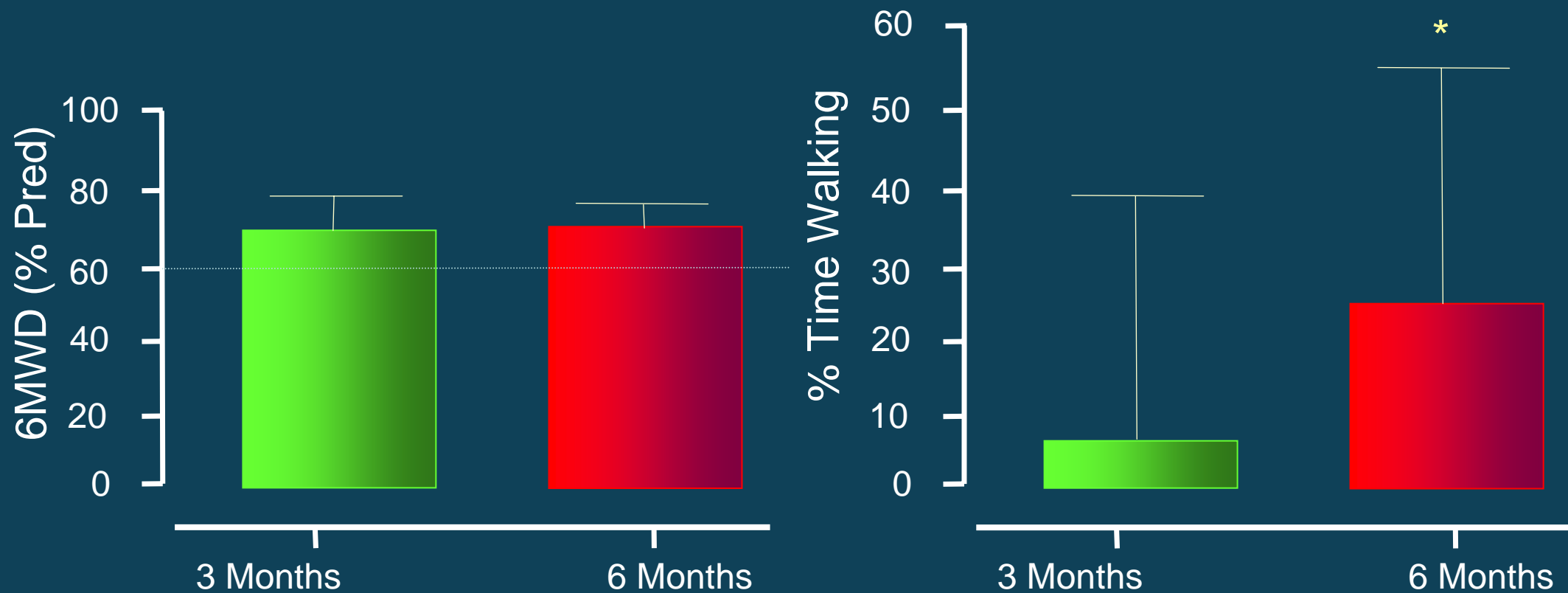
Exercise Tolerance in COPD

Prognosis Factor



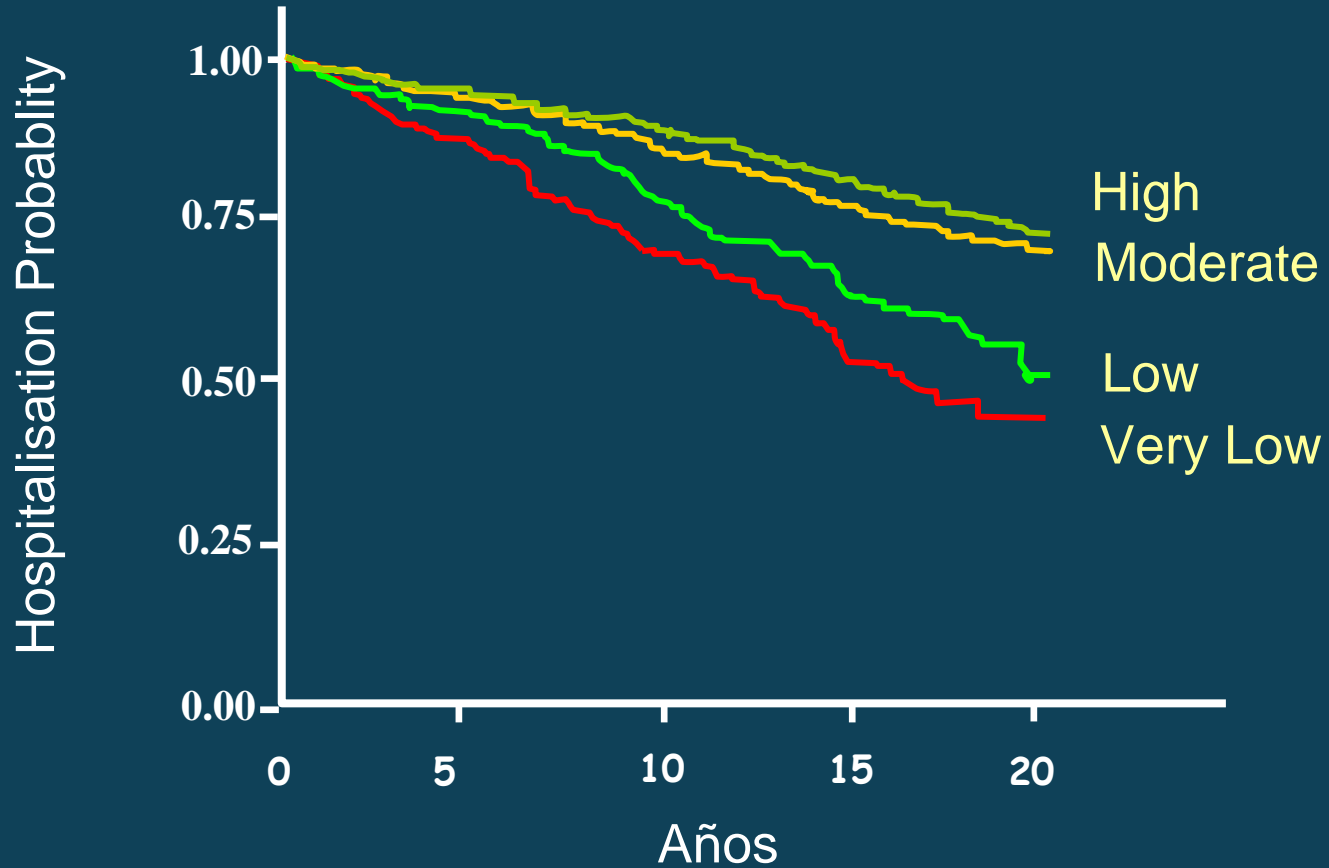
Physical Activity

Effects of rehabilitation



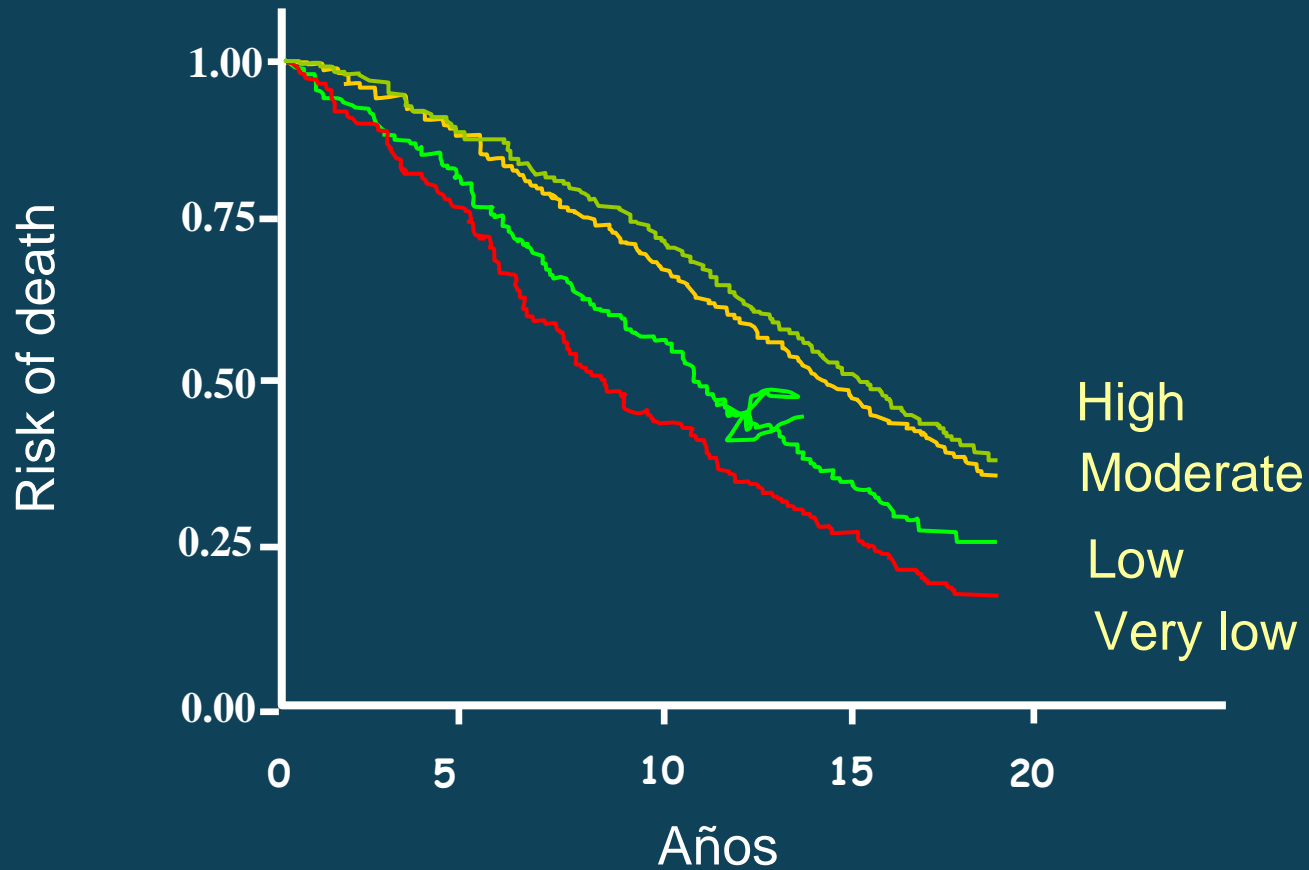
Physical Activity

Prognosis value in COPD



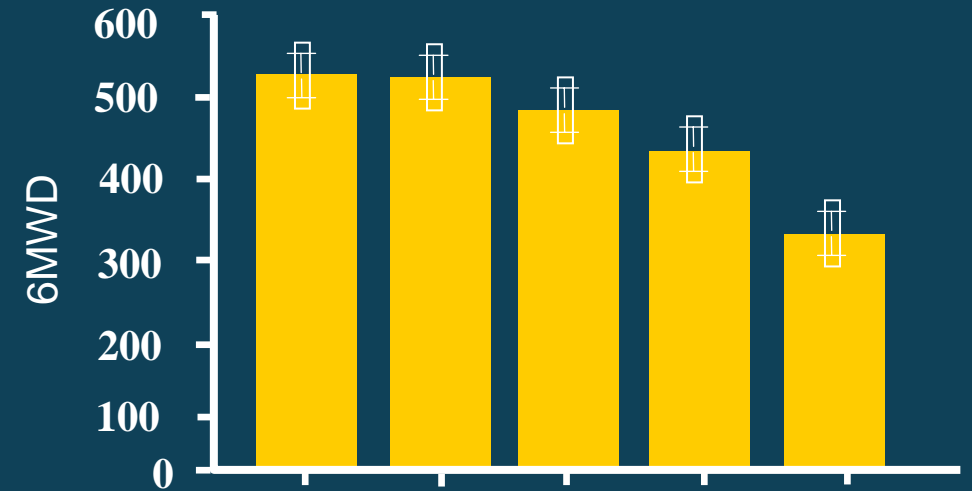
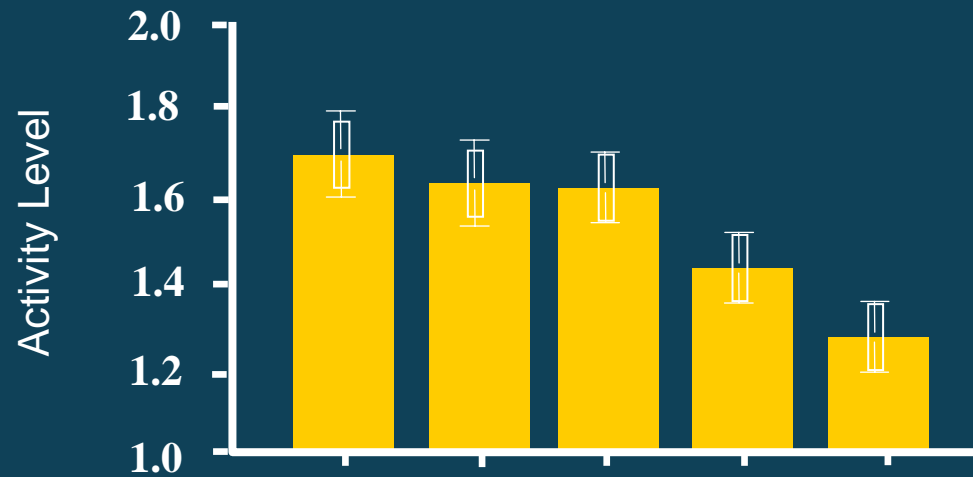
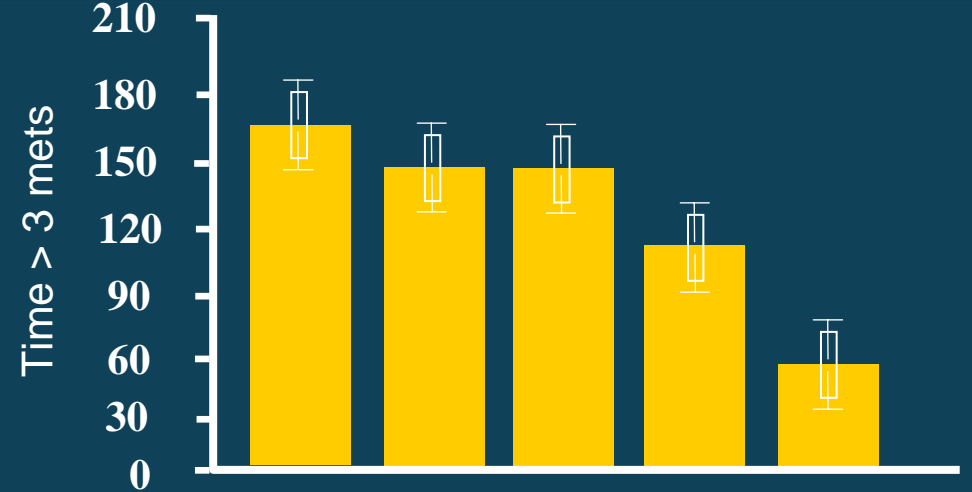
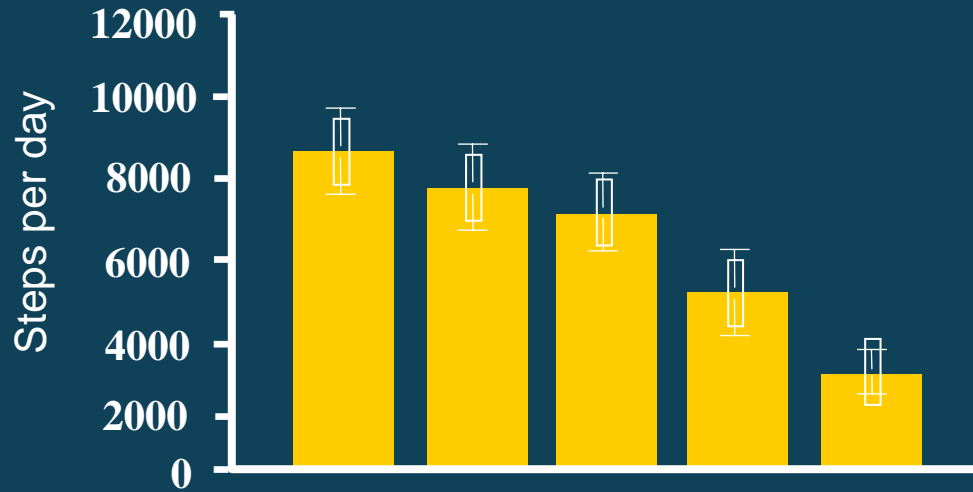
Physical Activity

Prognosis value in COPD



Physical Activity

Relationship with severity of COPD

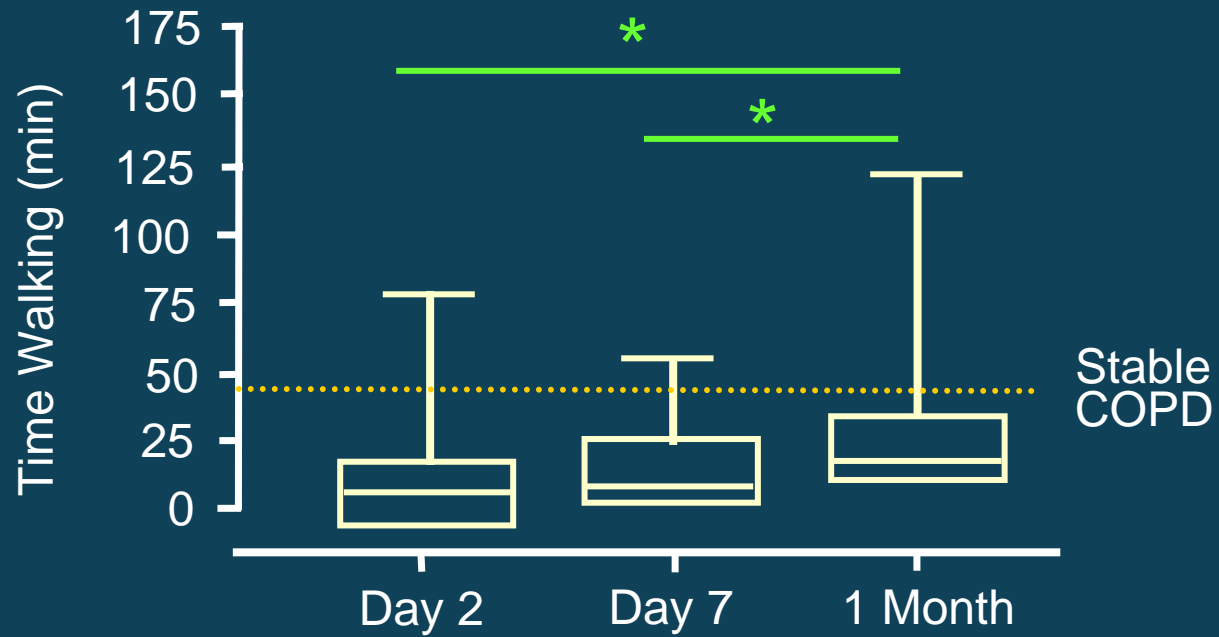


GOLD

GOLD

Exacerbations of COPD

Effect on Physical Activity



Physical Activity

Effect of exacerbations of COPD

Dyspnoea

Weakness

Hypoxemia

Acidosis

Corticosteroids

Psychology



Not a good time for a walk...

Physical Activity

Importance in COPD

- Physical activity levels constitute a prognosis factor in COPD
- Is related to the exercise tolerance but also with other aspects (attitude, psychological aspects, environment)
- It changes during exacerbations
- Remains lower after exacerbations
- Improving exercise tolerance does not immediately translate in improvements in physical activity levels



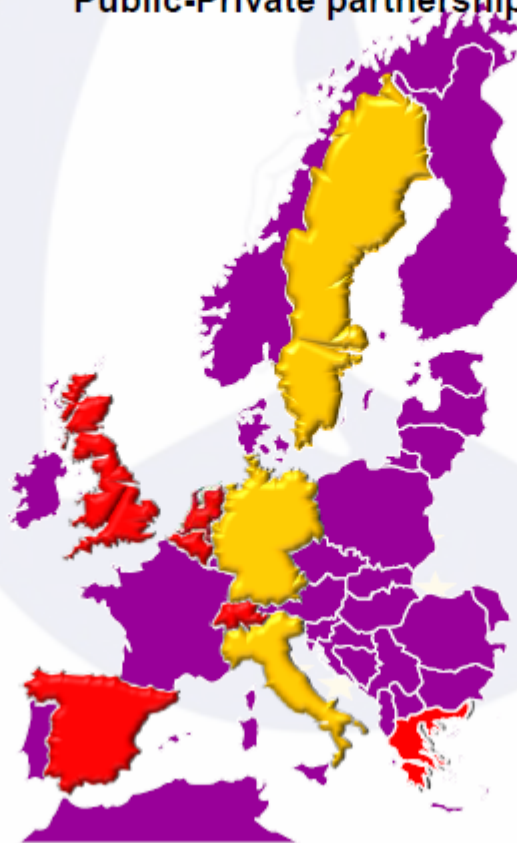
Innovative Medicines Initiative
Innovative Medicines Initiative



efpia

PROactive COPD

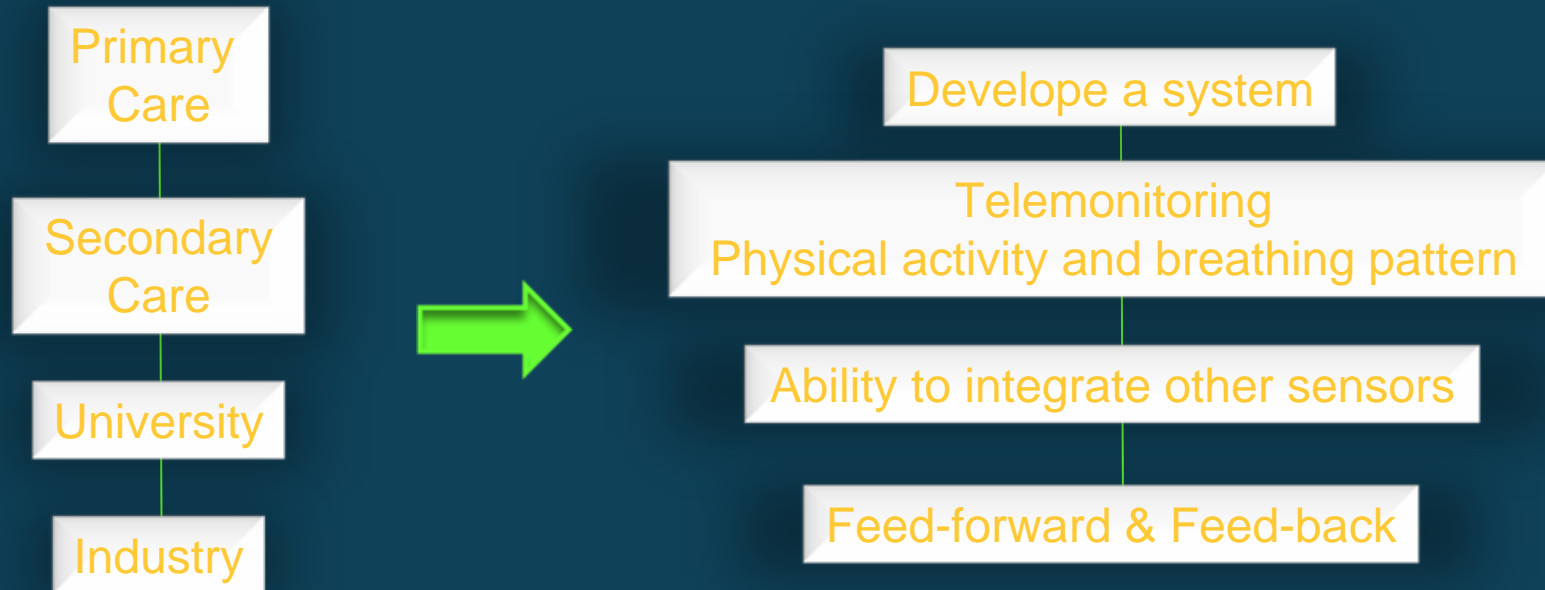
Public-Private partnership



emea

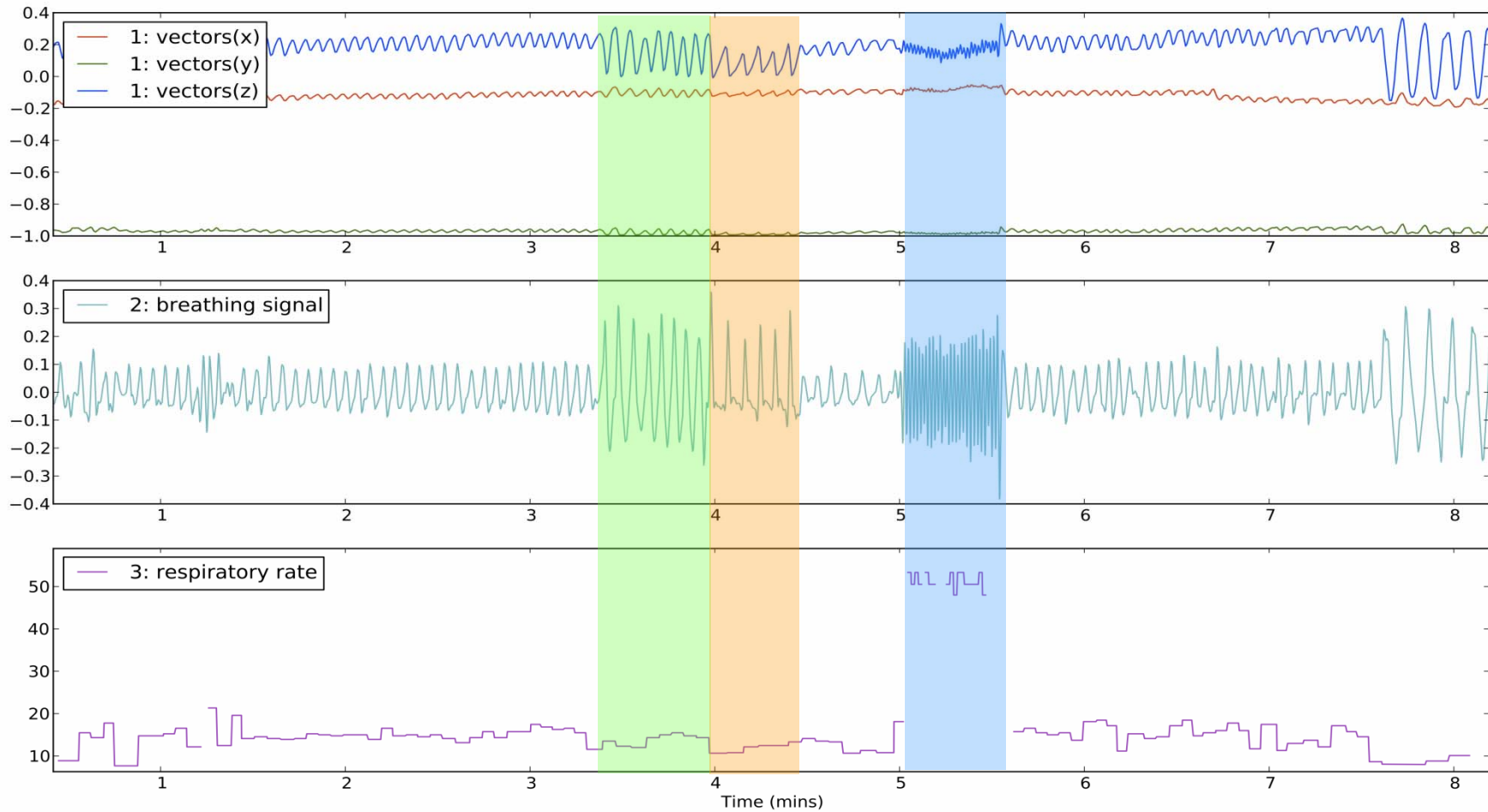
FDA

Using Speckled Computing to monitor chronic illness in the home



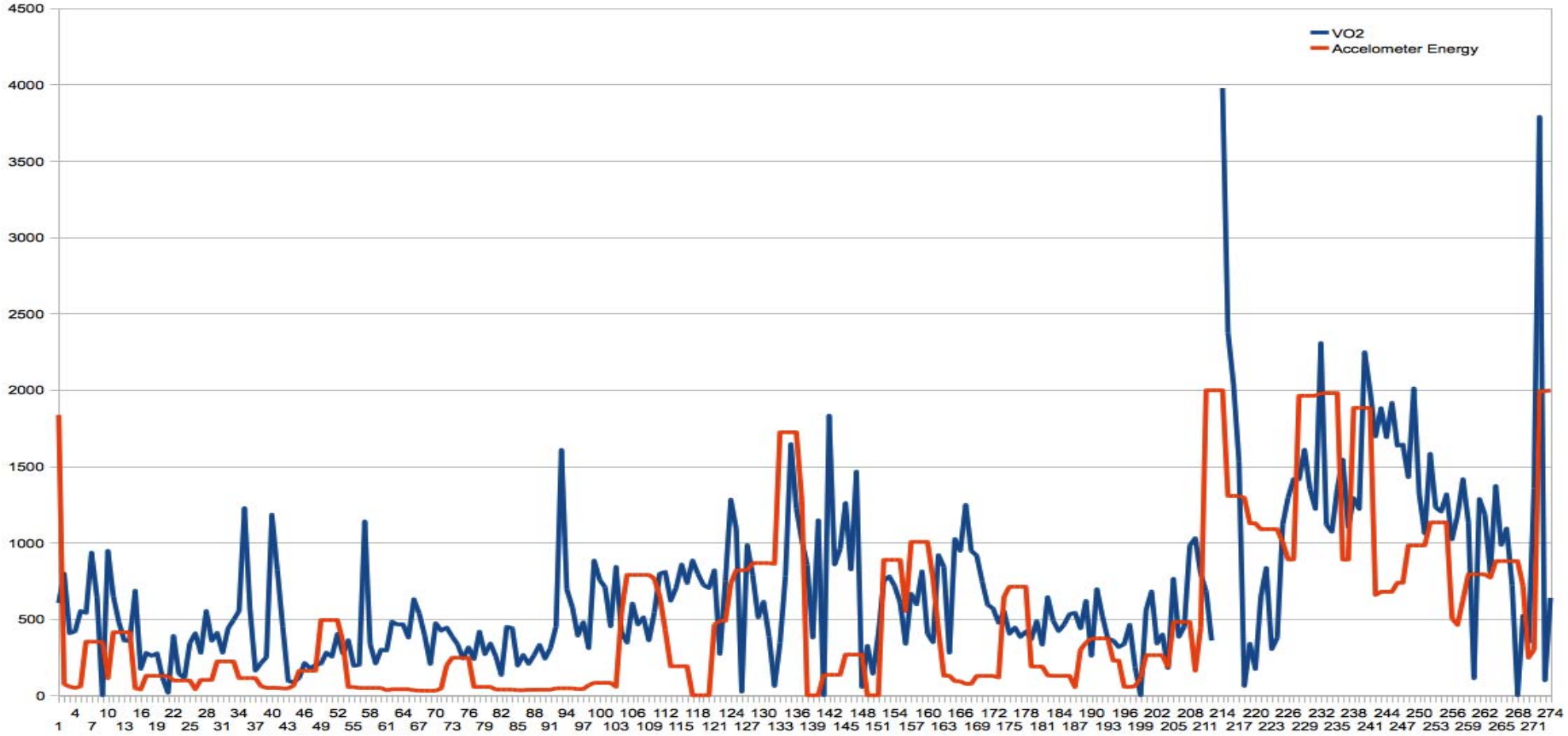
Speckled Computing

Breathing Pattern



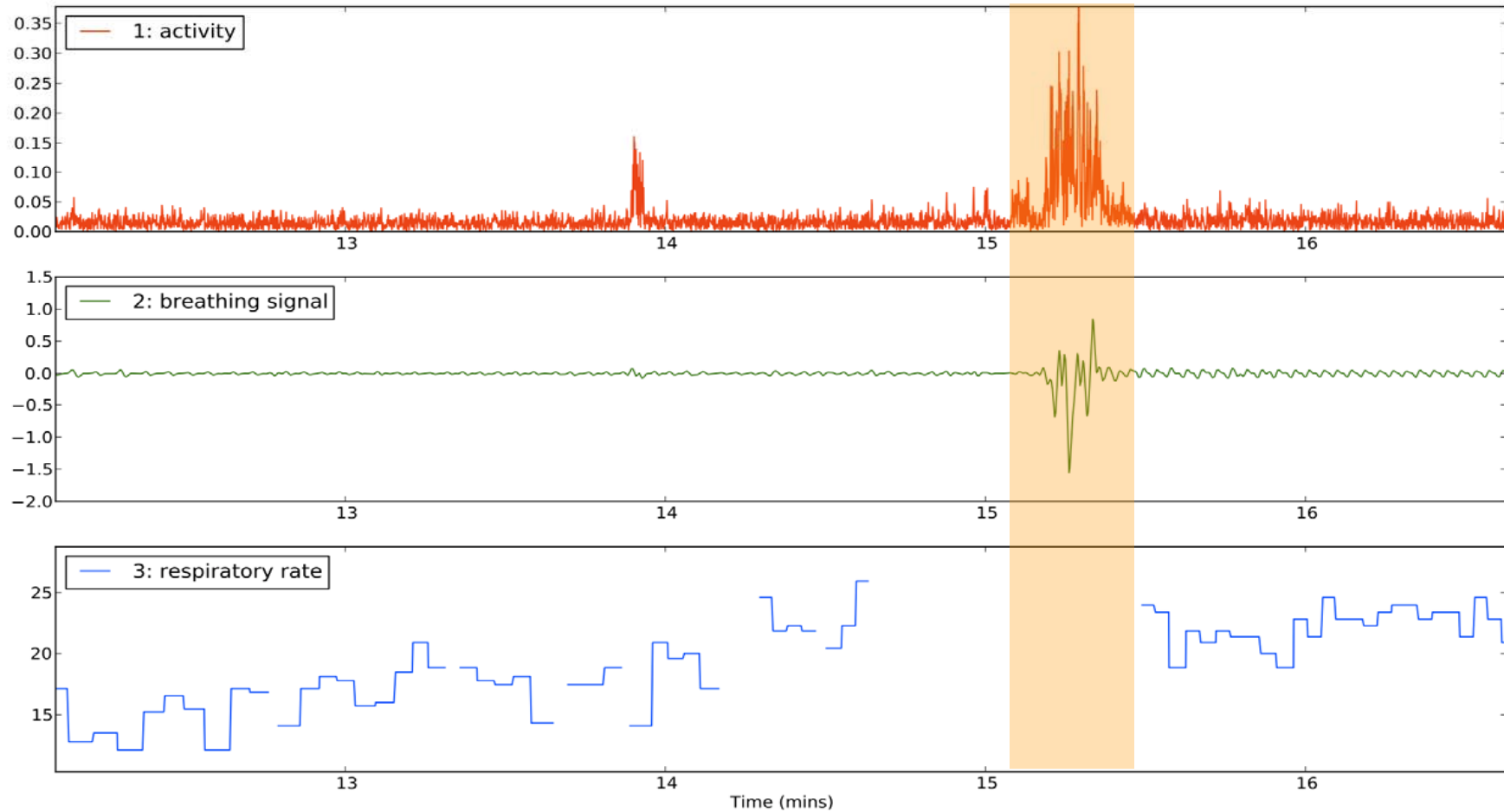
Speckled Computing

Physical Activity

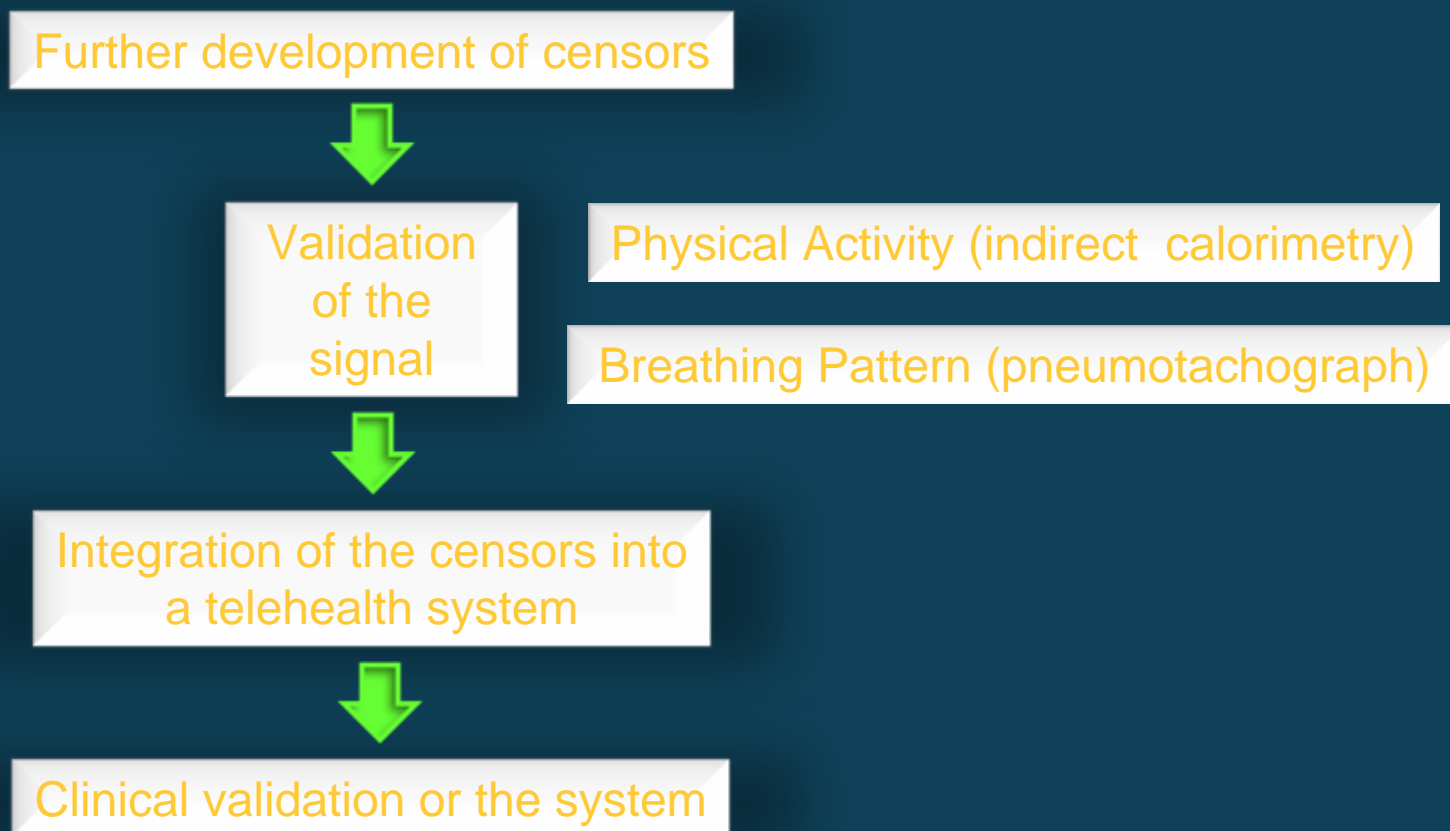


Speckled Computing

Physical Activity & Breathing Pattern



Using Speckled Computing to monitor chronic illness in the home



Conclusions

- COPD is a complex disease affecting the lungs but incurring in several systemic effects such as muscle dysfunction
- Muscle dysfunction, together with lung function impairment, causes exercise intolerance
- Patients with COPD do less physical activity compared with healthy subjects
- Physical activity levels in COPD is a prognosis factor
- During exacerbations of the disease physical activity levels are even lower than in stable patients
- The assessment of physical activity in COPD is a priority
- Several physical activity monitors are commercially available. None integrates a measurement of breathing pattern

Conclusions

- Speckled computing can capture physical activity together with breathing pattern in patients with COPD
- Speckled computing can be integrated in a system combining other interesting variables
- The combined system will help to tele-monitoring patients health status
- This integral system will help to better manage patients with chronic conditions in their environment
- Systems with the ability to provide feedback to the patient will help in the self-management of these population



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