



# Naval Health Research Center



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## Gulf War Veterans in the Millennium Cohort Study

Ben Porter, PhD

Presentation to The Research Advisory Committee on Gulf War Veterans' Illnesses  
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The views expressed in this research are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of the Army, Department of the Air Force, Department of Veterans Affairs, Department of Defense, or the U.S. Government.

Human subjects participated in this study after giving their free and informed consent. This research has been conducted in compliance with all applicable federal regulations governing the protection of human subjects in research.

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## Overview

1. The Millennium Cohort Study
2. Enrolled Gulf War and Era Veterans
3. Millennium Cohort Gulf War Participants and All Gulf War and Era Veterans: Population Differences
4. VA-Millennium Cohort Collaboration

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2



## The Millennium Cohort Study

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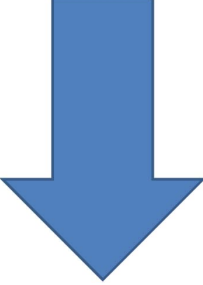
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## Introduction to Millennium Cohort Study

Objective:  
Prospectively evaluate the impact of military experiences, including deployment, on long-term health outcomes of U.S. service members



Translation                      Dissemination




Strategic evidence-based policy recommendations that inform leadership and guide interventions

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4

## Study Methodology





Multiple-panel cohort study

- Initiated July 2001
- Enrolled panels (groups): 2001, 2004, 2007, 2011
- Includes Active Duty, Reserve, National Guard

Participants who responded to the baseline survey are resampled via secure website or traditional paper survey every ~3 years (planned through 2068).


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5






## Questionnaires Include

- History of combat
- History of biological/chemical weapons exposure
- Symptom lists
  - Seabee Study
  - PHQ somatization
- SF-36
  - Includes general health
- Diagnosis list
- Mental health scales
- Alcohol use
- Tobacco use




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## Topics Examined

Over 85 scientific papers and 150 presentations.  
Examples include ...

- Posttraumatic stress disorder
- Alcohol and tobacco use
- Irritable bowel syndrome
- Suicide
- Burn pits
- Heart disease
- Weight change
- Hearing loss



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## Complementary Data Sources

Environmental Exposure Data

Deployment Data

Pharmacologic Data

Immunization Data

Recruit Assessment Program (RAP)

Medical History

Demographic Data

DoD Serum Repository

Survey Data

Family Data

DoD Birth and Infant Health Registry

Military Inpatient and Outpatient Care

Civilian Inpatient and Outpatient Care

Mortality Data

Dept. of Veterans Affairs Data

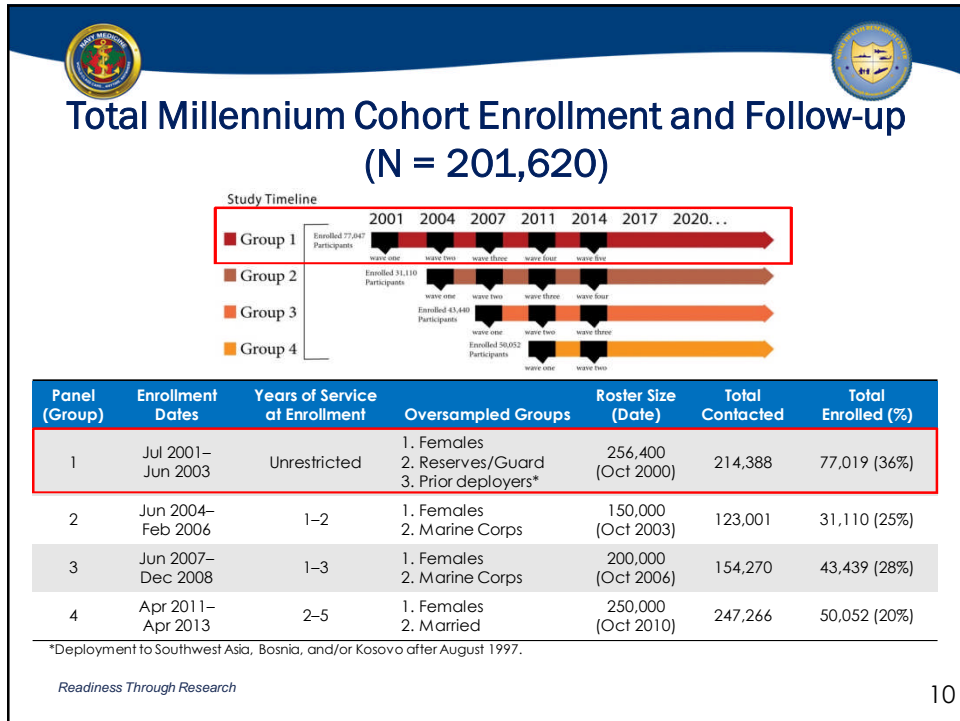
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8

## Enrolled Gulf War and Era Veterans

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9



## Gulf War Veterans in the Millennium Cohort Study



Although not designed specifically as a Gulf War cohort study, the Millennium Cohort Study enrolled:

- 9,130 Gulf War Veterans (deployed)
  - Identified through Defense Manpower Data Center (DMDC) roster
  - Deployed in Gulf War between August, 01 1990 – July, 31 1991
- 36,132 era Veterans (nondeployed)
  - Identified through DMDC roster



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11



## Responses Across Time


	Panel 1 (total)	Gulf War Veterans	Era Veterans
Invited	256,400	22,793	92,872
Enrolled	77,019 (30%)	9,130 (41%)	36,132 (39%)

Wave	Dates Collected	Panel 1 (total)	Gulf War Veterans	Era Veterans
1	Jul 2001 - Jun 2003	100%	9,130 (100%)	36,132 (100%)
2	Jun 2004 - Feb 2006	71%	7,101 (78%)	28,138 (78%)
3	May 2007 - Dec 2008	71%	6,984 (77%)	28,247 (78%)
4	Apr 2011 - Apr 2013	67%	6,551 (72%)	26,632 (74%)



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## Millennium Cohort Participants and All Gulf War and Era Veterans: Population Differences

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## Panel 1 Sampling Characteristics

- Panel 1 was randomly sampled from all branches and components of the military in October 2000.
- Oversampled groups
  - Women
  - Reservists/National Guardsmen
  - Service members deployed to Bosnia, Kosovo, and/or SW Asia during 1998-2000



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## Potential Differences

- Millennium Cohort Study Gulf War/era participants had to be connected to the military in October 2000:
  - Include fewer older Gulf War veterans
  - More likely to be career military
    - Potentially receiving care through TRICARE after retirement
    - Overrepresentation of Air Force, underrepresentation of Marines
  - Healthy warrior/healthy career effects

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### Demographic Characteristics (%)

		MilCohort GWV (N=9,130)	Pop. GWV (N=696,531)	MilCohort Era (N=36,132)	Pop. Era (N=2,912,737)
Female		14	7	24	13
Age (years) in 1991	<25	31	45	26	36
	26-32	46	30	40	28
	33-39	17	16	21	18
	≥40	7	9	13	18
Race/Ethnicity	White	76	71	81	77
	Black	18	23	15	18
	Other Race/Ethnicity	6	6	5	5

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16



### Military Demographics (%)

		MilCohort GWV (N=9,130)	Pop. GWV (N=696,531)	MilCohort Era (N=36,132)	Pop. Era (N=2,912,737)
Military Branch	Army	50	50	43	45
	Navy	19	23	18	23
	Marine Corps	8	15	3	6
	Air Force	23	12	35	24
Service Component	Active Duty	81	84	51	56
	Reserve	10	10	27	25
	National Guard	9	6	23	20

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17



## VA-Millennium Cohort Research Collaboration

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18





## Prior VA Collaboration

- The Millennium Cohort Study was designed to be a collaboration with investigators from all services and the VA.
  - Such collaboration occurred on a project-by-project basis.
- Dr. Edward Boyko has been involved in the study since its inception. He has served in several advisory and operations positions and has collaborated on numerous studies and publications.

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19






## Objectives

1. Analyze Millennium Cohort Study data from a veteran-centric perspective
2. Incorporate VA health data in Millennium Cohort Study research
3. Facilitate further collaboration between Millennium Cohort Study and other VA investigators

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20






## VA–Millennium Cohort Collaboration

- Office of Research and Development
  - Robert Jaeger, PhD
  - Victor Kalasinsky, PhD
- Office of Patient Care Services
  - Aaron Schneiderman, PhD, MPH, RN
  - Erin Dursa, PhD, MPH
- Millennium Cohort Project
  - CDR Dennis Faix, MD, MPH (PI of Millennium Cohort)
  - Rudolph Rull, PhD
  - Ben Porter, PhD
  - Deborah Bookwalter, ScD, MS
  - Rayna Matsuno, PhD, MPH


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21






## Study 1 – Describe the Study Population

- Describe military and demographic characteristics of Gulf War Veterans and era Veterans in the Millennium Cohort Study
- Examine associations with recruitment and attrition in the Millennium Cohort Study
- Compare 2011 Millennium Cohort survey with the VA's 2012 Follow-up Study of a National Cohort of Gulf War and Gulf War Era Veterans
  - Diagnoses by medical professionals
  - Self-reported health





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## Study 2 – Examine GWI Across Time

- Examine how prevalence of Gulf War Illness changes across time (2001-2013) using nonlinear mixed effects modeling
- Millennium Cohort Gulf War Illness definition as an approximation of CDC definition
  - Symptoms have been assessed at every wave.
- Determine whether Gulf War Illness is increasing or decreasing among deployed versus nondeployed Gulf War era personnel

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## Millennium Cohort Gulf War Illness Definition

Criteria met by endorsing items in at least two of three clusters:

<p><b>Fatigue</b></p> <ul style="list-style-type: none"> <li>• Unusual fatigue</li> <li>• Having a lot of energy (reverse coded)</li> </ul> <p><b>Musculoskeletal</b></p> <ul style="list-style-type: none"> <li>• Unusual muscle pains</li> <li>• Back pain</li> <li>• Pain in arms, legs, or joints</li> </ul>	<p><b>Mood/Cognition</b></p> <ul style="list-style-type: none"> <li>• Forgetfulness</li> <li>• Confusion</li> <li>• Trouble sleeping</li> <li>• Feeling downhearted and blue</li> <li>• Feeling nervous, anxious, on edge, or worrying a lot about different things</li> <li>• Feeling irritable or having angry outbursts</li> <li>• Trouble falling asleep or staying asleep</li> </ul>	
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## The Millennium Cohort Team

Richard Armenta, MPH; Lauren Bauer, MPH; Deb Bookwalter, PhD; Madeline Cross; James Davies; CDR Dennis Faix, MD, MPH; LTCOL Susan Farrish, MD, MPH; Toni Geronimo; Kathleen Gunn; Claire Kolaja, MPH; Joyce Kong, PhD; Cynthia LeardMann, MPH; William Lee; Hector Lemus, PhD; Kyna Long, MS; Gordon Lynch; Denise Lovec-Jenkins; Rayna Matsuno, PhD; Danielle Mitchell; Kristin Motylinski; Anna Nagel, MPH; Chiping Nieh, PhD; Serguey Parkhomovsky; Anet Petrosyan; Chris Phillips, MD, MPH; Ben Porter, PhD; Teresa Powell, MPH; Rudy Rull, PhD; Beverly Sheppard; Steven Speigle; Daniel Trone, PhD; Jennifer Walstrom

Co-Investigators

Dr. Paul Amoroso; Dr. Edward Boyko; Dr. Gary Gackstetter; Dr. Greg Gray; Dr. Tomoko Hooper; Dr. Margaret Ryan; Dr. Tyler Smith; Dr. Timothy Wells



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# Supplementary Slides

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26



## CDC War Illness Definition

Criteria met by endorsing items in at least two of three clusters. Symptoms must be present for at least six months.

<p>Fatigue</p> <p>Musculoskeletal</p> <ul style="list-style-type: none"><li>• Joint pain</li><li>• Joint stiffness</li><li>• Muscle pain</li></ul>	<p>Mood/Cognition</p> <ul style="list-style-type: none"><li>• Feeling depressed</li><li>• Difficulty in remembering or concentrating</li><li>• Feeling moody</li><li>• Feeling anxious</li><li>• Trouble finding words</li><li>• Difficulty in sleeping</li></ul>
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27