Institutional Review Board
Intervention/Interaction Detailed Protocol

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Project Title:	A community-based personalized omics profiling to assess biomarkers of aging
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1. Background and Significance

Healthy longevity research is expected to benefit from combining molecular aging biomarkers with regular monitoring of physiological and functional states with multiple high-throughput methods. To achieve this, we have developed a set of composite biomarkers: epigenomic (this shows how genes are regulated at the DNA level), transcriptomic (this informs us how genes are expressed), proteomic (this allows us to know the details of proteins in a sample) and metabolomics (this informs us about how the body metabolizes food to generate energy). Our previous study shows that this approach will not only reveal personalized medical risks but also uncover extensive, dynamic profiles in diverse molecular components and biological systems, in particular in combination with information on participant health characteristics and functional measurements. Our goal for this study is to enroll around 100 participants at our Biomarkers of Aging conference at Harvard Medical School. We will also recruit participants in Boston, where Harvard Medical School is located. Collecting blood samples for molecular profiling alongside questionnaire and functional data will allow us to obtain a better understanding of the variation and dynamics of omics in blood at both personal and population levels. This study will moreover provide insights into whether, and how, functional measures are associated with molecular features, and which participant characteristics can influence molecular biomarkers and functional capacity.
Ultimately, this study will play a critical role in setting a baseline for the advent of healthy longevity monitoring and personalized medicine.

2. Specific Aims and Objectives

We are doing the research to assess the population's molecular variation and dynamics at different ages using omic profiling, questionnaire data, and noninvasive functional tests.

3. General Description of Study Design

This is a pilot exploratory study to recruit volunteers of different ages to examine how various molecular omic data are modulated at different ages. This study involves a single blood draw, questionnaire, and four noninvasive functional tests, and poses a minimal risk to participants.

4. Subject Selection

1. Inclusion/Exclusion Criteria

Description of Subject Population: Healthy volunteers 18 years or older:
Healthy volunteers are included based on self-report: You are a generally healthy volunteer 18 years or older, at least 110 lbs., free of cold and flu symptoms the day of collection, had no infections within two weeks prior to collection, no symptoms of a heart condition within the six months prior to collection, and no known sickle cell disease or anemia, have not donated more than 550 ml during preceding eight weeks and no more than one blood draw has occurred during the preceding week.

2. Local Recruitment Procedures:

Participants of the Biomarkers of Aging Conference and first-year Harvard Medical School students are invited to join this study. They are invited via email. Email addresses are obtained from conference registrations or sent via a mailing list (students).

a. Who is responsible (role on research team) for identifying and recruiting individuals.

Dr. Mahdi Moqri is responsible

b. When individuals are recruited

Prior to our Biomarkers of Aging Conference (Nov 1, 2024)

c. Where individuals are recruited

Boston, HMS, NRB building

d. How recruitment goals match the prevalence rates of the condition/disease being studied and the populations most impacted by the condition/disease being studied

Healthy individuals are recruited

e. Methods to enhance enrollment of diverse individuals and under-represented populations.

All genders, races, ethnicities, and age groups are permitted and encouraged to participate

5. Subject Enrollment

No Pre-screening will be done as the study is open to any generally healthy individual (based on self-report and following MGB guidelines for blood draw requirements).
The consent will be obtained in person prior to the blood draw at the site of the Conference at HMS NRB building on Nov 1 2024.

6. STUDY PROCEDURE

- This study involved a one-time visit between the dates of Oct 31-Nov 2 at the HMS-NRB Building.
- No drugs or interventions are administered.
- A single blood draw of a maximum of 50 ml of blood will be conducted from each participant.
    - 4 omic tests will be performed on each sample: epigenomic (this shows how your genes are regulated at the DNA level), transcriptomic (this informs us how your genes are expressed), proteomic (this allows us to know the details of all your proteins in your sample) and metabolomics (this informs us about how your body metabolizes food to generate energy)
- Alongside blood samples, we will collect the following information from participants:
    - A single questionnaire to gather information on basic epidemiological characteristics, health status, medication, diet, exercise and stress levels.
    - Data on four noninvasive functional tests, including:
        - A balance test

    - 6-Meter Walking Speed
    - Grip strength
    - Cognitive Test. The test on cognition (Digit Symbol Substitution Test) will be administered online.

  These functional tests are typically designed for geriatric studies. The balance and walking test will only be conducted in suitable participants with minimal risk of falls, defined as participants able to walk without assistance..
- All participant data will be stored on MGB secured ERIS server
- The primary endpoints are the molecular profiles including various omic scores such as Horvath Epigenetic clock and MetaboHealth Score constructed using omic profiling.
- Participants are eligible to receive a $50 gift card and complimentary virtual access to stream the Biomarkers of Aging Conference.

7. Risks and Discomforts

The main risks of being in the study are risks from taking blood from participants' arms that are minimal, which may involve a little pain, a bruise or local infection at the site. Functional tests, though noninvasive, may carry minimal risks associated with falls, especially in geriatric participants. To minimize risks associated with falls, we will have the following safeguarding mitigating strategies: functional tests involving walking or balance will only be conducted in suitable participants, defined as those able to walk without assistance; additionally, any functional tests involving balance and walking (guarded if needed) will be conducted with pre-assigned study staff in close proximity to avoid falls.

The main risk of allowing us to store and use samples and certain limited health information for research is a potential loss of privacy. We will protect your privacy by labeling your samples and information only with a code and keep the key to the code in a password protected database. Genetic information that results from this study does not have medical or treatment importance at this time. However, there is a risk that information about taking part in a genetic study may influence insurance companies and/or employers regarding your health. To further safeguard your privacy, genetic information obtained in this study will not be placed in your medical record.

8. Benefits

Personal benefit to you may or may not result from taking part in this research. However, knowledge may be gained from your participation that might eventually benefit you and others.

9. Statistical Analysis

Each omic profile data type is processed according to the best practice standards.Statistical analyses for both functional tests and omics data are performed on a continuous scale for association between participants' ages and the changes in their functional or molecular profiles. Additional statistical association analyses will be performed to examine the link between various omics measurements, functional tests, controlling for the age of the participants.

Formal power analysis has not yet been performed for this pilot study, but we except to observe enough correlation between confirmed age-dependent omic profiles and age with around 100 samples.

10. Monitoring and Quality Assurance

Blood samples will be quality controlled using cell counts. Each omic profiling data will be quality controlled using best practices in the literature. For DNA Methylation data we will follow quality metrics established by the Sesame Library.

11. Data and Research Material Sharing

All samples and aliquots will be coded using our label-free coding technology
All data will be deidentified before sharing.
All de-identified data will be publicly shared on the Dataverse platform
Participants can withdraw their data/materials at any time by contacting Dr. Mahdi Moqri at mmoqri@bwh.harvard.edu

A) Sending Data/Materials to Research Collaborators outside Mass General Brigham

None

B) Receiving Data/Materials from Research Collaborators outside Mass General Brigham

None

12. Privacy and Confidentiality

- ☒ Study procedures will be conducted in a private setting.
- ☒ Only data and/or specimens necessary for the conduct of the study will be collected.
- ☒ Data collected (paper and/or electronic) will be maintained in a secure location with appropriate protections such as password protection, encryption, physical security measures (locked files/areas)
- ☒ Specimens collected will be maintained in a secure location with appropriate protections (e.g. locked storage spaces, laboratory areas)
- ☒ Data and specimens will only be shared with individuals who are members of the IRB-approved research team or approved for sharing as described in this IRB protocol.
- ☒ Data and/or specimens requiring transportation from one location or electronic space to another will be transported only in a secure manner (e.g. encrypted files, password protection, using chain-of-custody procedures, etc.)
- ☒ All electronic communication with participants will comply with Mass General Brigham secure communication policies.
- ☒ Identifiers will be coded or removed as soon as feasible and access to files linking identifiers with coded data or specimens will be limited to the minimal necessary members of the research team required to conduct the research.
- ☒ All staff are trained on and will follow the Mass General Brigham policies and procedures for maintaining appropriate confidentiality of research data and specimens.
- ☒ The PI will ensure that all staff implement and follow any Research Information Service Office (RISO) requirements for this research.
- ☐ Additional privacy and/or confidentiality protections