1. Cohorts:
   1. 1-PD
   2. 2-healthy
   3. 3-SWEDD(Scans without Evidence of Dopamine Deficit)—Absence of any scan abnormality in ppl who are resumed to have PD
   4. 4-Prodromal
   5. 5-Genetic Cohort PD
   6. 6 Genetic Cohort-Unaffected PD
   7. 7-Genetic Registry PD
   8. 8-Genetic Registry -Unaffected

Genetic Cohort:

o PD or Unaffected o More intensive arm

o Schedule of events similar to PPMI de novo PD and HC cohorts.

• Genetic Registry :

o PD or Unaffected

o Subjects evaluated at less frequent intervals, fewer study visits and assessments.

1. Despite similar disease duration and severity, patients with PD carriers of the G2019S mutation walked with lower arm swing amplitude and higher arm swing asymmetry ratio than PD non-carriers.
2. The width of the dominant frequency in the locomotion band was larger in the carriers, indicative of a less consistent, more variable walking pattern). This finding suggests an association between carrying the LRRK2 G2019S mutation and poorer performance in gait dynamics
3. Increased arm swing asymmetry was detected in both patients with PD carriers of the LRRK2 G2019S mutation and non-manifesting carriers, compared to non-carriers (p<0.009).
4. Despite similar disease duration and severity, patients with PD carriers of the G2019S mutation walked with lower arm swing amplitude and higher arm swing asymmetry ratio than PD non-carriers.
5. These findings were consistent with higher gait variability and a higher frequency of Postural Instability Gait Difficulty (PIGD) manifestation in PD carriers, as compared to non-carriers.
6. Non-manifesting carriers walked with higher asymmetry ratios and worse arm swing jerk (smoothness) as compared to the non-carriers in the challenging gait conditions. The findings

suggest that arm swing measures may be related to LRRK2, further indicating that quantitative evaluation of arm swing may have utility for identifying early motor changes even in prodromal PD.

We propose to perform a simple gait test annually in order to identify potential motor markers of disease in the prodromal phase. We anticipate that the data collected will provide insight into phenoconversion and motor biomarkers.