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TITLE: Human Leukocyte Antigen in Gulf War Veterans: Association with Symptoms and Inflammatory Markers

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13. SUPPLEMENTARY NOTES					
14. ABSTRACT During this third year of the grant period, we have continued to focus on participant recruitment. In light of the COVID-19 pandemic we have made adjustments to the study protocol to continue recruitment and study procedures remotely. Despite the impact of the COVID-19 pandemic we completed 60 acquisitions during this period. We requested and were awarded a no-cost extension to continue recruitment for the study. To date we have completed 206 acquisitions.					
15. SUBJECT TERMS Gulf War Illness, Human Leukocyte Antigen, Genetics, Inflammation					
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1. INTRODUCTION:

GWI has affected a large number of veterans who served during the 1990-1991 Persian Gulf War. Despite extensive study, the pathogenesis and pathophysiology remain unclear. There is evidence of genetic effects and blood biomarkers that point to disruptions in immune system function as one underlying cause of GWI symptoms; however, studies evaluating immune system involvement in GWI have typically included small, non-representative samples. This project aims to evaluate GWI symptoms, genes associated with immune system functioning, and biomarkers of immune system dysfunction, inflammation, and autoimmunity in a large sample of Gulf War veterans with and without GWI to elucidate the relation of GWI to immune system dysfunction. If our hypothesis that GWI reflects immune system dysfunction resulting from genetic susceptibility coupled with environmental exposure(s) is supported, this will open new avenues of potential treatment, consistent with the burgeoning field of immunogenetics.

2. **KEYWORDS:** Gulf War Illness, Human Leukocyte Antigen, Genetics, Inflammation

3. ACCOMPLISHMENTS:

- **What were the major goals of the project?**

The major goal of this study is to evaluate immune genotype, inflammatory markers, and autoimmune involvement in a large sample of Gulf War veterans with and without GWI randomly selected from a list of 66,229 people in the State of Minnesota who served during the Gulf War from August 2, 1990 to April 11, 1991(provided to us by the Department of Defense).

- **What was accomplished under these goals?**

During this study period we have focused on recruitment and adjusting to virtual study acquisitions in light of the COVID-19 pandemic. To that end, we recruited and acquired data on 60 new participants. We also requested and were awarded a no-cost extension to continue acquisitions.

- **What opportunities for training and professional development has the project provided?**

Nothing to Report.

- **How were the results disseminated to communities of interest?**

Nothing to Report

- **What do you plan to do during the next reporting period to accomplish the goals?**
We plan to continue recruitment for virtual participation in the study.

4. **IMPACT:**

- **What was the impact on the development of the principal discipline(s) of the project?**
Nothing to Report
- **What was the impact on other disciplines?**
Nothing to Report
- **What was the impact on technology transfer?**
Nothing to Report
- **What was the impact on society beyond science and technology?**
Nothing to Report

5. **CHANGES/PROBLEMS:**

- **Changes in approach and reasons for change**
 - Nothing to report
- **Actual or anticipated problems or delays and actions or plans to resolve them**

The COVID-19 pandemic resulted in a temporary pause of research activities. In order to resume research activities, several adjustments were made to acquire some of the data via mail and telephone, the result of which is partial data acquisition on most participants recruited during this reporting period. Participants have been informed they will be invited at a later date to come in to the VA to complete in-person aspects of the study when deemed safe to do so locally.
- **Changes that had a significant impact on expenditures**
Nothing to Report
- **Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents**
Nothing to Report

6. **PRODUCTS:**

- **Publications, conference papers, and presentations**
Nothing to Report

- **Journal publications.**
Nothing to Report
- **Books or other non-periodical, one-time publications.**
Nothing to Report
- **Other publications, conference papers, and presentations.**
Nothing to Report

Website(s) or other Internet site(s)

Nothing to Report

Technologies or techniques

Nothing to Report

Inventions, patent applications, and/or licenses

Nothing to Report

Other Products

We have developed a database to facilitate data analysis and dissemination of research findings.

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

- **What individuals have worked on the project?**

Name:	<i>Lisa James</i>
Project Role:	<i>PI</i>
Researcher Identifier (e.g. ORCID ID):	
Nearest person month worked:	<i>2</i>
Contribution to Project:	<i>Study design and oversight; completion of regulatory documents; training of study staff</i>
Funding Support:	<i>DoD</i>

Name:	<i>Apostolos Georgopoulos</i>
Project Role:	<i>Co-I</i>

Researcher Identifier (e.g. ORCID ID):	
Nearest person month worked:	2
Contribution to Project:	<i>Oversight of database development and staff involved in DNA isolation</i>
Funding Support:	DoD

Name:	<i>Brian Engdahl</i>
Project Role:	<i>Co-I</i>
Researcher Identifier (e.g. ORCID ID):	
Nearest person month worked:	2
Contribution to Project:	<i>identification of study participants</i>
Funding Support:	DoD

Name:	<i>Laura Kalipe</i>
Project Role:	<i>Coordinator</i>
Researcher Identifier (e.g. ORCID ID):	
Nearest person month worked:	2
Contribution to Project:	<i>Data acquisition and DNA isolation</i>
Funding Support:	DoD

Name:	<i>Matt Sanders</i>
Project Role:	<i>Research Fellow</i>
Researcher Identifier (e.g. ORCID ID):	
Nearest person month worked:	1
Contribution to Project:	<i>Database development</i>

Funding Support:	DoD
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- **Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?**

Nothing to Report

- **What other organizations were involved as partners?**

Nothing to report

8. SPECIAL REPORTING REQUIREMENTS

Nothing to report

9. APPENDICES

Nothing to report