OPERATIONALIZING NUTRITION: LESSONS LEARNED ACROSS NAVY POPULATIONS

Lynn Cialdella-Kam[1], Mary Polan[1,2], Christina Cornell[1,2], Trisha Sterringer [1,2], Michael Stone[1,2]
[1]Naval Health Research Center, San Diego, CA; [2]Leidos, Inc., San Diego, CA

INTRODUCTION

Over the past 5 years, we have assessed energy and nutrient status across several Navy populations to support readiness. In alignment with Pillar 4 of the Chief of Naval Operations' "Sailors First" Guidance (NAVADMIN 186/25), our aim is to summarize best practices, common barriers, and opportunities to enhance the Navy through nutrition.

METHODS

Nutrition and physiological outcomes were assessed across Navy populations: 1) Officer Training Command (OTC, Newport, RI; n=53); 2) Recruit Training Command (RTC, Great Lakes, IL; n=88); 3) Explosive Ordnance Disposal (EOD) dive candidates (two locations: Great Lakes, IL [prep/select], Panama City, FL [dive school]; n=40); and 4) active-duty sailors (n=166; stationed at one of four bases or deployed). Assessments included energy and nutrient intake and timing, nutrient status via biomarkers (vitamin D, omega-3), and environmental barriers. Best practices and recommendations (e.g., menu, policy, training changes) were identified to enhance readiness.

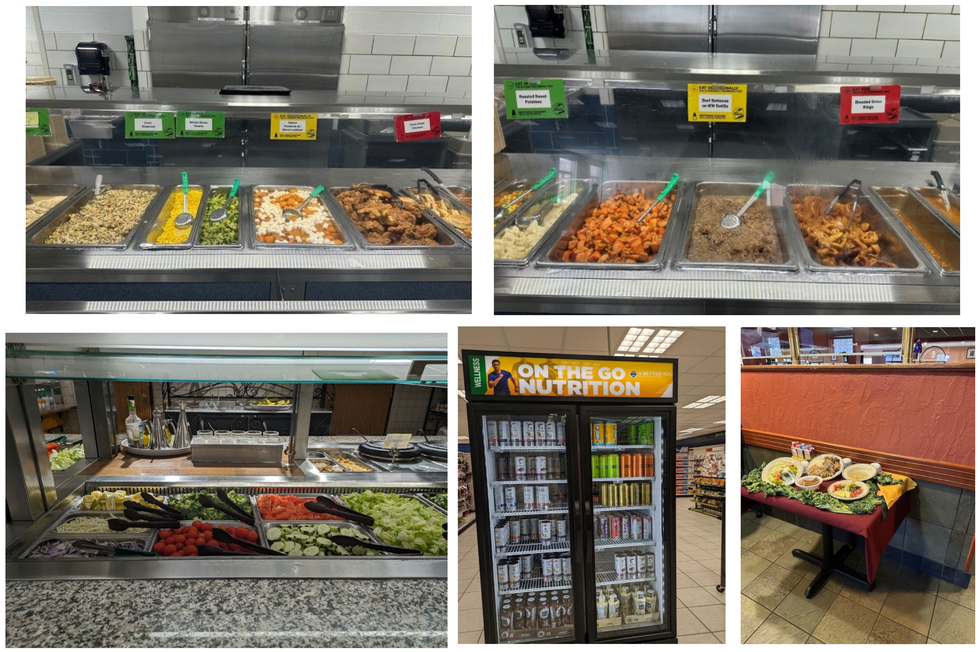
Measurements across studies:

1. **Anthropometrics:** height, body weight (BW), body fat percentage (%BF) using bioelectrical impedance (BIA, InBody 270), body mass index (kg/m^2)
2. **Dietary intake:** digital photography/ weighed food trays (Figure 1)
3. **Total Energy Expenditure:** doubly labeled water (dose=1.5 g/kg BW)
4. **Dried Blood Spots (DBS)** for vitamin D and omega-3 fatty acid status
5. **Nutrition environment assessment** via the Military Nutrition Environment Assessment Tool (mNEAT; scores based on mNEAT version through March 2025: fully supportive=90-100%, mostly supportive=75–89%, partially supportive=60–74%, not supportive=0–59%)

Statistical Analysis: Data were summarized using means and standard error. Analysis of variance was used to test for differences between sex and location. Pearson correlations and regression were used to determine associations between age, weight, sex, energy, and nutrient intake and biomarkers. Significance was set at p<.05.

RESULTS

Environment Assessment (mNEAT): Overall, the DFAC/Galleys at all locations were at least partially supportive (range: 61 to 71%) and commissaries at Naval Base San Diego and Naval Station Norfolk were mostly supportive. Generally fast-food/mini-mart options were less than ideal (<35%).



Photos courtesy of Michael Stone

Figure 1. Nutrition offerings across installations.

Base galleys provided food choices that supported operational readiness; a key limitation was access (e.g., location and availability) due to job/personal constraints. Food offerings outside the galley were often suboptimal. Vitamin D insufficiency/deficiency (A; Figure 3) and poor omega-3 status (B; Figure 3) were prominent across the populations assessed (>70% for vitamin D and 100% for omega-3).

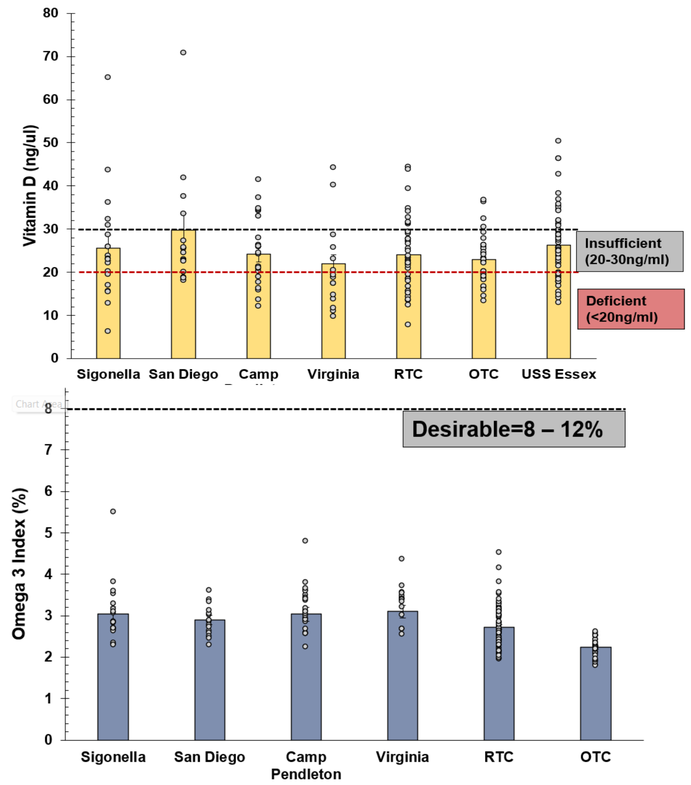


Figure 2. Vitamin D and omega-3 fatty acid status in active-duty and RTC/OTC recruits.

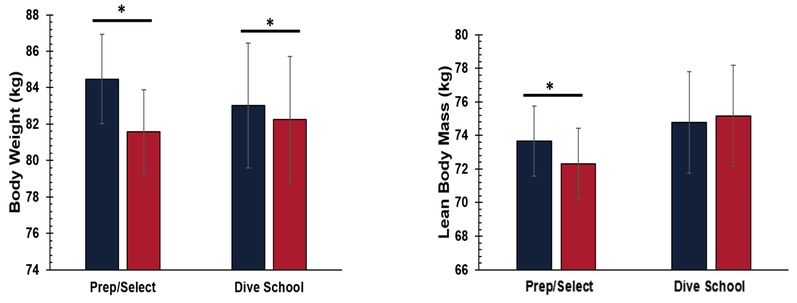


Figure 3. Body mass decreased pre(day-1)/post(day-7) training in EOD dive candidate.

- Dive training was monitored for two 7-day phases: prep/selection (PS) and dive school (DS)
- At PS, BW (-2.6±0.2 kg; p<.001), %BF (-1.5±0.2%; p<.001), and LBM (-1.0±0.3 kg; p=.001) decreased.
- At DS, BW (-0.8±0.3 kg; p=.01) and %BF (-1.1±0.3%; p=.003) decreased; no change in LBM.
- Energy balance at PS and DS was estimated as -1960±147 and -2025±311 kcal/d, respectively.

CONCLUSION

1) The galleys at RTC and OTC supported energy and macronutrient needs for most candidates.
- Standard portions are served independent of body size, resulting in insufficient or excess intakes
- Strategies, including offering whole-wheat bread and sunflower butter, led to adequate fiber intake in recruits

2) Low energy intake, nutrient timing (breakfast too close to training), and meals consumed outside the galley were key issues identified in EOD candidates.
- Improvements could be realized with changes in training, nutrient timing, and nutrition education

3) An opportunity to improve the nutrition environment across installations is identifying ways to improve visibility/offering of nutritious foods with NEX mart, food cart, and commissary management.

4) Suggested policy improvements include offering more foods rich in vitamin D and omega-3s, education, and providing annual status screenings.

Leadership continues to be informed of menu recommendations and policy changes to optimize operational readiness via nutrition.

 This work was supported by Office of the Chief of Naval Operations, Naval Education Training Command, Navy Restoral Funding under work unit nos. 62447, 62334, 62370. The views expressed in this work are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government. The study protocol was approved by the Naval Health Research Center Institutional Review Board in compliance with all applicable federal regulations governing the protection of human subjects. Research data were derived from approved Naval Health Research Center Institutional Review Board protocol number NHRC.2023.0017, NHRC.2023.0018, NHRC.2023.0003.