Human Systems Community of Interest (HS CoI) Newsletter

SPECIAL EDITION: RESPONSE TO COVID-19

Jul 2020

Senior Leader Perspectives: As a community, the HS CoI often gathers in the spirit of science, technology, and knowledge. In the span of a few months, however, we have had not one, but two defining moments in our nation's history. Such a time highlights the most important word in the HS CoI acronym: Human. Both COVID-19 and the groundswell of recent protests across the nation—indeed, the globe—remind us so poignantly that we are human first, and scientists second.

We also find ourselves reminded of the importance of another word in HS CoI: Community. COVID-19 encouraged us to reflect on the importance of family, friends, and colleagues. It made many us of realize how much we cherish being with one another in a non-socially distanced space. The protests in our nation further reinforce the powerful idea of Community, the strength that can be found in unity, and the wisdom of the compassion we can express to one another as human beings. While this unique time lays bare many of the human and societal flaws that lurk below the surface of our daily routines, this time also reveals that large-scale change can begin when individuals join together as one community and one voice.

As a scientific community, we work together to bring our knowledge and talent to bear on some of the most important challenges confronting the Department of Defense today. This newsletter will highlight research within our community to address COVID-19. Additionally, it is worth noting that many aspects of our human systems S&T portfolio-- training, assessment, resilience, and teams research—provide solutions and a path forward to ensure the DoD is diverse, inclusive, healthy, and a representation of the society it is called to defend.

Be safe, be well, be kind, and above all, be human. ***Dr. Michelle Zbylut, Army Research Institute, HS CoI Chair.***

The DoD has been actively engaged in supporting the national COVID-19 efforts on a variety of fronts. The Air Force Research Laboratory has pivoted several of its in-house R&D activities towards supporting the DoD and the nation during this crisis. The COVID-19 Innovation Cell at the 711th Human Performance Wing within the Air Force Research Laboratory (AFRL) coordinates and supports COVID-19 related requests as well as providing subject matter experts to MAJCOMs, the Defense Health Agency and other service partners. Some specific activities supporting COVID-19 operational needs include collaborating with DoD, National Institute of Health and commercial partners on addressing SARS--CoV-2 testing using serology and nucleic acid assays, and providing biodynamic assessment of portable bio-containment care module for patient transport on C-17 aircraft. Our Airman Data and Performance Tracking System (ADAPTS) tool is been used to remotely monitor COVID-19 symptoms among airmen undergoing quarantine prior to deployment, allowing the medical group staff to quickly identify an airman with positive symptoms and intervene. Our explainable artificial intelligence laboratory (ExAIL) has built a COVID-19 pandemic epidemiological modeling and visualization dashboard. These are among several of our in-house R&D efforts applied towards COVID-19. The technical expertise residing within AFRL along with our network of DoD partners, industry, and academia has enabled us to be responsive to urgent needs for dealing with the pandemic. ***Dr. Rajesh Naik, Chief Scientist, 711th Human Performance Wing at AFRL.***

Hails/Farewells & News

Hail - Dr. Thomas Davis, Chief of the Human Systems Integration Division at the Army's Data Analysis Center, will be replacing Dr. Pat Baker on our CoI Steering Group. We look forward to his insights and expertise—welcome!

News - We've sent out "Save the dates" of Sept 1-3 for our 2020 HS CoI Annual meeting. As of this publication, it's virtual — but stay tuned!

Feedback: Please send comments to our Newsletter Editor: Alan.Livada.ctr@us.af.mil

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HUMAN SYSTEMS CoI

https://defenseinnovationmarketplace.dtic.mil/communities-of-interest/human-systems/

Vision: Develop & deliver technologies to enable, sustain, enhance and quantify human performance for measurably improved mission effectiveness

Mission: Enhance mission effectiveness through: 1) Integrated simulations for mission training and experimentation, 2) Human-machine designs for mission effectiveness, 3) Assessment of operator effectiveness, 4) Operating through battlespace stresses, and 5) Mastering the PMESII battle space.

Key Products: Integrated service roadmaps; CoI taxonomy, budget & programs; seedling and tri-service ARAP proposals, collaboration opportunities and success stories.

Key Personnel
OSD Chair: Dr. Ben Petro, USD (R&E)
COI Chair: Dr. Michelle Zbylut, ARI
Navy Lead: Dr. John Tangney, ONR
Air Force Lead: Dr. Kevin Geiss, AFRL
Army Lead: Dr. Corde Lane, ARL
Army Lead: Dr. Robb Wilcox, ARL
SOCOM Rep: Ms. Lisa Sanders, SOCOM
WG Chair: Dr. Kelly Ervin, ARI
PAE&T Lead: Dr. Kendy Vierling, USMC
SICP Lead: Dr. Mark Draper, AFRL
PSWP Leads: Dr. Peter Squire, ONR Dr. Mike LaFiandra, ARL

Major Annual Events/Activities 2020	
Reliance 21 Annual Overview	Jan
NDIA Human Systems Conference & Ft Belvoir Steering Group Meeting	Mar
NDIA S&ET Conference (Cancelled)	May
ARAP Winner Announced	May
Seedling Proposal Data Call	TBD
COI Steering Group/All Hands Meeting	Sept
Human Factors Engineering TAG	Nov/Dec
I/ITSEC	Nov/Dec

CoI Highlights - Past Events

Applied Research for the Advancement of S&T Priorities (ARAP) Call. As we mentioned in the last Newsletter, though well–received our candidate "Human and Autonomous System Teaming Ecosystem (HASTE)" was not selected by OSD. In May, the winner was announced from the Advanced Electronics CoI and was titled "A Combined Development Pipeline for Novel Neuromorphic Hardware". POC: Katie Smith Stilling, Strategic Analysis, kstilling@sainc.com

CoI Highlights - "*Next Up*"

Department of Defense Human Factors Engineering Technical Advisory Group (HFE TAG) Virtual Event. This fall, the HFE TAG will occur via an online collaboration tool such as Microsoft Teams with a dial-in option for redundancy and easier connectivity. For this one-day event, the HFE TAG Executive Committee and Operating Board will contact authors who previously submitted abstracts to gauge their level of interest in presenting for this event. The date will be selected based on authors' responses and will most likely occur in November. Although DoD HFE TAG meetings typically are not open to the general public, this virtual event will be open to all interested individuals with the virtual presentations at Distribution A.

Continue to check https://rt.cto.mil/ddre-rt/dd-rtl/hfetag/meetings/and social media @DoDHFETAG for updates or feel free to contact Dr. Ben Petro (HFE TAG Proponent) or Dr. Liana Algarín (HFE TAG Coordinator). POC: Dr. Liana Algarín, OSD, liana.m.algarin.ctr@mail.mil

HS CoI Strategic Communications Documents. The HS CoI Project Team is working with the CoI Chair Dr. Michelle Zbylut to craft the first in a series of strategic communications to stakeholders, partners and customers. The initial documents are meant to provide awareness about the CoI and the Human Systems S&T enterprise we represent by communicating our mission, vision, and lab membership as well as the enterprise's core capabilities, major investment areas, and intended future Warfighter capabilities. POC: Dr. Carolyn Parish, MITRE, cparish@mitre.org

From Our Stakeholders and Partners

Human Systems Integration in Adaptive Acquisition Framework Pathways Workshop. Even though the HFE TAG in-person event did not occur as planned in May due to COVID-19, one of its planned workshops successfully occurred via virtual format. On May 8th, the Naval Postgraduate School hosted the Human Systems Integration (HSI) in Adaptive Acquisition Framework Pathways Workshop. Human Factors Engineers and HSI practitioners from each of the Services and various agencies participated via Zoom or a dial-in phone number.

The objective of this workshop was to discuss and plan how the DoD's revised acquisition process described in DoD Directive 5000.01 and DoD Instruction 5000.02 will impact acquisition programs and their HSI activities. Six break-out groups identified key HSI activities, tools, techniques, approaches, and methods for each of the acquisition pathways: (1) urgent capability acquisition, (2) middle tier acquisition, (3) major capability acquisition, (4) software acquisition, (5) defense business systems, and (6) acquisition of services. Final deliverables from this workshop and each group's subsequent effort will be shared in HSI training and education programs, as well as HSI policy and guidance updates. POC: Dr. Liana Algarín, HFE TAG Coordinator, liana.m.algarin.ctr@mail.mil

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From Our Stakeholders and Partners (Continued)

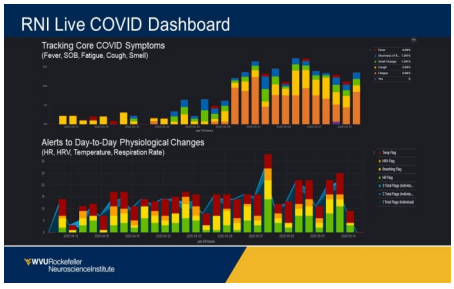
DoD Instruction (DoDI) 3216.02, "Protection of Human Subjects and Adherence to Ethical Standards in DoD Conducted and Supported Research". Published in April, the reissued instruction establishes policy, assigns responsibilities, and provides procedures for protection of human subjects in DoD conducted and supported research. It implements the recently revised "Federal Policy for the Protection of Human Subjects" — informally known as the "Common Rule" — as well as captures efficiencies, reduces previous DoD administrative burdens, and decreases research delays along with their associated costs.

Institutional Human Research Protections Program (HRPP) offices and their corresponding DoD Component Offices will direct specifically how these efficiencies are realized in their research programs. The DoD Office for Human Research Protections within the Office of the Under Secretary for Research and Engineering's Human Systems Directorate is responsible for the implementation of the revised instruction and DoD-wide HRPP. The reissued DoDI 3216.02 can be found on the DoD Issuances website: http://www.esd.whs.mil/Directives/Recent-Publications/. POC: Dr. Liana Algarín, OSD, liana.m.algarin.ctr@mail.mil

SPECIAL THEME: COVID-19

711 HPW COVID-19 Innovation Cell (CIC). A team co-led by the Air Force Medical Service (AFMS) Chief Scientist and 711 HPW Chief Scientist have been reviewing numerous COVID-19 related developmental and technology push initiatives. The CIC includes key members connected to the ASBREM CoI Medical Countermeasures Task Force, the Biomedical Advanced Research and Development Authority COVID response team, and Air Force Warfighting Integration Capability (AFWIC) and is integrated with both the Department of the Air Force and the Defense Health Agency (DHA). In this role, the CIC is the focal point for R&D idea submissions and assessment — with over 70+ submissions tracked and assessed by the team. Submissions have also been forwarded for further consideration to DHA and both AFWERX and AF Ventures which are Air Force vehicles for accelerating technology innovation. Finally, the team provided an assessment on serological testing kits to the Air Force Surgeon General. POC: Dr. Rajesh Naik, 711 HPW/CL, rajesh.naik@us.af.mil

ONR COVID-19 Detection Study. The Office of Naval Research Code 34 Human Performance Training & Education Program-funded performer, West Virginia University - Rockefeller Neuroscience Institute (WVU - RNI), announced in April a national study designed to accelerate early detection of the COVID-19 virus. The novel technology product, the Oura Ring, is being leveraged by WVU -RNI and utilizes an artificial intelligence-driven predictive model and a COVID-19 monitoring app. This enables RNI scientists in the development of an innovative approach that potentially can identify infected frontline healthcare professionals before they become symptomatic; a key monitoring-capability breakthrough.



Over three weeks, Oura Rings + RNI COVID-19 smartphone apps have been deployed and monitored more than 1,000 physicians, nurses and other healthcare workers with exposure to COVID-19 in Emergency Departments, ICUs, testing sites, and urgent care settings within West Virginia and across the Nation including New York City, Philadelphia, Nashville and other critical emerging areas. Currently, the WVU - RNI COVID-19 Artificial Intelligence-driven models are predicting symptomology 24-hours prior to onset with the intent of 3-day early identification. The Oura Ring's continuous data-feed of the autonomic nervous system, fatigue, sleep and circadian rhythm metrics is also undergoing Test & Evaluation at the School of Infantry - East, Human Performance Center and in the assessment of a Marine's recovery from stressors within the training and education environment. These are key milestones for the technology-product under two different auspices; healthcare mitigation and human performance recovery, illustrating a critical COTS enabling capability that's scalable, flexible and easily integrated into various frontline operations. POC: Dr. Peter Squire, Office of Naval Research, peter.squire@navy.mil

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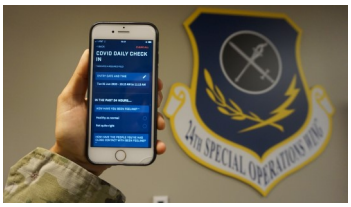
SPECIAL THEME: COVID-19



711 HPW Performance Assessment Platform Modified for Special Tactics Units and Medical Groups for COVID-19 Tracking. ADAPTS, which stands for Airman Data Analysis and Performance Tracking System, is a performance monitoring platform that includes mobile applications for fitness, wearable sensors for physiological monitoring, prediction analytics and visualizations. In the fight against COVID-19, the Smartabase software component of ADAPTS has emerged as a versatile tool for monitoring symptoms while Airmen are placed in quarantine. Unit command and medical personnel can use the Smartabase mobile application and internet website to remotely track and monitor COVID-19 symptoms and intervene if problems are detected.

This new COVID-19 monitoring capability is in use by the AFSOC 24th Special Operations Wing, 1st Special Operations Medical Group (SOMDG), and the 27th SOMDG. In the near future, this capability will be extended to deployed locations in need of rapid COVID-19 monitoring. In addition, ADAPTS was recently integrated with Battlefield Assisted Trauma Distributed Observation Kit (BATDOK), another key 711 HPW capability which is a rugged, low cost, easy to use in the field patient monitoring system. This pairs the existing daily monitoring capability of ADAPTS with the second-by-second monitoring capability of BATDOK if required.

Finally, 711 HPW has continued its planned rollout of ADAPTS for AFSPECWARFARE, now including 15 squadrons serving more than 3,000+ operators. The success of this rollout has resulted in Special Operations Command's (SOCOM) Preservation of the Force and Family program adopting the Smartabase build as its template for all units, with the enterprise rollout for SOCOM beginning later this summer. POC: Dr. Adam Strang, 711HPW, adam.strang.1@us.af.mil.

Measuring and Advancing Soldier Tactical Readiness and Effectiveness (MASTR-E). Collaborating on a COTS sensor-based study to advance COVID-19 early predictors and human performance research, the US Army Combat Capabilities Development Command Soldier Center (CCDC SC) MASTR-E Program will lead a symptomology and physiology data collection in active duty military cohort to support model development and testing of susceptibility to illness predictive algorithms. This tri-service (CCDC SC, Naval Health and Research Center (NHRC), and Air Force Research Laboratory (AFRL)) team, along with academia, will support U.S. Army Medical Research and Development Command's (MRDC's) Military Infectious Disease and Military Operational Medicine Research Program, by teaming with 4th Battalion, 31st Infantry Regiment, 2nd BCT, 10th Mountain Division (LI) to monitor up to 1000 Soldiers for a period of 1 year to understand how physiological, cognitive, and behavioral data can lead to understanding this susceptibility. This approach will enable short term targeted testing of the most vulnerable, maintain unit readiness, and support long term ideas of a predictive algorithm evaluation that enable screening and triage for unit members while maintaining the end objective of optimizing the human weapon system. POC: Joseph Patterson, joseph.e.patterson.civ@mail.mil

711 Human Performance Wing Solution for COVID-19 Testing. Researchers will be collaborating with the SAF/AQ COVID -19 Taskforce funded effort with Curative Labs and the National Institute of Health (NIH)/Gingko Bioworks on investigating existing and emerging testing methods to address COVID-19 R&D testing gaps by demonstrating scalable methods for antibody and infection detection. Immediate and scalable screening solutions are needed to maintain force readiness and quantify the epidemiological impact of DoD return-to-work efforts despite laboratory supply chain and throughput delays.

Researchers from the Wing will investigate existing and emerging testing methods by 1) collaborating with NIH to determine the number of people with detectable COVID-19 antibodies but no known exposure or confirmed clinical illness, and 2) validate and verify capacity of Next Generation Sequencing (NGS) at Ginkgo Bioworks as a novel detection method of active infections. Blood, saliva, and nasal swab samples along with screening questionnaires will be collected from a subset of the Wright-Patterson Air Force Base workforce. Using the NIH's validated ELISA protocol, up to 15,000 samples are to be fully analyzed within a 2-3 month period for the first aim. Simultaneously, Gingko's novel NGS approach will test a similar amount of workforce samples per day with the potential to phase up to several thousand per day. Given the rapid rate of technological advancements in detection speed, accuracy, and throughput, additional testing methods with FDA Emergency Use Approval will be considered for implementation throughout the duration of this study.
POC: Dr. Corey Hart, 711 HPW, corey.hart.5@us.af.mil

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COVID 19 (Continued)

Office of Naval Research Investigating Cross Domain Adaptive Training Data Collection at Marine Corps Intelligence School (MCIS). ONR's Human Performance Training & Education Program team members collected data with MCIS at Dam Neck in March as part of an experiment to test the efficacy of the flashcard-based adaptive training system. Over the course of the effort, 40 Marines awaiting training at MCIS participated in a 2-part experiment examining the impacts of adaptive sequencing and different flashcard dropping criteria on performance in an armored vehicle identification task. Ultimately, the data collected during this event and others will be used to determine an optimized adaptive training algorithm to increase the efficacy of flashcard training and provide additional training opportunities for Marines outside of a traditional classroom environment. Because of COVID-19, there has been a growing interest for remote training which this effort would be able to address as it relates to mass/rote learning. POC: Dr. Peter Squire, ONR, peter.squire@navy.mil

711 HPW Biodynamics Team Assessment of Portable Bio-Containment Care Module (PBCM) Proposed Medical Crew Seat. At the request of HQ Air Mobility Command (AMC), the Biodynamics Team under 711 HPW conducted an impact assessment to ensure the medical crew seats passed impact standards as defined in SAE AS8049 which resulted in a successful Operational Utility Evaluation for the PCBM. This module is designed to protect USAF crew and aircraft from any follow-on contamination from airmen and medical personnel who had been exposed to infectious diseases or biological agents such as COVID-19 and still allow the contaminated personnel to receive proper medical care during transport. In the assessment, two PBCM medical crew seats were successfully exposed to impacts on the horizontal sled and vertical tower research facilities at Wright Patterson Air Force Base.

The Biodynamics team is currently working on a summary report to provide documentation to all involved Program Offices, Laboratories, and Commands and is also providing advice on decontamination to AMC and AFOTEC (Air Force Test and Evaluation) as they develop a safety of flight test plan for the PBCM which is also currently used by the State Department to transport infectious individuals. The Air Force is also testing the module to ensure safety of flight on the C-17. POC: James Christensen, 711 HPW, james.christensen.7@us.af.mil

711 HPW Support on Bio-aerosol Flow Analysis on Aircraft. 711 HPW is providing expertise on aircraft airflow modeling in consideration of bio-aerosol transport to identify potential risk to air crews and mitigation measures. The team is working with the Air Force Life Cycle Management Center (AFLCMC) to conduct 3-D mapping and airflow analysis of an 445th Air Wing C-17 to determine the unique flow characteristics within the cargo hold area to model coronavirus dispersion and exposure. This will inform AFLCMC and Air Mobility Command protection decisions for C-17 crew and passengers if transport of COVID-19 positive patients is required and isolation units are not available.

The team also scanned the geometry and collected boundary condition data for five additional airframes, including the KC-135, C-130J, C-5, KC-10 and KC-46 at a Nebraska Air National Guard base, and LCMC will support with high-powered computers conducting model analysis. The next step is to use the geometry and boundary condition data to build computational fluid dynamics models for airflow and bio-aerosol transport in the air mobility airframes evaluated. POC: Dr. Chrissy Duran, 711 HPW, christin.duran@us.af.mil

US Army Combat Capabilities Development Command Simulation and Training Technology Center (CCDC-SC-STTC) Leverages Collaboration Visualization Tools to Help Stop the Spread of COVID-19. The federal government needs to optimize the communication of information by scaling from local to Federal governments and beyond to manage the COVID-19 pandemic and similar future pandemics. Most local governments are prepared to attack the problem with a unified command solution, but in the case of COVID-19 each unified command needs to be able to communicate with those above, below, and potentially neighboring it (i.e., at jurisdictional borders). Therefore, the Army is developing a low-cost capability to visualize operations using COTS hardware and Government-owned software. A wide range of technologies are being used to visualize geospatial data for training, mission planning, mission command, and after action reviews that can be readily adapted to support the needs of organizations in achieving a coordinated response to COVID-19. POCs: Charles Amburn, CCDC-SC-STTC, charles.r.amburn.civ@mail.mil and Rodney Long, CCDC-SC-STTC, rodney.a.long3.civ@mail.mil.

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COVID 19 (Continued)

711 HPW Researchers Lead Collaboration on Non-invasive COVID-19 Detection. Responding to a request from Air Force Warfighting Integration Capability (AFWIC), 711 HPW led an effort to plan and execute a study aimed at developing a capability for rapid, on-site breath-based detection COVID-19 infection in collaboration with a small business partner. The Wing was specifically requested to lead a study design, Institutional Review Board approval, risk mitigation efforts, and transition strategy by the AFWIC Disruptive Technology Core Function Task Lead. The supporting team consisted of scientists and medical professionals across the Airman Systems Directorate and the University of Cincinnati Medical Center. The team identified biomarkers and associated artificial intelligence analytics approaches that have the ability to transform current best practice test capabilities for COVID-19 — non-invasive on-site detection performed in less than 7 seconds — with the potential to transition in less than 6 months to Air Force owned portable detection technologies deployed to medical centers. POC: Dr. Jennifer Martin, 711 HPW, jennifer.martin.39@us.af.mil

Department of the Air Force Acquisition Task Force (DAF ACT) for COVID-19 supported by 711 HPW. In March, the Acquisition Task Force initiated a request to look at our ability to engage the U.S. industrial base during these unprecedented times. There were four lines of effort: 1) *relief* for external assistance requirements; 2) *resilience* for defense industrial base; 3) *recovery* for consolidating funding requests that minimize program impacts; and 4) *rapid* for large-scale rapid small business contracts across all lines of effort. The Wing was responsive to the DAF ACT by volunteering to evaluate 293 small businesses in the rapid line of effort outlined by the Assistant Secretary of the Air Force, Dr. Roper. From those evaluations, the team aided development of a contact tracing program for the Air Force to help combat the spread of COVID-19. Additionally, the team developed a proposal routing algorithm utilizing recent advances in deep learning to automate judge to proposal matching and efficiency strategies in general. The routing algorithm continues to this day within the Joint Acquisition Task Force for COVID-19. POC: Dr. Brian Geier, 711 HPW, brian.geier.2@us.af.mil

Publications (Editor's Note: These are not intended as Covid –19 related topics)

Immersive Technology Used in Virtual Environment Training. Pollard KA, Oiknine AH, Files BT, Sinatra AM, Patton D, Ericson M, & Khooshabeh P "Level of immersion affects spatial learning in virtual environments: Results of a three-condition within-subjects study with long intersession intervals." 2020 Virtual Reality. https://doi.org/10.1007/s10055-019-00411-y

Abstract: US Army Combat Capabilities Development Command Soldier Center (CCDCSC) and Army Research Labs) (ARL) researchers, in collaboration with the University of Minnesota, University of California Santa Barbara, CCDC-Data Analysis Center, and CCDC- Soldier Center published an article in the journal "Virtual Reality (VR)." The complex multi-condition, with-in-subjects study revealed the level of immersive technology used in virtual environment training (e.g., a head mounted VR display with simulated audio effects versus a desktop monitor with simpler audio) affected learning outcomes for different types of tasks. The work highlights the value of within-subjects design in virtual training research, showing complex relationships that would have been missed under a simpler between-subjects or fewer condition design. This work supports the Army Modernization Priority of Soldier Lethality by contributing fundamental knowledge to inform smarter, cost effective use of advanced Soldier training technologies. The University of Southern California and the Institute for Creative Technologies are currently using these findings and an ARL- developed training and assessment testbed to further study spatial task training in virtual environments. POC: Dr. Kimberly Pollard, CCDC-ARL, kimberly.a.pollard.civ@mail.mil

Role of Gut Microbiota on Stress. Joshua M. Lyte, Cassandra E. Gheorghe, Michael S. Goodson, Nancy Kelley-Loughnane, Timothy G. Dinan, John F. Cryan, and Gerard Clarke (2020) 'Gut-Brain Axis Serotonergic Responses to Acute Stress Exposure are Microbiome-Dependent'. Neurogastroenterology and Motility (in press). doi: 10.1111/nmo.13881.

Abstract: The impact of stress on host physiology involves the recruitment of a variety of systems, including microbiota-gut-brain axis and neuroendocrine pathways. Serotonin is an important neurotransmitter within both the gastrointestinal (GI) tract and central nervous system and plays a key role in the adaptive response of the host to stress. Using germ-free and conventionally raised mice, this study is the first demonstration that gut microbiota regulates serotonin production and metabolism at both ends of the gut-brain axis in response to acute stress, and does so with a high degree of temporal and regional specificity. Understanding the role of the gut microbiome in stress-related alterations of host physiology has potential functional and translational implications. POC: Dr. Michael Goodson, 711 HPW, michael.goodson.4@us.af.mil

Publications (Continued)

Engineering Probiotics for Therapeutic Applications. Nikhil Aggarwal, Amy M. Ehrenworth Breedon, Christina M. Davis, In Young Hwang, and Matthew Wook Chang (2020) 'Engineering probiotics for therapeutic applications: recent examples and translational outlook'. Current Opinions in Biotechnology (in press). doi: 10.1016/j.copbio.2020.02.016.

Abstract: Engineered probiotics are the next generation of live bio-therapeutics that have been genetically modified to target specific diseases. With the advancements in synthetic biology, the engineering of probiotics has become increasingly sophisticated and has led to the development of therapies for treating cancer, infection, metabolic disorders and inflammation, as well as for diagnosing and preventing them. This paper reviews recent examples of probiotics which have been engineered to target such diseases; however, even though engineered probiotics show efficacy in animal models there are very few in clinical trials and no approved products on the market. Features that may be incorporated into engineered probiotics to aid in clinical translation are discussed so that the potential of these bio-therapeutics will ultimately be realized. POC: Dr. Michael Goodson, 711 HPW, michael.goodson.4@us.af.mil

Learning Performance in Immersive Virtual Reality (VR) systems. Parong J, Pollard KA, Files BT, Oiknine AH, Sinatra AM, Moss JD, Passaro A, Khooshabeh P. "The Mediating Role of Presence Differs Across Types of Spatial Learning in Immersive Technologies." 2020 Computers in Human Behavior 107 article 106290

Abstract: US Army Combat Capabilities Development Command (CCDC) and Army Research Lab (ARL) researchers, in collaboration with academia, had an article accepted for publication in the journal Computers in Human Behavior. In this peer-reviewed article, they examined learning performance in immersive virtual reality systems. This work uncovered that the degree of experienced presence (the psychological experience of "being there") in the virtual environment helped predict learning performance, but only for the most difficult spatial and navigational tasks. This work also supports the Army Modernization Priority of Soldier Lethality by contributing fundamental knowledge about spatial learning in VR technology, allowing smarter and more cost effective training to improve Soldier performance. Way forward: An academic partner is now using these findings and CCDC-ARL's developed testbed to further study the effects of social presence on learning in immersive VR. POC: Dr. Kimberly Pollard, CCDC - ARL, kimberly.a.pollard.civ@mail.mil.

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Jul 2020

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