

WHO

SYSCOM: NAVAIR

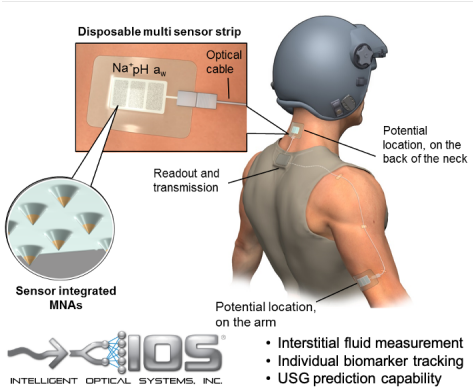
Sponsoring Program: PMA-265, PMA-202

Transition Target: F/A-18 and EA-18G

TPOC: (301) 342-9261

Other Transition Opportunities: Other transition opportunities include USAF fighter aircraft, military helicopters, midclass business jets, spacecraft crew monitoring, and emergency services aviation, where the "WEAR-Hyd" monitor can enhance safety and performance.

Notes: The WEAR-Hyd is a state-of-the-art real-time hydration monitor developed by Intelligent Optical Systems (IOS) for military aircrews. Using innovative luminescent microsensor technology, it continuously tracks pH, sodium ion, and water activity in interstitial fluid, offering precise hydration metrics. Individual biomarker reporting enhances hydration decision-making, while the model to predict urine specific gravity (USG), a gold standard for hydration determination, adds significant value. These advantages set the "WEAR-Hyd" apart, ensuring superior performance and safety during flights. IOS seeks collaboration with defense customers for operational validation and integration into aircraft systems. Moreover, partnering with prime contractors and equity investors will facilitate scaling and commercialization, driving widespread adoption to improve aircrew well-being and mission success.



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WHAT

Operational Need and Improvement: The operational need is to provide military aircrews with a real-time hydration monitoring solution that accurately tracks pH, sodium ion, and water activity in interstitial fluid, complemented by individual biomarker reporting and a predictive model for urine specific gravity (USG). This technology enhances aircrew safety and performance by enabling better hydration decision-making and reducing physiological risks during flights. The WEAR-Hyd monitor's robustness and compatibility with other aircrew physiology sensors ensure seamless integration into existing aircraft systems, meeting the Navy's specified combat criteria. It offers a sustainable competitive advantage, enabling timely interventions to mitigate dehydration-related hazards, thereby significantly improving aircrew well-being and mission success.

Specifications Required: The WEAR-Hyd hydration monitor must accurately measure pH, sodium (Na⁺), and water activity (a_w) levels in interstitial fluid, ensuring real-time tracking of hydration status. It must operate under high acceleration, reduced pressure, wide humidity range, and extremes of temperature. The device should seamlessly integrate with existing flight gear, enabling non-invasive monitoring without interference, and support reliable data transmission for enhanced aircrew safety and performance.

Technology Developed: The WEAR-Hyd is a robust and wearable real-time hydration monitor developed by IOS specifically for military aircrews. It utilizes a novel luminescent microsensor technology to continuously monitor pH, sodium ion, and water activity levels in interstitial fluid, providing accurate and reliable hydration metrics. This advanced technology includes a model that predicts urine specific gravity (USG), the gold standard for hydration determination, further enhancing its value in ensuring optimal hydration levels for aircrew members during critical missions. Technical validation has been demonstrated in a limited-scale human subject study.

Warfighter Value: The WEAR-Hyd ensures real-time, accurate hydration monitoring for military aircrews, enhancing performance and safety in high-stress flight operations. Its benefits extend beyond aircrews to ground crews, battle space managers, and personnel in hot environments, enabling improved focus and decision-making. By expanding its application to radar operators, communication specialists, medical personnel, and mission planners, the technology can enhance performance, reduce risks, and optimize mission success across various operational domains. The critical role of hydration in overall performance makes the WEAR-Hyd an indispensable tool for warfighter readiness.

WHEN

Contract Number: N68335-20-C-0135

Ending on: May 14, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Fabricate microsensors	Medium	Demonstrate technical feasibility	3	3rd QTR FY19
Ex vivo validation of microsensors	Medium	Validate operation in controlled lab environment	4	3rd QTR FY19
Develop optoelectronic interrogator	Low	Demonstrate technical feasibility	4	3rd QTR FY23
Complete preliminary human subject dehydration study	High	Validate operation in simulated operational environment	5	3rd QTR FY23
Preliminary predictive model built	High	Demonstrate predictability of hydration metric(s)	5	3rd QTR FY23
OPTION: Revise design, and assemble second generation	Low	Prototype meets or exceeds operational requirements	6	4th QTR FY24
OPTION: Complete extended human subject studies	Medium	Validate operation in simulated operational environment with high statistical significance	6	4th QTR FY25

HOW

Projected Business Model: The projected business model for the WEAR-Hyd technology involves collaboration with defense customers and prime contractors for integration into military aviation platforms. Additionally, partnerships with equity investors will facilitate scaling and commercialization, enabling broader adoption in both military and potential civilian applications. The technology's potential to revolutionize hydration monitoring in various sectors, including healthcare and consumer markets, creates opportunities for long-term growth and sustainability.

Company Objectives: Our company's objective is to strategically transition and commercialize the WEAR-Hyd technology through a multi-step approach. Firstly, we plan to spin out the intellectual property into a separate company, leveraging our experience in this process. Subsequently, we aim to collaborate with a larger company to secure funding for regulatory approvals and manufacturing capabilities. The initial focus will be on integrating the technology into healthcare and performance plans, with the potential to directly serve the warfighter once firmly established. The commercial opportunities in the sports, performance, and lifestyle tracking sectors reinforce our potential for partnering with larger companies, thereby achieving both military and commercial transition goals effectively.

Potential Commercial Applications: The WEAR-Hyd technology has potential commercial applications beyond military use, including healthcare for continuous hydration monitoring in patients, fitness and sports industries for optimizing performance, and consumer-oriented health monitoring devices to promote overall well-being.
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