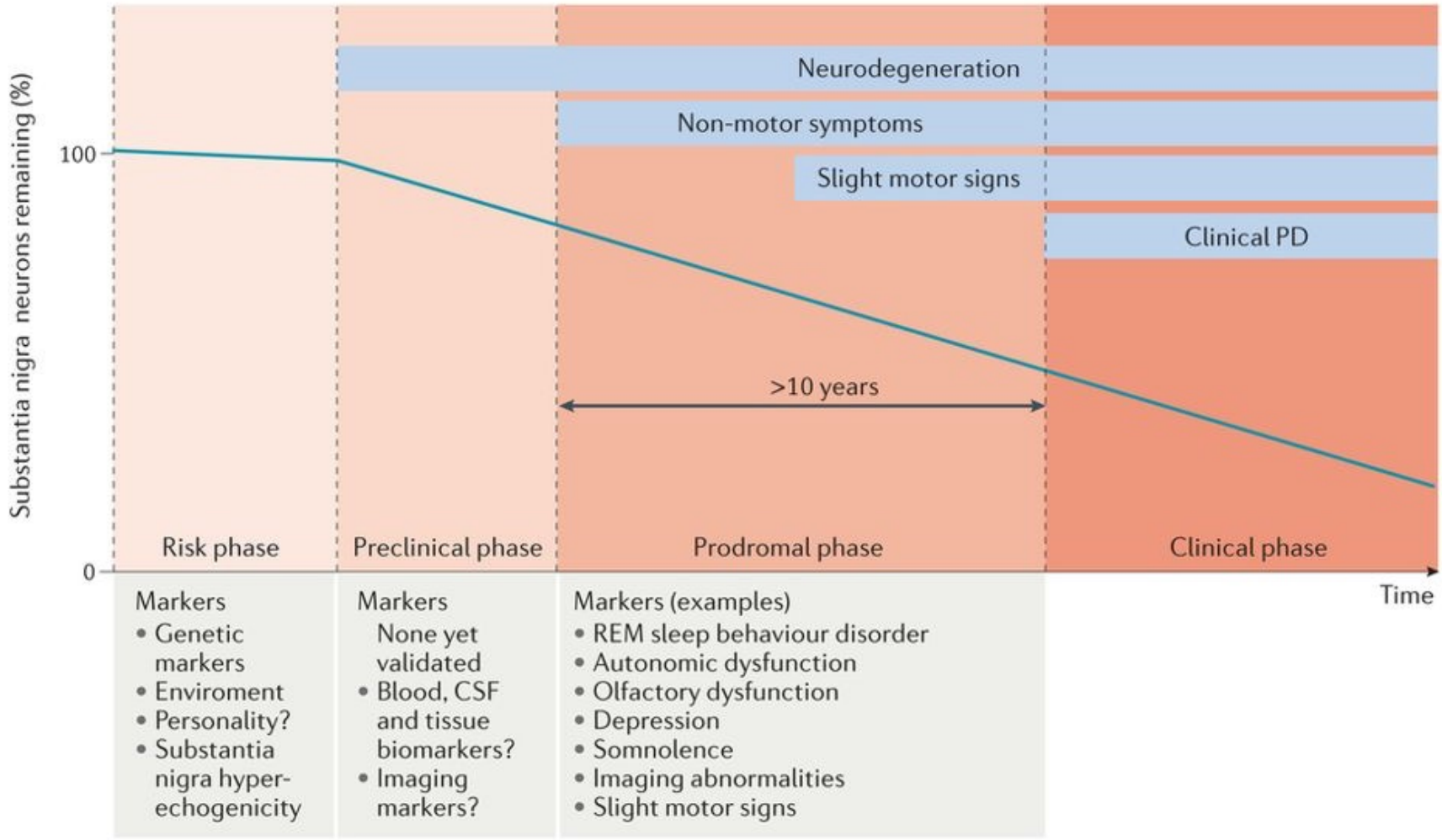
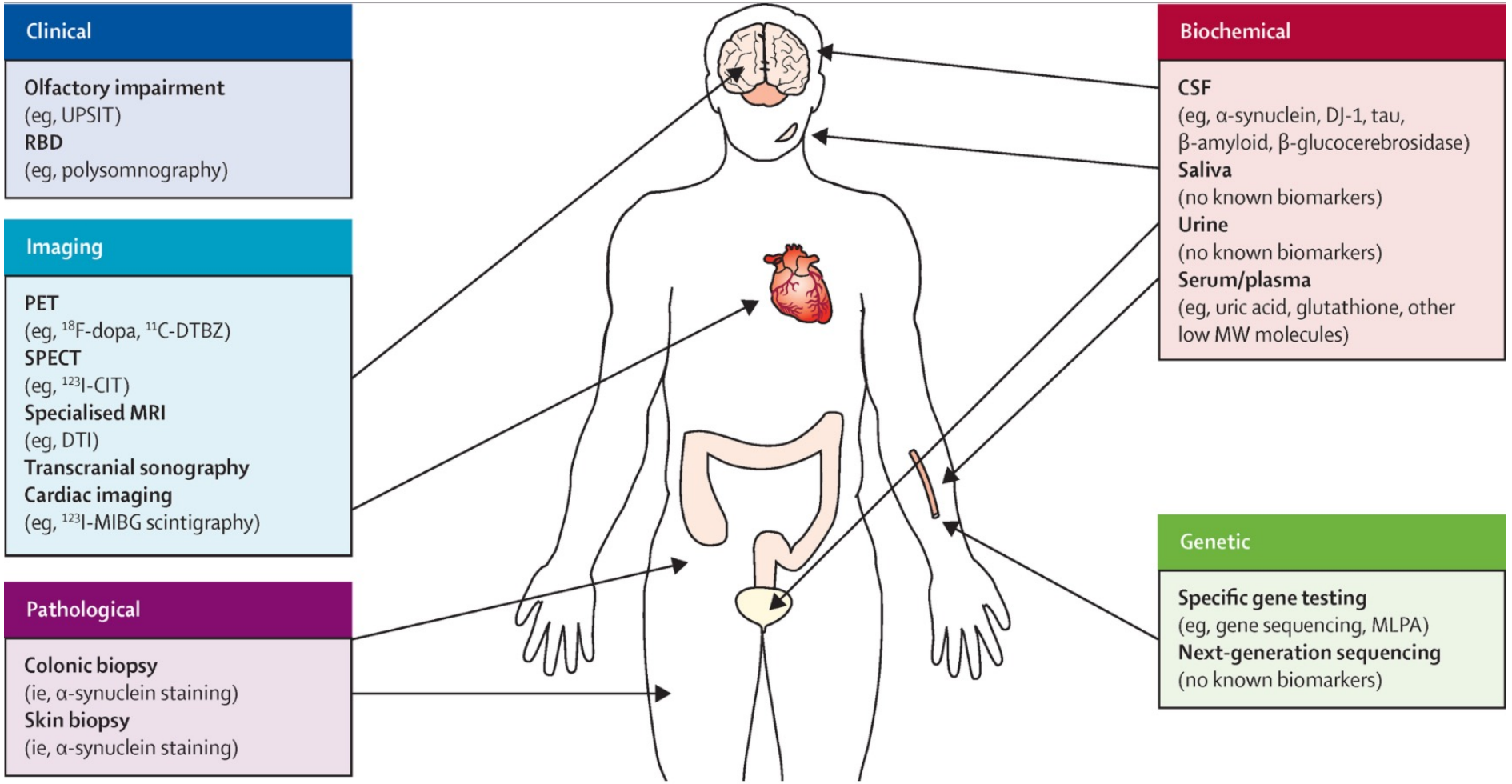
BIO 480 – November 2025

Exercise on Biomarkers for Parkinson’s disease



Postuma RB et al, Nat Rev Neurol 12, 622-634 2016


Clinical
Olfactory impairment
(eg, UPSIT)
RBD
(eg, polysomnography)
Imaging
PET
(eg, 18F-dopa, 11C-DTBZ)
SPECT
(eg, 123I-CIT)
Specialised MRI
(eg, DTI)
Transcranial sonography
Cardiac imaging
(eg, 123I-MIBG scintigraphy)
Pathological
Colonic biopsy
(ie, α-synuclein staining)
Skin biopsy
(ie, α-synuclein staining)
Biochemical
CSF
(eg, α-synuclein, DJ-1, tau,
β-amyloid, β-glucocerebrosidase)
Saliva
(no known biomarkers)
Urine
(no known biomarkers)
Serum/plasma
(eg, uric acid, glutathione, other
low MW molecules)
Genetic
Specific gene testing
(eg, gene sequencing, MLPA)
Next-generation sequencing
(no known biomarkers)

Exercise: development of a biomarker for Parkinson's Disease

Predictive

- Does the biomarker detect the disease before symptom onset?

Diagnostic

- Can the marker be used as a diagnostic test?
- Does the biomarker distinguish between different forms of neurological diseases?
- Does it potentially reflect a specific mechanism related to Parkinson's pathology?

Prognostic/Pharmacodynamic

- Can the biomarker be used to reveal the efficacy of a treatment on disease progression?

Applicability

- Does the biomarker require an invasive procedure?
- Is it accessible and not expensive?

A company has identified a potentially neuroprotective antibody that targets misfolded alpha-synuclein.

Your aim is to identify a biomarker able to assess the effect of the drug on (1) engaging the alpha-synuclein target and (2) disease progression in patients. Which one is most appropriate?

A. Biomarker 1 – Tears
B. Biomarker 2 – Diffuse Tensor Imaging
C. Biomarker 3 – Mitochondrial quality control
D. Biomarker 4 – Corneal confocal microscopy
E. Biomarker 5 – α-synuclein seed amplification
F. Biomarker 6 – α-synuclein PET tracer

A lab has developed a compound to be used as food supplement to improve mitochondrial function. The aim of a clinical trial is to demonstrate that this supplement can retard the onset of Parkinson's disease.

Which biomarker(s) could be used to identify a large cohort of asymptomatic patients with higher risk of developing the disease?

A. Biomarker 1 – Tears
B. Biomarker 2 – Diffuse Tensor Imaging
C. Biomarker 3 – Mitochondrial quality control
D. Biomarker 4 – Corneal confocal microscopy
E. Biomarker 5 – α-synuclein seed amplification
F. Biomarker 6 – α-synuclein PET tracer

A laboratory has developed a diagnostic test which could potentially differentiate between Parkinson's disease and Dementia with Lewy Bodies, two alpha-synucleinopathies that affect different brain regions.

Which other biomarker(s) could be used to try to verify this hypothesis?

A. Biomarker 1 – Tears
B. Biomarker 2 – Diffuse Tensor Imaging
C. Biomarker 3 – Mitochondrial quality control
D. Biomarker 4 – Corneal confocal microscopy
E. Biomarker 5 – α-synuclein seed amplification
F. Biomarker 6 – α-synuclein PET tracer