TIME MATTERS IN MS
31 MAY LISBON
The interaction between MS and vascular co-morbidities

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Disclosures

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Looking at the interaction between MS and vascular co-morbidities

Why should we look into vascular comorbidities in MS?

How can we understand MS/vascular disease interaction?

How can we promote brain health in MS?
Why should we think about vascular comorbidities in MS?
Time matters: MS and vascular comorbidities

Geraldes R. Brain Pathology. 2016

MS is a disorder of the central nervous system

...but what happens with the rest of the body matters

Adapted from https://www.mstrust.org.uk/a-z/central-nervous-system-cns
Vascular comorbidities and the brain

Hypertension
Diabetes
Dyslipidemia
Smoking
Physical Inactivity
Obesity

Arterial stiffness
Ischemic heart disease
Cerebrovascular/Peripheral vascular disease

Brain volume loss
White matter lesions
Cognitive impairment

Beauchet O et al. J Hypertens 2013
Rostrup E et al. Neuroimage 2012
Prins & Scheltens Nature Rev Neu 2015
Pase MP et al, Hypertension 2016
Vascular comorbidities and the brain

• Non MS cases will accumulate white matter hyperintensities with increased age and vascular risk factors, typically around the lateral ventricles.
Vascular comorbidities in MS

• Certain vascular disease risk factors are increased in MS:
  - smoking
  - diabetes, hypertension

• Possible ↑ prevalence of ischemic heart disease and stroke
Vascular disease is an important cause of death in MS
Vascular comorbidities in MS

Nature Reviews | Neurology

Marrue, R. A. Nat. Rev. Neurol. 2017
Smoking decreases time to secondary progression and to ambulatory disability


Manouchehrinia et al. Brain 2013
Vascular comorbidities decreased time to ambulatory disability in MS
Neurons, oligos and immune cells are key players in MS pathology

...but cerebral vessels are also quite important!
MS T1 lesions accumulate in areas of hypoperfusion

Cerebral blood flow map  T2 lesions  T1 lesions
MS lesions accumulate in watershed areas

MS

Watershed area

Age – matched control
Vessels change in MS

MS case, Oxford Brain Bank
Vascular risk factors/comorbidities can cause additional brain damage

Geraldes R et al. Brain Pathology 2016
Time matters: MS and vascular dysfunction

**RR**

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Age related pathology
Amyloid, iron deposition, mitochondrial dysfunction, microglia senescence

Vessel pathology
SVD, infarcts, perivascular matrix changes, BBB dysfunction (pericyte loss, increase permeability)

MS pathology
Inflammation
BBE leakage

Neurodegeneration
Mitochondrial dysfunction, iron deposition, perivascular matrix changes, hypoxia

Geraldes R. Brain Pathology. 2016
Why should we think about vascular comorbidities in MS?

...vascular comorbidities are common
...associate with worse clinical outcomes in MS
...there is evidence of vascular dysfunction in MS
...vascular comorbidities cause additional brain damage
...their presence may impact MS expression and treatment
How can we understand MS/vascular disease interaction?
• Big Data
• Better epidemiological studies
• Identify more specific imaging markers
• Integrate comorbidity information into pathology studies
• Develop animal models to study the interaction MS/each VRF
• Integrate vascular comorbidities information into clinical trials
How can we promote brain health in MS?
the earlier MS patients quit the stronger the reduction in the risk of reaching disability milestones
Promoting brain protection in MS

VRF prevention

Vascular comorbidities treatment

DMTs
Promoting brain protection in MS

**Patients**
1. Recognize vascular risk factors
2. Be in charge: be active, watch weight, stop smoking
3. Ask for help

**Health care professionals**
1. Ask about vascular risk factors
2. Promote integrated care (i.e. fast track for smoking cessation, dietitian, etc.)