FACT SHEET

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Naval Submarine Medical Research Laboratory
Groton, CT

The United States Submarine service has a long and proud tradition of developing and operating with leading edge technologies. The Naval Submarine Medical Research Laboratory (NSMRL) is a major contributor to integrating these technologies into submarine crew operations. NSMRL is DoD's Center for Undersea Biomedical Research. The laboratory's mission is to protect the health and enhance the performance of warfighters through submarine, diving and surface biomedical research solutions. Established in World War II to conduct mission critical studies in night vision, sonar sound discrimination, and personnel selection, NSMRL continues to serve the fleet by taking the lead in undersea human factors, sensory sciences and operational medicine.

Located on Submarine Base New London, Groton, CT, NSMRL conducts research into Submariner Wellness, Psychological Fitness, Shipboard Health and Performance, Underwater Bioeffects and Submarine Survival & Escape, and Human Systems. Researchers work with many partners including the Naval Undersea Warfare Center, Naval Medical Center San Diego, NASA, NAVSEA, Navy Experimental Diving Unit, U.S. Army Research Institution of Environmental Medicine and others. NSMRL has an MOA with Commander, Submarine Forces to serve as their human technology laboratory. NSMRL researchers have access to three submarine squadrons in Submarine Group Two; the Navy Submarine School; the Naval Submarine Support Facility; Naval Undersea Medical Institute; and the Electric Boat Division of General Dynamics, which builds the nation's submarines. The laboratory is staffed by a diverse group of psychologists, audiologists, physicians, physiologists, and electrical, biomedical and nuclear engineers. Several colleges and universities are located in the same area, including the US Coast Guard Academy, Connecticut College, and the University of Connecticut.
NSMRL's accomplishments continue to be many and varied, and include scientifically based recommendations for submarine rescue procedures, submarine atmosphere limits, waivers for clinical medical conditions, advanced sonar system capabilities, diver/sonar safe distances, and symbology for visual displays.

A Forward Thinking Design for a Forward Thinking Lab

In 2011, NSMRL completed a large improvement project to update its facilities and create a combined worksite more conducive to the current and future NSMRL mission. Major improvements include replacing the outdated and inefficient steam heating and window a/c units with a new system, adding elevator access, and the addition of a research pool and new physiology lab. In addition, the Command moved from 3 buildings into 2 renovated spaces that are bridged by a 2nd story medical library. Updated communication and data infrastructure complete this $9.3 million dollar renovation.

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Research

Submarine Medicine & Survival Systems Department

NSMRL conducted research and evaluation on carbon dioxide technologies that doubled survival time in a disabled submarine scenario. Additionally NSMRL developed submarine disaster survival and escape procedures and guidance. Other work includes the development of new submarine atmosphere limits for mixed gender crews and deep submersibles, investigation of submariner bone health and vitamin D levels, submarine atmosphere monitoring through the Submarine Atmosphere and Health Assessment Program, and initiating the Submariner Epidemiology Research Program.

Warfighter Performance Department

NSMRL is the Navy's lead on psychological selection and classification of submariners, gender integration into submarines and other unique environments, and the bio effects of underwater sound. NSMRL is currently developing a Bioeffects Model for Underwater Sound, providing DoD guidance on various underwater sound exposures (SONAR systems, pile driving, etc.), and documenting underwater hearing in humans to include 100kHz exposures that has never been documented before. Additional efforts include development and testing of dive side noise measurement systems, underwater tool noise, and possible hearing conservation procedures.

NSMRL research areas include:

Submariner Wellness NSMRL conducts hearing conservation efforts from basic research, such as the ability of otoacoustic measurements to predict hearing loss, through a toolkit to assist field audiologists in hearing education, to field studies onboard the Littoral Combat Ships.
Physical Health studies include Bone Density/Vitamin D studies on board submarines.
NSMRL initiated the first-ever study of Submariner Epidemiology and the impacts of the unique submarine environment.

Psychological Fitness includes selection of submariners for submarine service suitability (SUBSCREEN), prediction of unplanned losses from operational units, individual and team resilience, and integration of mixed gender crews.

Shipboard Health and Performance includes submarine atmosphere effects for mixed gender crews and Submarine Atmosphere Monitoring (SAHAP) to ensure health. Circadian Rhythm research to maximize performance includes evaluation of watchstanding cycles, lighting to improve vigilance, and entraining Special Forces.

Survival and Escape & Underwater Bioeffects has a diverse set of projects including diving physiology studying hyperbaric stress alleviation, underwater human factors including high frequency underwater hearing and underwater sound location, assessment of nonlethal underwater bioeffects, and development of pressurized Submarine Rescue Manual.

Human Systems covers human perception including how to panoramically display 360 degree visual data and integrate audio and visual clues as well as Command Decision-Making Processes in Submarines.