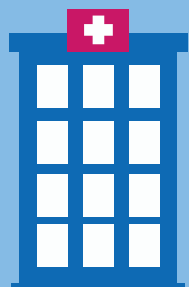


## SINGLE CENTER STUDY



To ascertain less variability, all assessments are performed at a single centre, the Radboud university medical center.

## REAL WORLD PATIENTS

Focus on "real world" representative patients through liberal inclusion.

No convenience sampling: the dataset will be representative for the entire population in gender and age. Diagnosis time is limited to 0-5 years.



1

## OBJECTIVES

### NEW INSIGHTS

To gain insights into the disease and provide a foundation for new, more personalized treatments.

2

### VERILY STUDY WATCH

To evaluate the Verily Study Watch.

3

### SHARE DATA WORLDWIDE

To create an extensive longitudinal dataset that can be accessed by qualified researchers worldwide.

## SKILLED TEAM THAT PERFORMS ALL ASSESSMENTS

### ADVANCED NEUROIMAGING

#### STOOL SAMPLING

#### LUMBAR PUNCTURE

#### BLOOD SAMPLING

#### ECG & HOLTER

#### CLINIMETRICS & SELF ASSESSMENTS

#### VERILY STUDY WATCH



## EXTREME DEEP PHENOTYPING

Including microbiome and inflammation.

### Biospecimens:

- Stools
- Genetics: DNA, RNA
- Blood: plasma, PBMCs, serum, EDTA
- Optional cerebrospinal fluid: tau, urate

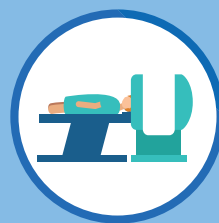


## HIGH QUALITY IMAGING

Repeated MRI scans, including functional MRI with focus on collapse of compensation.

### Imaging

- MRI: structural and functional
- ECG: holter monitor, heart rate variability



## STATE OF THE ART WEARABLES

Follow-up using a state-of-the-art and convenient wearable: the Verily Study Watch.



- Physiological sensors: ECG, PPG, IMU, EDA
- Environmental sensors: temperature, relative humidity, barometric pressure, sound level, ambient light

Over **15 months** time collected more than **1 million hours** of cumulative sensor data

## DETAILED CLINIMETRICS

- Neuropsychological assessments
- Motor assessments

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[INFO@PARKINSONOPMAAT.NL](mailto:INFO@PARKINSONOPMAAT.NL)



## STATE OF THE ART DIGITAL SECURITY

Our digital security standards are based on four pillars:

1. Free choice to participate (informed consent)
2. Governance
3. Data use agreement (contract)
4. Data protection and pseudonymisation



The research data are securely stored and shared using a state-of-the-art method called Polymorphic Encryption and Pseudonymisation.

## CO-DESIGN STRATEGIES

We provide extensive communication with the participants via a website, monthly newsletters and videos. There is also a helpdesk available.

### PARTICIPANT PANEL

### SURVEYS

### EVENTS

### EDUCATIONAL PROGRAM



## BIOMARKERS

### IMAGING

#### MRI

Structural and functional

#### ECG

Holter  
Heart rate variability

### BIOSPECIMEN

#### BLOOD

Plasma  
PBMC  
Serum  
ED TA (DNA)  
PAXgene RNA

#### CSF

#### STOOL

#### DATA

Physiological sensors  
Environmental sensors

### VERILY STUDY WATCH

## CLINIMETRICS

### MOTOR SUBSET\*

UPDRS-III (W. Hoehn & Yahr Stage)  
Timed up-and-go test  
UPDRS-IV\*\*  
Standing leg test  
Rapid Turning test  
Peg board test  
Grip Strenght

### OTHER

UPDRS-II  
SCOPA-autonomic  
SCOPA-sleep  
RBD questionnaires  
Epworth sleepiness test  
SF-12  
Wearing-off questionnaire  
Radboud Oral Motor Inventory  
Screening Questionnaire on Visual Impairment  
PDQ-39  
PASE  
Caregiver Strain Index  
New Freezing Gait Questionnaire

### NEURO-PSYCHOLOGICAL

Beck Depression Inventory  
Quip-RS (impulsive compulsive disorder)  
Apathy scale  
State Trait Anxiety Inventory for Adults  
UPDRS-I  
MoCA  
Phonemic Fluency Test  
Semantic Fluency Test  
Brixton Spatial Anticipation Test  
15 words test  
Benton Judgement of Line Orientation  
Letter Number Sequencing  
Symbol Digit Modalities Test

### ADLs

Modified Schwab and England Scale

### DEMOGRAPHIC QUESTIONNAIRES

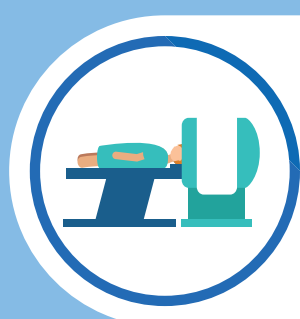
For example medical history, medication, and use of drugs

\* All the motor clinical assessments are performed in OFF medications state and then repeated in ON medications state.

\*\* Performed only in ON medications state.



## BIOMARKERS (Genotypic, Functional and Phenotypic)



### IMAGING

#### MRI

Structural: T1/T2, FLAIR, susceptibility mapping, DTI  
Functional: resting state, task

#### ECG

12 lead ECG  
Holter monitor recordings  
Heart rate variability



### BIOSPECIMEN

#### BLOOD

Plasma: in aliquots (n=24) of 0.5 ml in 2 ml polypropylene cryovials

PBMC:  $5 \times 10^6$  cells/aliquot in liquid nitrogen (generally 2 aliquots per tube)

Serum: in aliquots (max n=18) of 0.5 ml in 2 ml polypropylene cryovials

ED TA (DNA): stock solution is stored in 1 aliquot at -20°C in REMP tube

PAXgene RNA: Tube at -80 °C for maximum 8 years (thereafter RNA should be isolated by PAXgene blood RNA kit (Qiagen))

#### CSF

In aliquots of 0.5 ml in 2 ml polypropylene cryovials, storage at -80°C

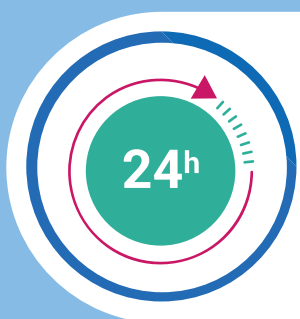
#### STOOL

Storage in 6 feces tubes at -80°C

#### DATA

Physiological sensors:  
ECG, PPG, IMU, EDA

Environmental sensors:  
temperature, relative humidity, barometric pressure, sound level, ambient light



### VERILY STUDY WATCH

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