



DEPARTMENT OF THE AIR FORCE
711TH HUMAN PERFORMANCE WING (AFMC)
WRIGHT-PATTERSON AFB OHIO

27 March 2026

MEMORANDUM FOR AFGSC/SG

FROM: USAFSAM/PHR
2510 Fifth Street
Wright-Patterson, AFB OH 45433

SUBJECT: Missile Community Cancer Study (MCCS) Epidemiology Study Phase 2 Brief Report

1. **SUMMARY:** Following concerns of elevated cancer rates expressed by the missile community, Air Force Global Strike Command (AFGSC) requested the United States Air Force School of Aerospace Medicine (USAFSAM)/Defense Centers for Public Health-Dayton (DCPH-D) Epidemiology Consult Service (PHR) to evaluate the incidence and mortality of cancer among Department of the Air Force (DAF) service members in the missile community. After analyzing incident cancer cases in the missile community from Phase 1B (the Military Medical Records, Veterans Affairs (VA) Medical Records, Department of War (DoW) Cancer Registry, VA Cancer Registry), and cancer mortality data from Phase 1C (the National Death Index), we found no statistically significant increased risk of cancer in the missile community. After the analysis of Phase 1B did not demonstrate an elevated incidence of cancer in the missile community, in accordance with our study plan, we moved on to the next phase of analysis (Phase 2) incorporating the Virtual Pooled Registry (VPR) into the incident datasets from Phase 1B. **Attachment 1** shows the MCCS data sources timeline.
Throughout the MCCS, USAFSAM has collaborated with a variety of external academic partners. For Phase 2, this included Dr. Timothy Crawford (Wright State University, Boonshoft School of Medicine), whose signature appears below. External partners have reviewed analysis plans, assisted with interpretation of results, and provided iterative input at every stage.
2. **EXPANSION OF INCIDENT CANCER DATA USING THE VPR (PHASE 2):** We anticipated gaps in the incidence dataset from Phase 1B that prevented us from drawing any concrete conclusions. Phase 2 of the study was designed to close these gaps, as we expected to find 2-3 times more cancer cases utilizing the VPR. At this time, VPR data has been received from 43 out of the 44 state and territorial cancer registries that participate in the VPR, including all states with an active Intercontinental Ballistic Missile (ICBM) base. The VPR is managed by the North American Association of Central Cancer Registries (NAACCR), funded by the National Cancer Institute (NCI), and represents >95% of the U.S. population, plus Puerto Rico. **Attachment 2** shows the timeline of VPR datasets received,

the number of records received, and the estimated completeness of the data source.

3. **RESULTS:** Phase 2 found a total of 148,078 cases of cancer in the entire DAF cohort of 1.8+ million individuals. 4,942 cases were in the missile community and 143,136 were in the non-missile community. Phase 2 captured over 2.7 times the number of incident cases captured in Phase 1B, demonstrating the value of VPR for optimal case capture. **Attachment 3** shows the cancer case counts and percentages among the missile community and non-missile community.
 - a. *External Comparison (Missile Community versus U.S. Population):* Phase 2 of the MCCS showed a statistically significant lower incidence of cancer in the missile community compared to the U.S. population for four study cancers (colon and rectum, non-Hodgkin lymphoma, prostate, and testicular) as well as for all 14 cancer types overall. Conversely, Phase 2 found a statistically significant higher incidence of cancer in the missile community compared to the U.S. population for one study cancer: melanoma. This finding is in line with previous DAF cancer investigations in the aviation community. The remaining nine study cancers were statistically similar among the missile community and the US population. **Attachment 4** shows the Standardized Incidence Ratios (SIRs) by cancer type among the missile community, compared to U.S. civilian cases using the Surveillance, Epidemiology, and End Results (SEER) program's research database from 1 January 1976 – 31 December 2020.
 - b. *Internal Comparison (Missile Community versus Non-Missile Community):* Phase 2 of the MCCS demonstrated a statistically significant lower incidence of cancer in the missile community compared to the non-missile community for four study cancers (colon and rectum, lung and bronchus, prostate, and urinary bladder) as well as for all 14 cancer types overall. Conversely, Phase 2 found a statistically significant higher incidence of cancer in the missile community compared to the non-missile community for two study cancers: Hodgkin lymphoma and testicular cancer. The remaining eight study cancers were statistically similar among the missile community and non-missile community. **Attachment 5** shows Incidence Rate Ratios (IRRs) by cancer type among the missile community, compared to non-missile community from 1 January 1976 – 31 December 2020.
4. **NEXT STEPS:** Following this Phase 2 basic analysis, the missile community cancer study is advancing with an enhanced epidemiology review, focusing on specific jobs, time periods, and bases to see if there are associations with increased cancer incidences in these groups. This analysis will be accomplished with active participation from our external academic partners and results will be presented once completed. Alongside these efforts, the study will maintain robust stakeholder engagement through congressional updates and coordination with the VA. To this end, the VA has received a roster of individuals who served in the missile community from 1976-2025 to follow this cohort into the future, ensuring service members are aware of expanded VA coverage for toxic exposures

under the Promise to Address Comprehensive Toxics (PACT) Act.

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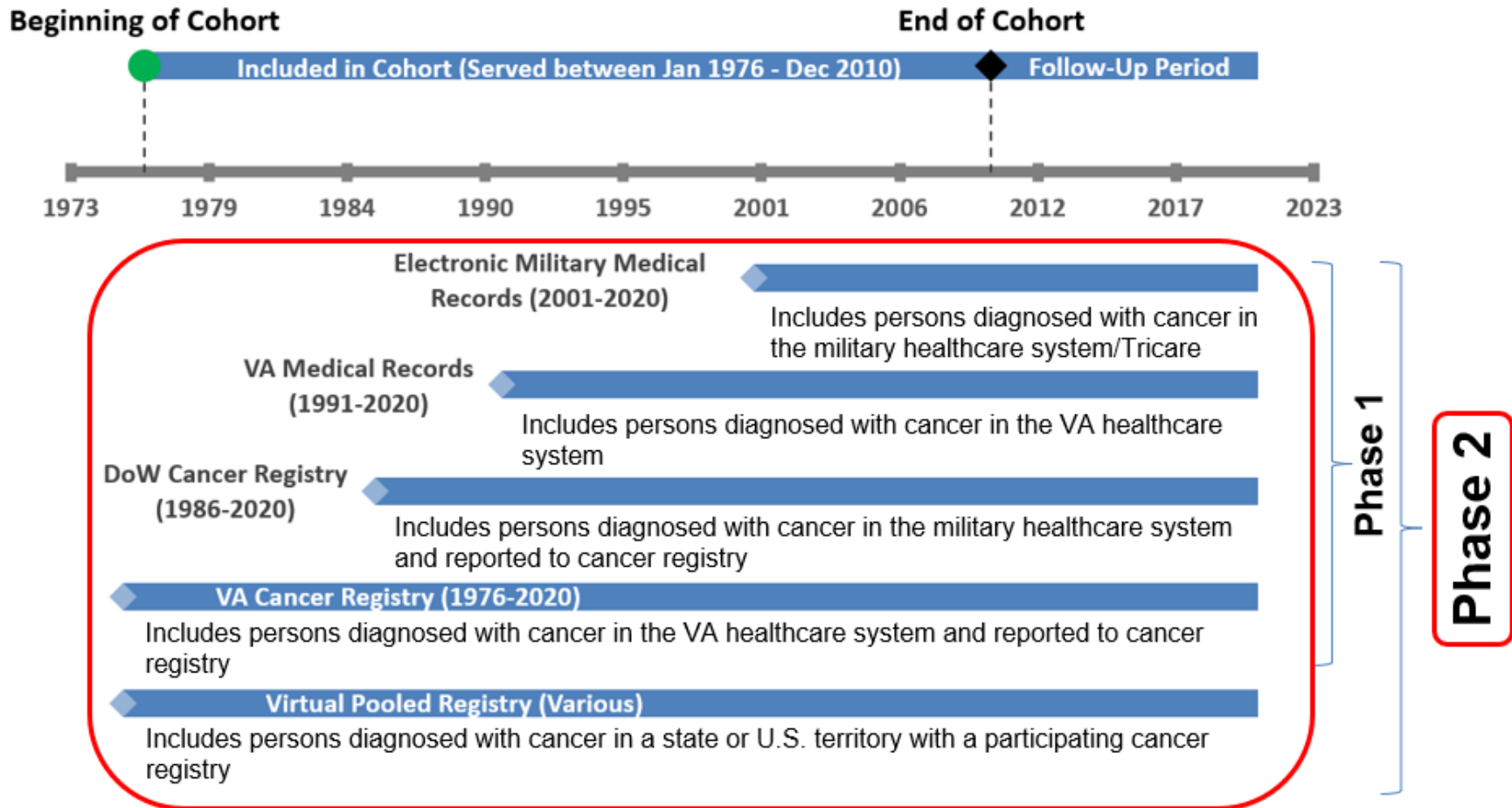
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6 Attachments

1. Attachment 1: Missile Community Cancer Study Cohort and Data Sources Timeline
2. Attachment 2: Missile Community Cancer Study VPR Data Timeline
3. Attachment 3: Cancer Cases Among Missile Community and Non-Missile Community, 1 January 1976 – 31 December 2020
4. Attachment 4: Standardized Incidence Ratios (SIRs) by cancer type among the missile community, compared to U.S. civilian cases using SEER Research database from 1 January 1976 - 31 December 2020
5. Attachment 5: Cancer cases, by type, of missile community compared to non-missile community from 1 January 1976 – 31 December 2020 (IRR = Incidence Rate Ratio)



Attachment 1: MCCA Data Sources Timeline



Attachment 3: Cancer cases among missile community and non-missile community, 1 January 1976 – 31 December 2020

Cancer Type	Missile Community (N=64,735)	Non-Missile Community (N=1,757,033)	Total (N=1,821,768)
All 14 types*	4,942	143,136	148,078
Breast (Female)	109 (2.21%)	7,932 (5.54%)	8,041 (5.43%)
Colon and Rectum	462 (9.35%)	13,729 (9.59%)	14,191 (9.58%)
Hodgkin Lymphoma	67 (1.36%)	1,543 (1.08%)	1,610 (1.09%)
Kidney and Renal Pelvis	320 (6.48%)	7,976 (5.57%)	8,296 (5.60%)
Leukemia	201 (4.07%)	5,457 (3.81%)	5,658 (3.82%)
Lung and Bronchus	582 (11.78%)	18,606 (13.00%)	19,188 (12.96%)
Melanoma of the Skin	546 (11.05%)	14,450 (10.10%)	14,996 (10.13%)
Non-Hodgkin Lymphoma	285 (5.77%)	7,767 (5.43%)	8,052 (5.44%)
Ovarian (Female)	12 (0.24%)	638 (0.45%)	650 (0.44%)
Pancreatic	175 (3.54%)	4,407 (3.08%)	4,582 (3.09%)
Prostate (Male)	1,626 (32.90%)	44,958 (31.41%)	46,584 (31.46%)
Testicular (Male)	111 (2.25%)	2,688 (1.88%)	2,799 (1.89%)
Thyroid	154 (3.12%)	4,543 (3.17%)	4,697 (3.17%)
Urinary Bladder	292 (5.91%)	8,442 (5.90%)	8,734 (5.90%)
*All primary cancers counted (individuals may have more than 1 primary cancer but not the same type).			

Attachment 4: Standardized Incidence Ratios (SIRs) by cancer type among the missile community, compared to U.S. civilian cases using SEER Research database from 1 January 1976 – 31 December 2020

Cancer Type	Observed Cases	Expected Cases	SIR	95% CI, lower	95% CI, upper	p-value
All 14 types**	4,942	5,238	0.94	0.91	0.98	≤0.001
Breast (Female)	109	100	1.09	0.84	1.39	0.393
Colon and Rectum	462	581	0.80	0.70	0.90	≤0.001
Hodgkin Lymphoma	67	79	0.85	0.60	1.15	0.191
Kidney and Renal Pelvis	320	290	1.10	0.95	1.27	0.087
Leukemia	201	204	0.99	0.82	1.18	0.870
Lung and Bronchus	582	599	0.97	0.87	1.08	0.503
Melanoma of the Skin	546	484	1.13	1.01	1.26	0.006
Non-Hodgkin Lymphoma	285	357	0.80	0.68	0.93	≤0.001
Ovarian (Female)	12	8	1.50	0.62	3.02	0.224
Pancreatic	175	161	1.09	0.89	1.32	0.288
Prostate (Male)	1,626	1,753	0.93	0.87	0.99	0.002
Testicular (Male)	111	171	0.65	0.50	0.83	≤0.001
Thyroid	154	149	1.03	0.83	1.27	0.704
Urinary Bladder	292	302	0.97	0.83	1.12	0.589
<p>*Bold represents statistically significant findings (p≤0.05).</p> <p>**All primary cancers counted (individuals may have more than 1 primary cancer but not the same type).</p>						

Attachment 5: Cancer cases, by type, of missile community compared to non-missile community* from 1 January 1976 – 31 December 2020 (IRR = Incidence Rate Ratio)

Cancer Type	IRR	95% CI, lower	95% CI, upper	p-value
All 14 types**	0.94	0.91	0.97	≤0.001
Breast (Female)	0.83	0.64	1.02	0.052
Colon and Rectum	0.88	0.78	0.97	0.006
Hodgkin Lymphoma	1.45	1.21	1.70	0.003
Kidney and Renal Pelvis	1.01	0.90	1.12	0.823
Leukemia	0.99	0.85	1.13	0.922
Lung and Bronchus	0.80	0.71	0.88	≤0.001
Melanoma of the Skin	1.03	0.94	1.11	0.560
Non-Hodgkin Lymphoma	1.00	0.88	1.12	0.987
Ovarian (Female)	1.17	0.60	1.74	0.590
Pancreatic	1.03	0.88	1.19	0.657
Prostate (Male)	0.88	0.83	0.93	≤0.001
Testicular (Male)	1.43	1.24	1.62	≤0.001
Thyroid	1.13	0.97	1.29	0.127
Urinary Bladder	0.88	0.76	0.99	0.027
*Multiple Poisson regression adjusted for age, race, sex, and rank.				
**Only the first primary cancer per individual was counted.				
*** Bold represents statistically significant findings (p≤0.05).				