AWARD NUMBER: W81XWH-22-1-0936

TITLE: Epigenetics and PD

PRINCIPAL INVESTIGATOR: Dr. Giulietta Riboldi, MD, PhD

CONTRACTING ORGANIZATION: New York University

REPORT DATE: OCTOBER 2023

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Development Command
Fort Detrick, Maryland 21702-5012

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5f. WORK UNIT NUMBER

6. AUTHOR(S)

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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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New York, NY 10017

8. PERFORMING ORGANIZATION REPORT

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Medical Research and Development Command
Fort Detrick, Maryland 21702-5012

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

During Year 1, study cohort recruitment and sample processing were implemented. We collected n = 34 subjects with prodromal features of Parkinson's disease (PD) (including REM sleep behavior disorders, genetic variants in the *GBA* gene, and hyposmia)but without motor symptoms of PD. For each enrolled subject detailed clinical and demographic information were collected, including validated rating scales for motor and non-motor symptoms of PD and an extensive questionnaire for environmental exposure. Blood samples were collected from enrolled subjects and processed fresh for the isolation of peripheral blood mononuclear cells (PBMC) that will be utilized to extracted DNA from CD14+ monocytes for methylation analysis. Recruitment was significantly slowed down during quarter 1 and 2 by COVID-19 restrictions and limitation of personnel for sample processing. In the last quarter, recruitment dramatically increased and we have plans in place to achieve the proposed goals.

15. SUBJECT TERMS

Parkinson's disease; Methylation; Epigenetic; Monocytes; Prodromal; REM-sleep Behaviors Disorders (RBD); Hyposmia; GBA; LRRK2; Environment; Exposome; Biomarkers

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
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1. **INTRODUCTION:** *Narrative that briefly (one paragraph) describes the subject, purpose and scope of the research.*

The project proposes to characterize the contribution of environmental factors to the modulation of the inflammatory response in prodromal stages of Parkinson's disease (PD) through the characterization of epigenetic profiles and anamnestic exposome profiles in a cohort of subjects with prodromal features of PD (i.e. subjects with REM sleep behavior disorder (RBD), certain genetic mutations (*GBA*, *LRRK2*), and hyposmia). The final goal is to identify early biomarker of PD in the deregulation of the inflammatory response.

2. **KEYWORDS:** *Provide a brief list of keywords (limit to 20 words).*

Parkinson's disease; methylation; epigenetic; monocytes; prodromal; REM-sleep behaviors disorders (RBD); hyposmia; GBA; LRRK2; environment; exposome; biomarkers

3. **ACCOMPLISHMENTS:** *The PI is reminded that the recipient organization is required to obtain prior written approval from the awarding agency grants official whenever there are significant changes in the project or its direction.*

What were the major goals of the project?
List the major goals of the project as stated in the approved SOW. If the application listed milestones/target dates for important activities or phases of the project, identify these dates and show actual completion dates or the percentage of completion.

Aim 1: To characterize the environmental exposure of a cohort of prodromal-PD subjects:
- Human research Protection office (HRPO).
  Predicted timeline: 1 month. Status: finalized. The protocol and related material was approved and study protocol was set up to start the study visits.
- Scheduling of clinical visit and collection of clinical and demographic data, environmental exposure questionnaire and biosamples (blood) (n =100 subjects with prodromal PD).
  Predicted timeline: 11 months. Status: ongoing (more than 30% complete) .

Aim 2: To characterize the epigenetic profiles of innate immune cells in prodromal subjects compared to PD patients and non-affected subjects:
- Blood sample processing for isolation of PBMC.
  Predicted timeline: 11 months. Status: ongoing (more than 30% complete).
- Blood processing for isolation of monocyte and DNA
  Predicted: 1 month (end of Year 1). Status: not yet started since samples collection has not been completed yet.
- Bisulfite conversion and methylation array.
  Predicted timeline: 3 months (end of Year 1). Status: not yet started since samples collection has not been completed yet.
- Analysis of bioinformatic data
  Predicted timeline: Year 2. Status: not yet started (Year 2).

Aim 3: Correlation of epigenomic profiles with environmental exposure.
- Correlation of clinical and bioinformatic data
  Predicted timeline: Year 2. Status: not yet started (Year 2).

What was accomplished under these goals?

For this reporting period describe: 1) major activities; 2) specific objectives; 3) significant results or key outcomes, including major findings, developments, or conclusions (both positive and negative); and/or 4) other achievements. Include a discussion of stated goals not met. Description shall include pertinent data and graphs in sufficient detail to explain any significant results achieved. A succinct description of the methodology used shall be provided. As the project progresses to completion, the emphasis in reporting in this section should shift from reporting activities to reporting accomplishments.

1) Major activities.

The main goal of Year 1 of this project was to recruit clinical data and biological samples from the cohort of subjects with prodromal symptoms (**Figure 1**).

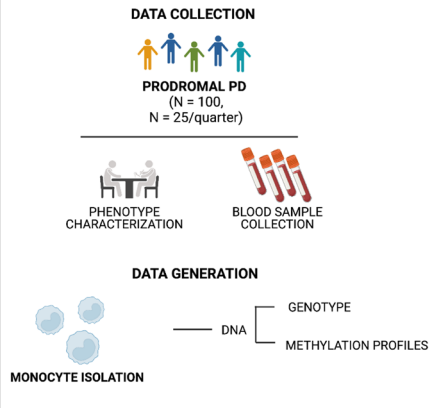

Figure 1. Schematic representation of data and biosample collection during Year 1.

2) Specific objectives.

During Year 1 the protocol of the study and the workflow for subject enrolled was put in place. Subjects were recruited from available research databases at the NYU Movement Disorder Center, as well as from referrals from providers at our center. The study was regularly discussed with the providers at our center and with collaborators during research meetings.

During Year 1 we have enrolled n=34 subjects with prodromal symptoms of PD (n=22 with REM sleep behavior disorder (RBD), n=8 with Hyposmia, and n=4 non-manifesting *GBA*-carrier). Thus far, n=121 subjects have been screened of which n=33 were ineligible (n=27 due to medical history and n=6 due to age). Of the eligible subjects n=8 were not interested in participating in the study and n=14 contacted eligible subjects were lost to recruitment follow up. N=49 have been recruited: n=34 have been enrolled up to date of this report, and n=15 have already scheduled upcoming research visits. Coordinator is in process of establishing contact or following up with subjects to finalize research visits with n=17 other potential subjects for a total of n = 66 subjects (enrolled + potential).

Enrollment was significantly slowed down at the beginning of the project (especially quarter 1 and 2) due to limited availability or research personnel in the laboratory for sample processing due to personnel transfers and COVID19-related limitations. During the second and third quarter of the project, recruitment was also limited by frequent visit re-scheduling due to ongoing infections of study participants, possibly exacerbated by the winter season. Per protocol, subjects could not be recruited within 3 months from an infection or use of antibiotic due to potential interference with the study results.

For each enrolled subject within each category of prodromal symptoms (**Figure 2**), we collected clinical and demographic information (**Table 1**) and biosamples (peripheral blood). Data analysis presented in this report include the first 30 subjects enrolled in the study for which data were curated at the preparation of this report.

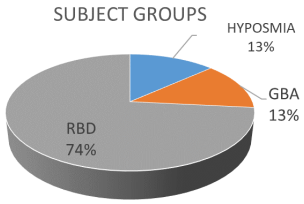

Figure 2. Prodromal groups distribution.

Table 1. Demographic characteristics of enrolled subjects.
AJ: Ashkenazi Jewish; C: Caucasian; H: Hispanic.

	DEMOGRAPHIC			
	Gender (Female) n (%)	Age (average, min-max)	Ancestry n (%)	Race (AJ) n (%)
Count	11 (36.7)	61.3 (31-75)	28 (93.3) C; 2 (6.7) H	9 (30)

3) Significant results or key outcomes, including major findings, developments, or conclusions (both positive and negative)

Data analysis was not planned during the first quarter of the process, since the main goal of this quarter was data and sample collection. However, we analyzed the clinical and demographic data of the curated data from the cohort (n=30) of subjects enrolled during Year 1. We compared data across the different prodromal sub-groups, including genetics (*GBA* variants), RBD and hyposmia (**Figure 3-5**). In particular, we compared demographic features (**Figure 3**), self-reported non-motor symptoms collected during the visit (**Figure 4**) and the score of specific rating scales (**Figure 5**). As we increase the sample size, this analysis will allow to better control for differences across groups and highlights important phenotype-epigenetic correlations.

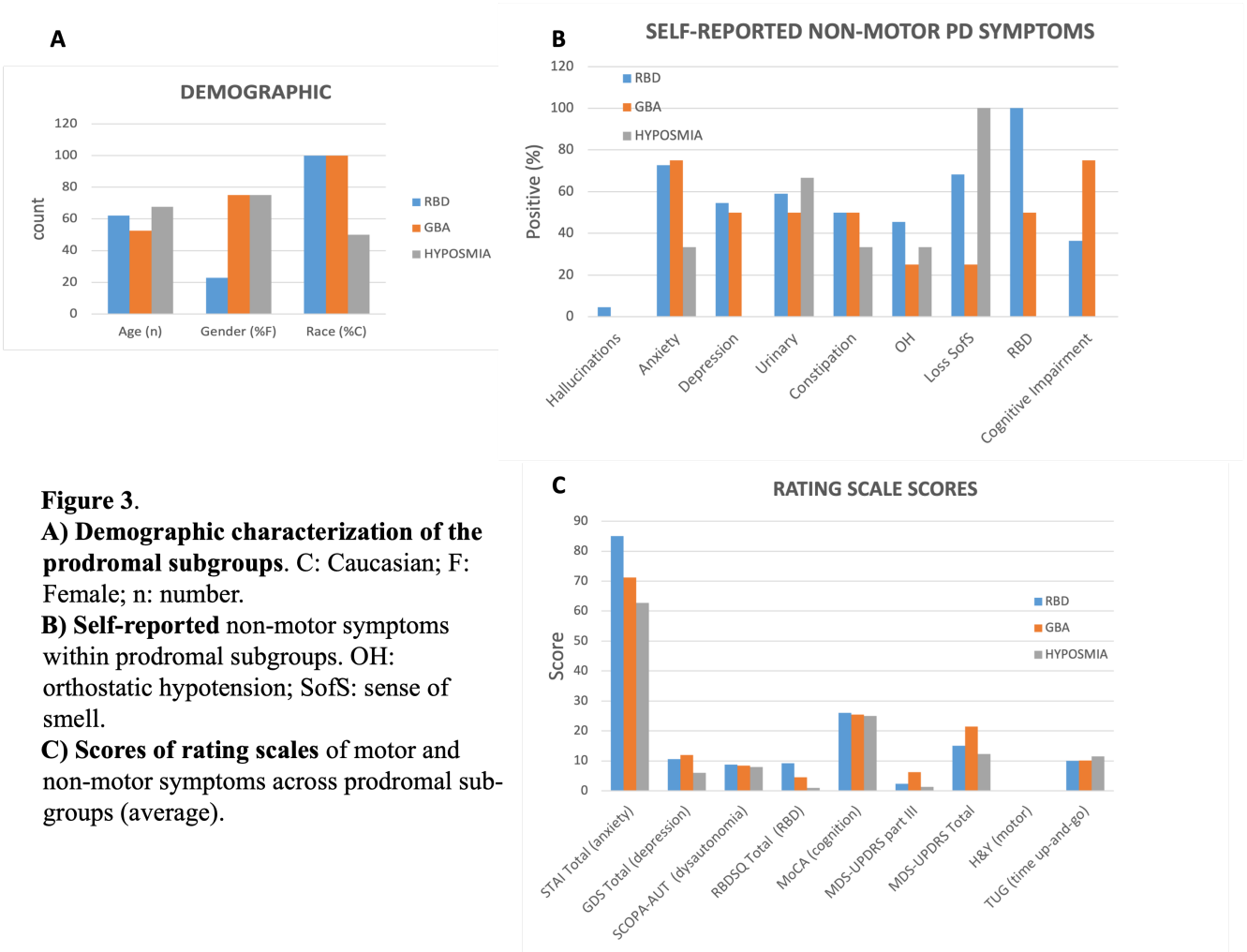

Figure 3.
A) Demographic characterization of the prodromal subgroups. C: Caucasian; F: Female; n: number.
B) Self-reported non-motor symptoms within prodromal subgroups. OH: orthostatic hypotension; SofS: sense of smell.
C) Scores of rating scales of motor and non-motor symptoms across prodromal sub-groups (average).

We also started analyzing the data regarding environmental exposure that will be correlated with the methylation profiles of the entire cohort and different subgroups (**Table 2**).

	Lived in Urban enviroment								PHYSICAL ACTIVITY			
	0-17 y	18-40 y	after 40 y	Alcohol	Concussion	Ever smoked	NSAID	ASPIRIN	0-20 y	20-40 y	>40 y	STRESSFULL EVENT
n (%)	14 (48.3)	22 (75.9)	13 (44.8)	23 (76.7)	11 (37.9)	11 (37.9)	26 (86.7)	15 (50)	27 (90)	27 (90)	28 (93.3)	24 (80)

Table 2. Percentage of subjects with exposure to a sub-set of environmental factors collected across enrolled cohort. Y: years; NSAID: non-steroid anti-inflammatory drugs.

4) Other achievements

During the first quarter of the project, our Center (NYU Langone Health) has reached out to providers at the Sleep Center at NYU Langone Health and Sleep Center at Weill Cornell Medical Center. The study's objectives and goals were discussed with the providers at these two Centers in order to establish a recruitment initiative of prodromal subjects with RBD symptoms. This initiative has been fruitful as some of the recruited subjects (n=4) were directly recruited from these centers. We anticipate that these centers will continue to provide a steady number of referrals and will significantly improve recruitment at our Center.

5) Discussion of stated goals not met

The Enrollment goal for Year 1 was n=100 subjects with prodromal symptoms of Parkinson's disease. The major limitation for reaching the projected recruitment goal for the first quarter of the project was represented by limited availability of sample processing at the lab during this quarter. This was due to unexpected changes in personnel (requiring personnel replacement and training), and limited personnel availability due to COVID-19 infection.
The lab has now put in place a plan for prioritization of processing of sample for this project in order to guarantee achievement of targeted goals in the next quarters.

Given the exponential implementation of the enrollment rate in the last quarter of the project, we are confident that we will be able to complete the goal that was not met in Year 1 (completion of cohort recruitment) within the first 6 months of Year 2.

What opportunities for training and professional development has the project provided?
If the project was not intended to provide training and professional development opportunities or there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe opportunities for training and professional development provided to anyone who worked on the project or anyone who was involved in the activities supported by the project. "Training" activities are those in which individuals with advanced professional skills and experience assist others in attaining greater proficiency. Training activities may include, for example, courses or one-on-one work with a mentor. "Professional development" activities result in increased knowledge or skill in one's area of expertise and may include workshops, conferences, seminars, study groups, and individual study. Include participation in conferences, workshops, and seminars not listed under major activities.

As requested by grant reviewers the study PI (G. Riboldi) attended a training course on the topic of this grant: "The Exposome Boot Camp: Measuring Exposures on an Omic Scale" (Columbia Mailman School of Public Health, 722 W. 168th Street in NYC; July 20-21, 2023).
https://www.publichealth.columbia.edu/research/programs/precision-prevention/sharp-training-program/exposome#Location
The course was held by expert in the field of exposome and it included lessons and workshop for data analysis, development of research questions on the topic of exosome in difference medical conditions, and access to informatic tools relevant for the fields.

How were the results disseminated to communities of interest?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how the results were disseminated to communities of interest. Include any outreach activities that were undertaken to reach members of communities who are not usually aware of these project activities, for the purpose of enhancing public understanding and increasing interest in learning and careers in science, technology, and the humanities.

The project was presented by the PI of the study in multiple avenues to colleagues and potential participants groups in order to inform and engage them in this research. This included: division/departmental/institutional meetings; PD patients support groups; annual visits of research foundations (Parkinson's Foundation, PSP Center of Excellence Foundation).

What do you plan to do during the next reporting period to accomplish the goals?
If this is the final report, state "Nothing to Report."

Describe briefly what you plan to do during the next reporting period to accomplish the goals and objectives.

For the next reporting period we plan to:

- Finalize the recruitment of the study cohort (predicted time for completion of this task = 6 months)
- Finalize isolation of PBMC and DNA from isolated CD14+ monocytes from the cohort of prodromal subjects and the additional cohort of n = 50 PD subject and n = 50 CTRL subjects (predicted = 6 months)
- Hire data analyst for the accomplishment of data analysis and performing bioinformatics analysis of expression data, and cluster analysis of clinical and exposome data (predicted = 12 months)

4. **IMPACT:** D*escribe distinctive contributions, major accomplishments, innovations, successes, or any change in practice or behavior that has come about as a result of the project relative to:*

What was the impact on the development of the principal discipline(s) of the project?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how findings, results, techniques that were developed or extended, or other products from the project made an impact or are likely to make an impact on the base of knowledge, theory, and research in the principal disciplinary field(s) of the project. Summarize using language that an intelligent lay audience can understand (Scientific American style).

Nothing to report

What was the impact on other disciplines?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how the findings, results, or techniques that were developed or improved, or other products from the project made an impact or are likely to make an impact on other disciplines.

During the first year of the project, our Center (NYU Langone Health) has reached out to providers at the Sleep Center at NYU Langone Health and Sleep Center at Weill Cornell Medical Center. The study's objective and goals were discussed with the providers at these two Centers in order to establish a recruitment initiative of prodromal subjects with RBD symptoms. This initiative has been fruitful to increase recruitment. This initiative also implemented collaborative efforts with the sleep clinics, and contributed to an increased awareness at the sleep centers of the link between RBD and PD, also offering concrete possibilities to the subjects with this conditions to be engaged in research.

What was the impact on technology transfer?
If there is nothing significant to report during this reporting period, state "Nothing to Report. Describe ways in which the project made an impact, or is likely to make an impact, on commercial technology or public use, including:

- *transfer of results to entities in government or industry;*
- *instances where the research has led to the initiation of a start-up company; or*
- *adoption of new practices.*

Nothing to report

What was the impact on society beyond science and technology?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how results from the project made an impact, or are likely to make an impact, beyond the bounds of science, engineering, and the academic world on areas such as:

- *improving public knowledge, attitudes, skills, and abilities;*
- *changing behavior, practices, decision making, policies (including regulatory policies), or social actions; or*
- *improving social, economic, civic, or environmental conditions.*

Nothing to report

5. **CHANGES/PROBLEMS:** *The PD/PI is reminded that the recipient organization is required to obtain prior written approval from the awarding agency grants official whenever there are significant changes in the project or its direction. If not previously reported in writing, provide the following additional information or state, "Nothing to Report," if applicable:*

No changes in direction and scope of the projects are anticipated.

Remember that significant changes in objectives and scope require prior approval of the agency.

Actual or anticipated problems or delays and actions or plans to resolve them

Because of the delays in recruitment that we experienced during year 1 of the study, we anticipated that this will reflect on delays in the execution of the goals of year 2.
In particular, we anticipate that the recruitment period will extend up to month 6 of year 2. This will delay the entire project of about 6 months. This may imply to request a no-cost extension at the end of Year 2 in order to successfully conclude the study, with no need for additional funding or resources for the accomplishment of the proposed tasks.
In adjunct, we are already starting processing the samples of PD and CTRL subjects and we will start processing samples of the prodromal subject as we approach the end of the prodromal cohort collection. This will allow to start bisulfide sequencing as soon as the cohort collection is completed and be able to complete the analysis within projected time frame (considering no-cost extension of 6 months).

Changes that had a significant impact on expenditures

Describe changes during the reporting period that may have had a significant impact on expenditures, for example, delays in hiring staff or favorable developments that enable meeting objectives at less cost than anticipated.

During Year 1, we encountered one main, unanticipated change during Year 1 due to the significant impact that COVID-19 still had during the first two quarters and a half of the study. In particular, this has significantly impacted on one side the availability of lab personnel to process the samples (samples needed to be processed fresh, causing that a number of participants to postpone their visit) as well as rate of cancellation of research visit due to sickness of the participant (subjects need to be infection and antibiotic free for a period of 3 months before the collection of the sample).

Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents

Describe significant deviations, unexpected outcomes, or changes in approved protocols for the use or care of human subjects, vertebrate animals, biohazards, and/or select agents during the reporting period. If required, were these changes approved by the applicable institution committee (or equivalent) and reported to the agency? Also specify the applicable Institutional Review Board/Institutional Animal Care and Use Committee approval dates.

Significant changes in use or care of human subjects

None

Significant changes in use or care of vertebrate animals

Not applicable

Significant changes in use of biohazards and/or select agents

None

6. PRODUCTS: *List any products resulting from the project during the reporting period. If there is nothing to report under a particular item, state "Nothing to Report."*

- **Publications, conference papers, and presentations**
  Report only the major publication(s) resulting from the work under this award.

  Journal publications. *List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).*

Nothing to report

  Books or other non-periodical, one-time publications. *Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like. Identify for each one-time publication: author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (e.g., book, thesis or dissertation); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).*

Nothing to report

  Other publications, conference papers and presentations. *Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication as noted above. List presentations made during the last year (international, national, local societies, military meetings, etc.). Use an asterisk (*) if presentation produced a manuscript.*

Nothing to report

- **Website(s) or other Internet site(s)**
  List the URL for any Internet site(s) that disseminates the results of the research activities. A short description of each site should be provided. It is not necessary to include the publications already specified above in this section.

Not applicable

- **Technologies or techniques**
  Identify technologies or techniques that resulted from the research activities. Describe the technologies or techniques were shared.

Not applicable

- **Inventions, patent applications, and/or licenses**
  Identify inventions, patent applications with date, and/or licenses that have resulted from the research. Submission of this information as part of an interim research performance progress report is not a substitute for any other invention reporting required under the terms and conditions of an award.

Not applicable

- **Other Products**
  Identify any other reportable outcomes that were developed under this project. Reportable outcomes are defined as a research result that is or relates to a product, scientific advance, or research tool that makes a meaningful contribution toward the understanding, prevention, diagnosis, prognosis, treatment and /or rehabilitation of a disease, injury or condition, or to improve the quality of life. Examples include:
  - *data or databases;*
  - *physical collections;*
  - *audio or video products;*
  - *software;*
  - *models;*
  - *educational aids or curricula;*
  - *instruments or equipment;*
  - *research material (e.g., Germplasm; cell lines, DNA probes, animal models);*
  - *clinical interventions;*
  - *new business creation; and*
  - *other.*

RedCap database (n = 34 subjects) for the collection of clinical data (demographic data, clinical history, medications, self-reported non-motor symptoms of Parkinson's disease, Montreal Cognitive Assessment Scale (MOCA, for the evaluation of cognitive profiles), and the Movement Disorder Society Unified Parkinson's Disease Scale (MDS-UPDRS) and Hoehn and Yahr scale (HY) for the assessment of motor symptoms. The collection of the following scales will make the cohort comparable to our previously enrolled cohorts of patients with PD and non-affected subjects, for which the following scales are already in place. In adjunct, for each enrolled subject an Environmental Exposure Questionnaire will be administered. This questionnaire that was curated at our Center, integrating questions from different questionnaire reported in the literature, especially in the context of Parkinson's disease, as well as the ones from the Parkinson's Progression Marker Initiative (one of the largest biorepository study for PD) to ensure collection of exhaustive information and comparability with the data from the literature. The questionnaire will explore the following domains: *residency location per bi-decades of life (to assess urban vs rural exposure); alcohol use and exposure; history of head injuries; employment history; military history; heavy metal exposure; tobacco use; use of recreational drugs; non-steroidal anti-inflammatory drugs exposure; other drugs exposure; caffeine use; exposure to pesticides; physical activities; stress exposure; female health history*.

Sample collection (n = 33 subjects): approximately 35 ml of whole blood from venipuncture. Samples were processed at NYU Langone Health (7 ml of whole blood) for isolation of plasma, cell pellet and aliquoting of whole blood. Four tubes (7 mL each) of whole blood were transferred and processed fresh in Dr. Towfique Raj Laboratory at Mount Sinai School of medicine. In brief, peripheral blood mononuclear cells (PBMC) was isolated for each collected sample as follow. SepMate tubes (StemCell Technologies) were utilized for PBMC isolation. (Gibco) tubes were filled with 15 ml of Ficoll-Plaque PLUS (GE Healthcare), followed by dilution in 2-fold PBS, centrifuged at 1,200 g for 10 mins, and PBS wash. PBMC was frozen. For methylation analysis, DNA will be extracted upon processing the samples once the collection of the cohort is completed to reduce the variability related to sample processing and for consistency with the protocol previously used in the laboratory for the processing of the cohort of PD patients and on-affected carriers. We will perform CD14+ purification and DNA extraction as previously utilizing QiAamp DNA Blood Midi kit (Qiagen) according to the manufacturer's instructions. DNA quality and concentration will be assess with Nanodrop.
One subject was enrolled but sample was not collected at the time of the visit because the subject reported recent treatment with antibiotics (less than 3 months prior). As per protocol, sample collection will be rescheduled within appropriate window from antibiotic treatment.

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What individuals have worked on the project?
Provide the following information for: (1) PDs/PIs; and (2) each person who has worked at least one person month per year on the project during the reporting period, regardless of the source of compensation (a person month equals approximately 160 hours of effort). If information is unchanged from a previous submission, provide the name only and indicate "no change".

Name:	*Giulietta Maria Riboldi, MD PhD*
Project Role:	*Principal Investigator*
Researcher Identifier (e.g. ORCID ID):	*0000-0003-0322-5718*
Nearest person month worked:	*0.95*
Contribution to Project:	*Dr. Riboldi has overseen the progress of the study and has coordinated monthly research meetings with the investigative team. Dr. Riboldi has assisted in the performance of study visits, and has overseen study assessments and data collection.*

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

If the active support has changed for the PD/PI(s) or senior/key personnel, then describe what the change has been. Changes may occur, for example, if a previously active grant has closed and/or if a previously pending grant is now active. Annotate this information so it is clear what has changed from the previous submission. Submission of other support information is not necessary for pending changes or for changes in the level of effort for active support reported previously. The awarding agency may require prior written approval if a change in active other support significantly impacts the effort on the project that is the subject of the project report.

Giulietta Riboldi:

Title: PD Generation
Status of Support: Active
Project Number: 999385
Source of Support: Parkinson's Foundation
Project/Proposal Start and End Date: 09/22/2022 – 09/21/2023 ***(NCE to 9/21/24)*** *Total Award Amount (including Indirect Costs):*
Person Months: 0.24 CM

Title: PD Network and Genotype
Status of Support:* ***Closed (was active)*
Project Number: Grant lD:16325
Name of PD/PI: Giulietta Maria Riboldi
**Source of Support: Northwell Health*
**Primary Place of Performance: NYU Langone Health*
Project/Proposal Start and End Date:06/21/2022 – 06/20/2023
**Total Award Amount (including Indirect Costs):*
**Person Months: 0.12CM*

**Title: Early Onset Parkinson's Disease Subtypes and Pathogenic Mechanisms*
**Major Goals: The objectives of this application are to identify EOPD sub-types and untangle the pathogenic architecture of EOPD by (1) quantifying clinical variability of EOPD subtypes; (2) quantify contribution of genetic, inflammation, and protein-centered mechanisms in EOPD.*
Status of Support:* ***Active (was pending)*
Project Number: R01NS133742
Name of PD/PI: Giulietta Maria Riboldi
**Source of Support: NIH/NINDS*
**Primary Place of Performance: NYU Langone Health*
Project/Proposal Start and End Date: ***09/01/2023 – 07/31/2028***
**Total Award Amount (including Indirect Costs): (proposed award)*
**Person Months per budget period. 3.0 CM for Years 1-5*

Steven Frucht:Nothing to Report

What other organizations were involved as partners?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe partner organizations – academic institutions, other nonprofits, industrial or commercial firms, state or local governments, schools or school systems, or other organizations (foreign or domestic) – that were involved with the project. Partner organizations may have provided financial or in-kind support, supplied facilities or equipment, collaborated in the research, exchanged personnel, or otherwise contributed.

Provide the following information for each partnership:

Organization Name:
Location of Organization: (if foreign location list country)
Partner's contribution to the project (identify one or more)

- *Financial support;*
- *In-kind support (e.g., partner makes software, computers, equipment, etc., available to project staff);*
- *Facilities (e.g., project staff use the partner's facilities for project activities);*
- *Collaboration (e.g., partner's staff work with project staff on the project);*
- *Personnel exchanges (e.g., project staff and/or partner's staff use each other's facilities, work at each other's site); and*
- *Other.*

Organization Name: Mount Sinai School of Medicine (Dr. Towfique's Raj)
Location of Organization: New York, NY (US)
Partner's contribution to the project (identify one or more):

- Sample processing (whole blood) for isolation of PBMC
- Sample storage for future isolation of CD14+ monocytes and DNA for methylation analysis

8. SPECIAL REPORTING REQUIREMENTS

COLLABORATIVE AWARDS: *N/A*

QUAD CHARTS: *N/A*

9. APPENDICES: *N/A*