Chemical Countermeasures Research Program

Background

The Chemical Countermeasures Research Program (CCRP) is a U.S. Department of Health and Human Services (HHS) and National Institutes of Health (NIH) initiative administered by NIAID. The program supports discovery research and early-stage therapeutic development to improve national health preparedness and medical response to high consequence civilian chemical emergencies.

The CCRP operates within the Public Health Emergency Medical Countermeasures Enterprise (PHEMCE), the federal partnership that coordinates the nation's medical preparedness and response to public health threats. The CCRP focuses on chemicals the Department of Homeland Security has designated as public health Chemical of Concern (CoCs).

CCRP provides funding and research support to help scientists develop new treatments for injuries caused by toxic CoC exposures. The initiative supports projects spanning basic research through applied and translational studies, moving promising discoveries toward real-world medical use to protect and save American lives.

CCRP is a collaborative network of academic institutions, industry partners, and federal laboratories. The initiative leverages the strengths of multiple NIH Institutes and Centers to support basic research to understand how CoC affects human health through early translational drug development, i.e., medical countermeasures (MCM). The program maintains a coordinated, trans-NIH research infrastructure that includes contracts, interagency partnerships with the Department of Defense (DoD) and HHS, and extramural grants for investigator-initiated research. Participating NIH partners include the National Institute of Environmental Health Sciences (NIEHS), National Eye Institute (NEI), National Institute on Drug Abuse (NIDA), National Institute of Neurological Disorders and Stroke (NINDS), National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), National Heart, Lung, and Blood Institute (NHLBI), and the National Center for Advancing Translational Sciences (NCATS). Together, these partnerships strengthen the nation's scientific foundation for responding to chemical threats and public health emergencies.

By translating innovative scientific advances into practical medical solutions, CCRP strengthens the nation's ability to prepare for, respond to, and recover from chemical emergencies to protect public health, enhance medical readiness, and improve national resilience.

Chemicals of Concern

The civilian chemical threat spectrum includes a wide range of hazardous substances, such as toxic industrial chemicals and materials, pharmaceutical-based compounds, and other substances with the potential to cause serious harm to public health.

CoCs can affect the body in different ways, i.e., toxidromes, including:

- **Pulmonary, irritant, and corrosive agents** that target the respiratory tract and damage the lungs and airways, potentially causing breathing difficulties or long-term lung disease
- **Pharmaceutical-based agents**, e.g., substances that depress breathing or temporarily incapacitate individuals
- **Blistering (vesicant) agents** that may cause dermal and ocular pathologies
- **Cellular respiration inhibitors**, such as blood (cyano agents & Kreb cycle poisons), hemolytic, and metabolic (heavy and non- metals) agents that interfere with the body's ability to use oxygen or disrupt normal metabolic processes
- **Cholinergic, convulsant, encephalopathic, and sympathomimetic/stimulant agents** that target the nervous system causing seizures, nerve damage, or long-term brain injury
- **Other specialized agents**, such as those that interfere with normal blood clotting

Research Priority Areas

- **Basic research** to better understand how CoC exposures cause immediate and/or long-term chronic harm at the molecular and cellular level. This includes model developments, identifying biological markers of exposure and validating potential treatments to reduce or prevent damage after exposure.
- **Applied research** to develop and improve laboratory screening tools that identify promising therapeutics. This work also includes creating and refining models that help researchers study the progression of CoC-related injuries and evaluate the effectiveness of new treatments in living systems.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health
National Institute of Allergy and Infectious Diseases

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CCRP Notices of Funding Opportunity include:

- **FOR-TR-27-004**: Intramural - Extramural Collaboration for Advanced 3-D Tissue Models for Drug Screening
- **PAR-27-083**: NIAID Resource-Related Research Projects (R24)
- **PAR-27-075**: CCRP Initiative - Promoting a Basic Understanding of Chemical Threats to Skin (R01)
- **PAR-25-296**: Limited Competition: CTSA Program: Collaborative and Innovative Acceleration Award (UG3/ UH3)
- **PAR-25-077:** CCRP Initiative - Basic Research on Chemical Threats that Affect the Nervous System (R01)
- **RFA-AI-27-014**: Development of Candidate Medical Countermeasures (MCMs) and Technologies Against Chemical or Radiation/Nuclear (CRN) Threats
- **RFA-DA-26-034:** CCRP Initiative - Basic Research on The Deleterious Effects of Acute Exposure to Ultra-Potent Synthetic (UPS) Opioids (R01)
- **RFA-HL-26-018**: Catalyze - Product Definition for Small Molecules, Biologics, and Combination Products - Preliminary Product/Lead Series Identification and Combination Product Prototype (R33)
- **RFA-HL-26-017**: Catalyze - Product Definition for Small Molecules, Biologics and Combination Products - Target Identification and Validation, and Preliminary Product/Lead Series Identification (R61/R33)
- **PA-25-304:** NIH Exploratory/Developmental Research Project Grant (Parent R21)
- **PA-25-301**: NIH Research Project Grant (Parent R01)
- **PA-25-093**: Limited Competition: Promoting a Basic Understanding of Chemical Threats to Skin (R34)
- **PA-25-080**: NIH Support for Conferences and Scientific Meetings (Parent R13)
- **PA-27-100**/**PA-27-101**/**PA-27-102**: NIH Small Business Innovation Research / Technology Transfer Grant (Parent SBIR [R43/R44] & STTR [R41/R42])

What We Offer — Product Development Support Services (PDSS)

- **NIH NCATS Division of Preclinical Innovation (DPI)**
  - Translational Science Support and Resources
    - 3-D Tissue Bioprinting, Analytical Chemistry, Assay Development and Screening Technology, Compound Management, Informatics, Chemistry Technology, and more
- **Pre-Clinical Efficacy Evaluation Resources (PEER)**
  - Limited exploratory efficacy evaluation
- **Pre-Clinical Development Resources (PDR)**
  - Non-Good Laboratory Practice (GLP)/Good Manufacturing Practice (GMP) Absorption, Distribution, Metabolism, Excretion (ADME), and Toxicity (ADME-Tox) Services
  - Chemistry and Manufacturing Services (CMC)
  - Development/Review of pre-clinical and/or Product Development Plans

What We Offer – Guidance to Academic, Commercial, and Government Investigators

NIH encourages investigators to consult with CCRP program staff for guidance on advancing potential models and therapies across the full development spectrum, from early-stage concepts and basic research, through discovery, and into the initial stages of product development.

Who To Contact

Based on the research topic, CCRP staff can connect investigators with appropriate NIH program officials and other U.S. government partners, such as BARDA, FDA, and the Department of Defense, that support emergency preparedness and advanced MCM research and development. For more information, contact niaidccrp@mail.nih.gov

Also see: **The National Institutes of Health Chemical Countermeasures Research Program (NIH CCRP): A Collaborative Opportunity to Develop Effective and Accessible Chemical Medical Countermeasures for the American People**. *Drug Dev Res*. 81 (8): 907-10. DOI: 10.1002/ddr.21707

Additional Information

- **Chemical Countermeasures Research Program (CCRP) -** https://www.niaid.nih.gov/research/chemical-countermeasures-program
- **Administration for Strategic Preparedness & Response (ASPR) –** https://aspr.hhs.gov/Pages/Home.aspx
- **HHS Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) -** https://aspr.hhs.gov/phemce/Pages/default.aspx
- **Center for the Biomedical Advanced Research and Development Authority (BARDA) -** https://aspr.hhs.gov/AboutASPR/ProgramOffices/BARDA/Pages/default.aspx
- **CBRN Chemical Medical Countermeasures Program -** https://www.medicalcountermeasures.gov/barda/cbrn/chemical-medical-countermeasures
- **Radiation and Nuclear Countermeasures Program (RNCP) -** https://www.niaid.nih.gov/research/radiation-nuclear-countermeasures-program
- **NIH NHLBI Catalyze Program -** https://www.nhlbi.nih.gov/grants-and-training/funding-opportunities-and-contacts/NHLBI-Catalyze-Program
- **NIH NCATS Division of Preclinical Innovation (DPI) Research Activities and Resources -** https://ncats.nih.gov/research/research-activities?related_office%5B%5D=1#research-activities-at-NCATS
- **Wake Forest University Vesicant Exposure Resource and Coordination Core -** https://wfuvesicants.org/

NIAID

National Institutes of Health

CCRP Portfolio

Project Identifier (NIH RePORTER Description)	Project Title	Contact PI/Project Leader	Awardee Organization	Toxidrome of Interest
IAA (AOD26008-001)*	Role of Melanin in Dermal and Systemic Injuries Following Sulfur Mustard Exposure	DREWES, JULIA	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Vesicant Dermal (Sulfur Mustard)
R34 AR083572	Explant Human Skin Perfusion Model to Study Mechanisms of Chemical Injury and Mitigation	EJAZ, ASIM	UNIVERSITY OF PITTSBURGH AT PITTSBURGH	Vesicant Dermal (Nitrogen Mustard & Phenylarsine Oxide)
R34 AR084669	Integrated Spatial Omics to Elucidate Conserved Inflammatory Mechanisms of Vesicant-Induced Skin Injury	PRIDEAUX, BRENDAN (contact) FINNERTY, CELESTE CAMPBELL	UNIVERSITY OF TEXAS MED BR GALVESTON	Vesicant Dermal (Sulfur Mustard & Lewisite)
R34 AR084090	Coordinated Cytoskeletal and Cell Adhesion Dynamics in Vesicant Induced Skin Injury	WU, XIAOYANG	UNIVERSITY OF CHICAGO	Vesicant Dermal (Nitrogen Mustard & Phenylarsine Oxide)
R34 AR087022*	Understanding Mechanisms of Cell-Cell Exchange of Topically Exposed Chemicals of Concern Provoking Human Skin Injury, Hypodermal Damage, and Wound Disrepair	GHATAK, SUBHADIP (contact) KHANNA, SAVITA	UNIVERSITY OF PITTSBURGH	Vesicant Dermal (Nitrogen Mustard, Phenylarsine Oxide, & Aqueous Hydrochloric Acid)
R34 AR087629*	Glutamine Metabolism and Vesicant Pathogenesis	ARCHER, NATHAN K.	JOHNS HOPKINS UNIVERSITY	Vesicant Dermal (Nitrogen Mustard & Phenylarsine Oxide)
R21 AR087354*	cGas-STING pathway based medical countermeasure for vesicant skin injury	ATHAR, MOHAMMAD	UNIVERSITY OF ALABAMA AT BIRMINGHAM	Vesicant Dermal (Phenylarsine Oxide & Lewisite)
R21 AR087357*	Opioids Promote Wound Healing in Vesicant Induced Skin Injury	JOSEPH, LAURIE BETH (contact) PINTAR, JOHN E	RUTGERS BIOMEDICAL AND HEALTH SCIENCES	Vesicant Dermal (Nitrogen Mustard)
R56 AR084847*	Developing Multi-Functional Dressings for Treating Chemical Vesicant-induced Skin Injury	LI, HAICHANG (contact) GUAN, JIANJUN	OHIO STATE UNIVERSITY	Vesicant Dermal (Nitrogen Mustard)

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UG3 AR083022	Development of Small Molecule Inhibitors as Anti-Inflammatory Agents and Antidotes for Arsenicals	AUGELLI-SZAFRAN, CORINNE ELIZABETH	SOUTHERN RESEARCH INSTITUTE	Vesicant Dermal (Lewisite & Phenylarsine Oxide)
UH3 AR084667	Synthetic Melanin for Accelerating Wound Repair	LU, KURT (contact) GIANNESCHI, NATHAN CLAUDE	NORTHWESTERN UNIVERSITY AT CHICAGO	Vesicant Dermal (Nitrogen Mustard & Sulfur Mustard)
IAA (AOD26008 -001)	High Throughput Screen Model Development and Screening of the Human Druggable Genome for Acrolein Ocular Injury	RUFF, ALBERT	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Vesicant Ocular (Acrolein)
IAA (AOD26008-001)	A Recurrent Neural Network Approach to Predict Target Discovery: Modeling of Gene Expression and Pathway Dynamics in Chemical-Induced Corneal Injury	DINH, THANH CONG	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Vesicant Ocular (Chloropicrin, Hydrogen Fluoride & Sulfur Mustard)
R21 EY035970	Cytoprotective and Pro-regenerative Neuropeptide as Countermeasure to Mustard Gas Ocular Damage	CHEN, YIHE	SCHEPENS EYE RESEARCH INSTITUTE	Vesicant Ocular (Nitrogen Mustard)
R21 EY035975*	Translational Approaches for Ocular Injuries	KOMPELLA, UDAY B	UNIVERSITY OF COLORADO DENVER	Vesicant Ocular (Phenylarsine Oxide)
R21 EY037262*	PEDF-enriched Urine-derived Stem Cell Sheets for Corneal Wound Healing in Mustard Gas Injury	ZHANG, YUANYUAN	WAKE FOREST UNIVERSITY HEALTH SCIENCES	Vesicant Ocular (Sulfur Mustard)
R01 EY035215	Immune Mechanisms of Chronic Ocular Damage after Acute Exposure to Nitrogen Mustard	CHEN, YIHE	SCHEPENS EYE RESEARCH INSTITUTE	Vesicant Ocular (Nitrogen Mustard)
R01 EY035221	Pathophysiology of Chronic and Delayed Mustard Gas Keratopathy	DJALILIAN, ALI R	UNIVERSITY OF ILLINOIS AT CHICAGO	Vesicant Ocular (Nitrogen Mustard)
R01 EY037664	Corneal and Schwann Cell Mechanisms in Vesicant Injury	MOHAN, ROYCE	UNIVERSITY OF CONNECTICUT SCH OF MED/DNT	Vesicant Ocular (Nitrogen Mustard)
R01 EY037745	The Role of Sirt6 in Acrolein-Induced Ocular Injury	LIU, HUA (contact) MOTAMEDI, MASSOUD	UNIVERSITY OF TEXAS MEDICAL BR	Vesicant Ocular (Acrolein)

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R01 EY037653*	Ocular Mustard Keratopathy Elicits Induced Autophagy, which is Detrimental to the Cornea	PENG, HAN	NORTHWESTERN UNIVERSITY AT CHICAGO	Vesicant Ocular (Nitrogen Mustard)
R01 EY037652*	The Impact of Hypoxia on Mustard Vesicant-Induced Eye Injury	YIN, JIA	SCHEPENS EYE RESEARCH INSTITUTE	Vesicant Ocular (Sulfur Mustard & Nitrogen Mustard)
R01 EY037660*	Single Cell Determinants of Corneal Injury Progression Following Mustard Exposure	MCNUTT, PATRICK MICHAEL (contact) JIN, GUANGXU	WAKE FOREST UNIVERSITY HEALTH SCIENCES	Vesicant Ocular (Sulfur Mustard)
R56 EY037651*	Sphingolipid Signaling in Vesicating Ocular Injury	MANDAL, NAWAJES	UNIVERSITY OF TENNESSEE HEALTH SCI CTR	Vesicant Ocular (Nitrogen Mustard)
U01 EY032973	First Aid Medicine to Treat Vesicant Induced Corneal Injury	CHANDLER, HEATHER	OHIO STATE UNIVERSITY	Vesicant Ocular (Nitrogen Mustard & Sulfur Mustard)
UG3 EY036558	Fenofibrate Microemulsion for Treating Nitrogen Mustard Induced Corneal Injury	XU, QINGGUO (contact) MA, JIAN-XING	VIRGINIA COMMONWEALTH UNIVERSITY	Vesicant Ocular (Nitrogen Mustard)
U2C EY036984	Wake Forest University Vesicant Exposure Resource and Coordination Core	MCNUTT, PATRICK MICHAEL	WAKE FOREST UNIVERSITY HEALTH SCIENCES	Vesicant Ocular, Dermal, & Pulmonary (Sulfur Mustard, Toxic Industrial Materials & Related Chemicals)
IAA (AOD26010-001)	Evaluation Of Therapeutics for Sulfur Mustard-Induced Pulmonary Fibrosis and Bronchiolitis Obliterans	ZIMMERMAN, DANIELLE	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Pulmonary (Sulfur Mustard)
IAA (AOD26010-001)	Toxicological Profiling of Acute Inhaled Aerosolized Epichlorohydrin	TRESSLER, JUSTIN	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Pulmonary (Epichlorohydrin)
IAA (AOD26010-001)*	Investigating Monoisocyanate Acute Pulmonary Toxicity and Potential Therapeutics Through Air-Liquid Interface Model Approaches	STUECKLE, TODD	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Pulmonary (Methyl Isocyanate)

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R21 ES036166	Defining Molecular Target of Arsine Gas-Induced Acute Kidney Injury and Associated Morbidity	SRIVASTAVA, RITESH K	UNIVERSITY OF ALABAMA AT BIRMINGHAM	Pulmonary (Arsine)
R21 ES037250	Medical Countermeasures to Chlorine Exposure Based on GABA(A) Receptor Targeting	ARNOLD, ALEXANDER	UNIVERSITY OF WISCONSIN MILWAUKEE	Pulmonary (Chlorine)
R21 ES036419	Electrophilic Fatty Acids Reduce Chlorine-Lung Toxicity via Inhibition of Macrophage Activation	GOW, ANDREW J	RUTGERS BIOMEDICAL AND HEALTH SCIENCES	Pulmonary (Chlorine)
R21 ES037285*	Therapeutic potential for NPS-2143 as treatment for chlorine induced lung edema	LAZRAK, AHMED	UNIVERSITY OF ALABAMA AT BIRMINGHAM	Pulmonary (Chlorine)
R21 ES037516*	2-Arachidonoylglycerol Signaling in Nitrogen Mustard-Induced Lung Injury	NAGRE, NAGARAJA	OLD DOMINION UNIVERSITY	Pulmonary (Nitrogen Mustard)
R01 ES036518	Role of Proteolytic Extracellular Vesicles in Halogen Gas Dependent Chronic Lung Injury	PATEL, RAKESH P (contact) GENSCHMER, KRISTOPHER R	UNIVERSITY OF ALABAMA AT BIRMINGHAM	Pulmonary (Chlorine & Bromine)
R01 ES037601	Mast Cell Activation as a Common Mechanism of Pulmonary Toxicity by Chemical Threat Agents	BROWN, JARED MICHAEL (contact) BAUER, ALISON K TEWARI-SINGH, NEERA	UNIVERSITY OF COLORADO DENVER	Pulmonary (Chloropicrin & Formaldehyde)
R01 ES037611	Studying The Mechanisms of Delayed Lung Injury Post-Arsenical Exposures	SUROLIA, RANU	UNIVERSITY OF ALABAMA AT BIRMINGHAM	Pulmonary (Lewisite, Phenylarsine Oxide, & Arsenic Trioxide)
R01 ES036487*	Electrophilic Halogenated Fatty Aldehydes Target Erythrocytes to Mediate Halogen Toxicity	FORD, DAVID A (contact) PATEL, RAKESH P	ST LOUIS UNIVERSITY, SCH OF MEDICINE	Pulmonary (Chlorine & Bromine)
R01 ES036491*	Identifying Mechanisms of Lung Toxicity from Skin Exposure to Vesicants	TEWARI-SINGH, NEERA (contact) BROWN, JARED MICHAEL	MICHIGAN STATE UNIVERSITY HEALTH SCIENCES	Pulmonary (Phosgene Oxime & Nitrogen Mustard)
R01 ES037603*	Preserving Lung Integrity and Harnessing Inflammation to Treat Vesicant-Induced Lung Injury	CAI, CHUANXI (contact) MCNUTT, PATRICK MICHAEL	UNIVERSITY OF VIRGINIA	Pulmonary (Sulfur Mustard & Nitrogen Mustard)

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U01 ES033263	Novel Lead Compound Advancement for Mitigating Halogen-Induced Mortality and Morbidity	AHMAD, SHAMA	UNIVERSITY OF ALABAMA AT BIRMINGHAM	Pulmonary (Chlorine & Bromine)
UG3 ES035689	Identification and Optimization of Medical Countermeasures for Phosgene Inhalation Injuries	ACHANTA, SATYANARAYANA	DUKE UNIVERSITY	Pulmonary (Phosgene)
R01 HL031197	Mitochondrial DNA Injury Is a Key Contributor to The Development of Chemical Lung Injury	MATALON, SADIS	UNIVERSITY OF ALABAMA AT BIRMINGHAM	Pulmonary (Chlorine)
IAA (NAI26017-001)*	Countermeasure Understanding Through Biological Evaluation Using Organoids and Multi-Dimensional Integrated Cellular Systems (CUBE-OMICS)	KIDAMBI, SRIVATSAN (contact) COLLINS, JACKIE	NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES	Pulmonary (Chlorine)
IAA (NHL26015-001)*	A Non-Invasive Prognostic Biomarker – Circulating Cell-Free DNA (cfDNA) – For Early Risk Stratification for Acute Lung Injury Following Chlorine Exposure	AGBOR-ENOH, SEAN (contact) MATTHEW, JOBY	NATIONAL HEART, LUNG, AND BLOOD INSTITUTE	Pulmonary (Chlorine)
IAA (AOD26010-001)	Inhaled Carfentanil Aerosol or Powder in African Green Monkeys: Toxicity Characterization and Efficacy of Treatments	MYERS, TODD	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Pharmaceutical-based Agent (Carfentanil)
IAA (AOD26010-001)	Investigating the Toxicology of Potent Synthetic Opioids and the Efficacy of FDA Approved Antagonists	RACINE, MICHELLE	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Pharmaceutical-based Agent (Acetylfentanyl, Etonitazene, Metonitazene, & Isonitazene)
IAA (AOD26010-001)	Characterization of Nitazene Kinetics and Toxicity: Therapeutic Efficacy of Available Opioid Antagonists	WESLEY, KATHERINE	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Pharmaceutical-based Agent (Etonitazene, Metonitazene, & Isonitazene)

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R21 DA057513	Functional Efficacy of Cannabidiol in Modulating the Abuse Liability and Adverse Effects of Opioids in Primates	KO, MEI-CHUAN	UNIVERSITY OF PITTSBURGH AT PITTSBURGH	Pharmaceutical-based Agent (Diacetylmorphine)
R21 DA061319	Fentanyl and Xylazine Interactions: Toxicity Produced by "Tranq-Dope"	SMITH, MARK	DAVIDSON COLLEGE	Pharmaceutical-based Agent (Fentanyl, Heroin, Carfentanil, Xylazine, & Medetomidine)
R21 DA065818*	Targeting PDGFR-β to Prevent Opioid-Induced Respiratory Depression and Overdoses Death	PUIG, STEPHANIE	UNIV OF MASSACHUSETTS MED SCH WORCESTER	Pharmaceutical-based Agent (Fentanyl)
R21 DA066888*	Protein Target Identification of Nitazenes and Their Metabolites Using Structural and Chemoproteomics	LIN, VIVIAN S (contact) MELCHIOR, JOHN	BATTELLE PACIFIC NORTHWEST LABORATORIES	Pharmaceutical-based Agent (Nitazenes)
R01 DA056658	Transcriptomic Single-Cell Profiling in Breathing-Specific Parabrachial Mu-Opioid Receptor Neurons	HAN, SUNG	SALK INSTITUTE FOR BIOLOGICAL STUDIES	Pharmaceutical-based Agent (Fentanyl)
R01 DA061320	Serotonin Mechanisms in Fentanyl-Induced Respiratory Depression	LEVITT, ERICA SAWYER	UNIVERSITY OF MICHIGAN AT ANN ARBOR	Pharmaceutical-based Agent (Fentanyl)
R01 DA061412	Investigating The Mechanistic Consequences of Fentanyl-Induced Hypoxia and Cardiorespiratory Collapse	GARCIA, ALFREDO J (contact) SHARP, WILLARD WILLIAM	UNIVERSITY OF CHICAGO	Pharmaceutical-based Agent (Fentanyl)
R01 DA061769	Development of Computational and AI/ML Tools to Accelerate Discovery of Vaccines and Antibodies Against Nitazenes and Fentanyl Analogs	PRAVETONI, MARCO	UNIVERSITY OF WASHINGTON	Pharmaceutical-based Agent (Fentanyl & Nitazenes)
R01 DA063220	Dissecting the Mechanisms Underlying Fentanyl-Induced Cardiorespiratory Depression	MORON-CONCEPCION, JOSE A	WASHINGTON UNIVERSITY	Pharmaceutical-based Agent (Fentanyl)
R01 DA063633*	Long-Acting Nanoparticle Antidotes for the Treatment	RALEIGH, MICHAEL DENNIS	UNIVERSITY OF MINNESOTA	Pharmaceutical-based Agent (Fentanyl)

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	of Synthetic Opioid Overdose			
R01 DA067003*	Metabolic-Epigenetic Mechanisms of Neurotoxicity Following Acute Fentanyl Exposure	TELESE, FRANCESCA	UNIVERSITY OF CALIFORNIA, SAN DIEGO	Pharmaceutical-based Agent (Fentanyl)
R01 DA066989*	Microbiome-Mediated Persistent Neuroimmune Injury After Single Fentanyl Exposure	ROY, SABITA	UNIVERSITY OF MIAMI SCHOOL OF MEDICINE	Pharmaceutical-based Agent (Fentanyl)
R01 DA067016*	Brain Circuits Mediating Adverse Effects of Fentanyl–Xylazine: Mechanisms and Therapeutic Targets	KAUR, SATVINDER	BETH ISRAEL DEACONESS MEDICAL CENTER	Pharmaceutical-based Agent (Fentanyl & Xylazine)
R56 DA066988*	Photoaffinity and Multi-Omic Analysis of Targets Pathways Driving Synthetic Opioid-Induced Toxicity and Reversal	SCHIEFER, ISAAC T	UNIVERSITY OF TOLEDO HEALTH SCI CAMPUS	Pharmaceutical-based Agent (Fentanyl)
R56 DA066990*	The Effects of Acute Fentanyl and Xylazine on Neural Respiratory Centers	MCELLIGOTT, ZOE ANASTASIA	UNIV OF NORTH CAROLINA CHAPEL HILL	Pharmaceutical-based Agent (Fentanyl & Xylazine)
R56 DA067015*	Mechanisms and Medical Countermeasures for Ultra-Potent Synthetic Opioid Overdose	ABBAS, ATHEIR IBRAHIM	OREGON HEALTH & SCIENCE UNIVERSITY (OR)	Pharmaceutical-based Agent (Fentanyl, Carfentanil, Etonitazene, Isonitazene, Metonitazene, & Protonitazene)
K01 DA062777	Investigation into nTS mu Opioid Receptor Mechanisms Contributing to Fentanyl-Induced Cardiorespiratory Depression	RUYLE, BRIAN C	WASHINGTON UNIVERSITY	Pharmaceutical-based Agent (Fentanyl)
R01 HL174373	K-Opioid Receptor Activation of The Carotid Body Mitigates OIRD By Fentanyl	PRABHAKAR, NANDURI R	UNIVERSITY OF CHICAGO	Pharmaceutical-based Agent (Fentanyl)
R01 HL174547	Brainstem Mechanisms of Opioid-Induced Respiratory Depression	LEVITT, ERICA SAWYER	UNIVERSITY OF MICHIGAN AT ANN ARBOR	Pharmaceutical-based Agent (Fentanyl)
R01 HL144801	Unraveling the Dynamic Mechanisms Underlying	RAMIREZ, JAN M	SEATTLE CHILDREN'S HOSPITAL	Pharmaceutical-based Agent (Fentanyl)

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	Opioid Respiratory Depression			
IAA (AOD26007-001)	Investigating 2,4-Dinitrophenol and The Development of Countermeasures for Its Toxic Effects	MCCRANOR, BRYAN	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Cellular Respiration / Metabolic Dysfunction (2,4-Dinitrophenol)
IAA (AOD26007-001)	Characterizing The Toxicological, Physiological, And Neurological Impacts of Aliphatic Nitriles in A Rat Model	MORGAN, JULIA	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Cellular Respiration / Metabolic Dysfunction (Cyanide, Acrylonitrile, Isobutyronitrile, Methacrylonitrile, Propionitrile, Hydroxyacetonitrile)
IAA (AOD26007-001)*	Identifying Common Therapeutic Targets for Phosphine and Cyanide	JASPER, COTY	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Cellular Respiration / Metabolic Dysfunction (Phosphine & Cyanide)
UH3 NS134957	Platinum Based Countermeasures and Combinations with Protective Agents	DAVISSON, VINCENT JO	PURDUE UNIVERSITY	Cellular Respiration / Metabolic Dysfunction (Cyanide)
R44 AI191943	Development of Cobinamide as a Cyanide Antidote: Completion of pre-IND Studies	DRETCHEN, KENNETH (contact) BOSS, GERRY R	MESA SCIENCE ASSOCIATES, INC.	Cellular Respiration / Metabolic Dysfunction (Cyanide)
IAA (AOD26011-001)	Exploring The Primary and Transgenerational Effects of Acute Organophosphate Exposure and Treatment During Early Gestation in Genetically Modified Human-Relevant Mice	CADIEUX, LINN	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Neurological (Anti-Neurodegeneration; Paraoxon, Sarin)
IAA (AOD26011-001)	Age and Sex Differences in Neurotoxic Effects of Seizure-Inducing Chemicals and Response to Anti-Seizure Medications and Novel Neuroprotectants	LUMLEY-LANGE, LUCILLE	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Neurological (Anti-Seizure / Anti-Neurodegeneration; Soman)
IAA (AOD26011-001)	Mechanism Investigation and Countermeasure	SANTORO, ANTONIA	U.S. ARMY MEDICAL RESEARCH	Neurological (Anti-Seizure;

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National Institutes of Health

CCRP Portfolio

	Identification for Acute Exposure to Hydrazine in Rats		INSTITUTE OF CHEMICAL DEFENSE	Hydrazine)
R21 NS127345	High-Throughput In Vivo Discovery of Novel Countermeasures Against Organophosphate-Induced Seizure and Status Epilepticus Using Zebrafish	MCGRAW, CHRISTOPHER	NORTHWESTERN UNIVERSITY	Neurological (Anti-Seizure; Chlorpyrifos)
R21 NS141771*	Disease-modifying effects of NRF2 activators in a nerve agent exposure model	THIPPESWAMY, THIMMASETTAPPA	IOWA STATE UNIVERSITY	Neurological (Anti-Seizure / Anti-Neurodegeneration; Diisopropyl Fluorophosphate)
R21 NS147992*	Preclinical Development of Oleoylethanolamide as a Medical Countermeasure for Long-Term Neurotoxicity Following Organophosphate Exposure	ABDULLAH, LAILA	ROSKAMP INSTITUTE, INC.	Neurological (Anti-Neurodegeneration; Chlorpyrifos)
R21 NS148313*	2-Deoxyglucose Therapy for Organophosphate Intoxication	REDDY, DOODIPALA SAMBA	TEXAS A&M UNIVERSITY HEALTH SCIENCE CTR	Neurological (Anti-Seizure; Diisopropyl Fluorophosphate & Soman)
R01 NS133584	Mechanisms Of Neurodegeneration in A Nerve Agent Model	THIPPESWAMY, THIMMASETTAPPA	IOWA STATE UNIVERSITY	Neurological (Anti-Seizure / Anti-Neurodegeneration; Diisopropyl Fluorophosphate)
R01 NS136102	MALDI Imaging of Acute Organophosphate Exposure in KIKO Mice	TRESSLER, CAITLIN	JOHNS HOPKINS UNIVERSITY	Neurological (Anti-Neurodegeneration; Sarin)
R01 NS144287	Impaired Sleep as a Target for Intervention Following Acute Organophosphate Intoxication	ANACLET, CHRISTELLE (contact) GURKOFF, GENE GABRIEL	UNIVERSITY OF CALIFORNIA AT DAVIS	Neurological (Anti-Neurodegeneration; Diisopropyl Fluorophosphate)
R01 NS144283*	Astrocyte-Based Mechanisms of Organophosphate Poisoning	JANG, MI-HYEON (contact) BOISON, DETLEV	RUTGERS BIOMEDICAL AND HEALTH SCIENCES	Neurological (Anti-Seizure / Anti-Neurodegeneration; Diisopropyl Fluorophosphate)

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R01 NS151264*	JAK/STAT Signaling as a Therapeutic Target to Mitigate Long-Term Effects of Acute Organophosphate Intoxication	BROOKS-KAYAL, AMY R (contact) LEIN, PAMELA J	UNIVERSITY OF CALIFORNIA AT DAVIS	Neurological (Anti-Seizure / Anti-Neurodegeneration; Diisopropyl Fluorophosphate)
R56 NS144209*	Neuronal Subcellular Mechanisms in Susceptibility and Resilience to Toxic Chemicals of Concern	HALPAIN, SHELLEY L	UNIVERSITY OF CALIFORNIA, SAN DIEGO	Neurological (Anti-Neurodegeneration; Sodium Cyanide, Arsenic Trioxide, Paraoxon, Aldicarb, Picrotoxin, & Strychnine)
U01 NS123252	Antiglutamatergic Therapy to Protect the Brain Against Nerve Agents	BRAGA, MARIA F.	HENRY M. JACKSON FDN FOR THE ADV MIL/MED	Neurological (Anti-Seizure / Anti-Neurodegeneration; Soman)
UG3 NS138911	Novel Anticonvulsants for Nerve Agents and Refractory Status Epilepticus	REDDY, DOODIPALA SAMBA	TEXAS A&M UNIVERSITY HEALTH SCIENCE CTR	Neurological (Anti-Seizure / Anti-Neurodegeneration; Diisopropyl Fluorophosphate & Soman)
UH3 NS133630	Identification And Optimization of Verapamil as A Novel Neuroprotective and Anti-Inflammatory Agent for Reducing Long-Term Neurological Morbidities Following Organophosphate-Induced Status Epilepticus	DESHPANDE, LAXMIKANT S	VIRGINIA COMMONWEALTH UNIVERSITY	Neurological (Anti-Seizure / Anti-Neurodegeneration; Diisopropyl Fluorophosphate)
UH3 NS134920	Long-Acting Aldicarb Hydrolase as a Medical Countermeasure for Aldicarb Poisoning	ZHENG, FANG	UNIVERSITY OF KENTUCKY	Neurological (Scavenger; Aldicarb)
U54 NS127758	UC Davis CounterACT Center of Excellence: Developing Therapeutic Strategies for Mitigating the Chronic Neurological Consequences of Acute Organophosphate Intoxication	LEIN, PAMELA J	UNIVERSITY OF CALIFORNIA AT DAVIS	Neurological (Anti-Seizure / Anti-Neurodegeneration; Diisopropyl Fluorophosphate & Soman)

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IAA (AOD26010-001)*	Stabilization of NRF2 as a Therapeutic Strategy to Mitigate ROS- and Inflammation-Mediated Injury from Arsenic Trioxide	BAHCALL, MAGDA	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Hemolytic/Metabolic (Pulmonary; Arsenic Trioxide)
R01 NS152092*	Mechanistic and Therapeutic Strategies to Mitigate Arsenic Trioxide-Induced Neurotoxicity	KHAN, MOHAMMAD MOSHAHID	UNIVERSITY OF TENNESSEE HEALTH SCI CTR	Hemolytic/Metabolic (Neurological; Arsenic Trioxide)
IAA (AOD26010-001)	Superwarfarin Sequestration by Cyclodextrin-Based Macrocycles	ZIEGLER, ERIC	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	Blood Toxicity (Coagulopathy; Brodifacoum)
U01 NS127746	Optimization of Bile Sequestrants to Treat Superwarfarin Poisoning	FEINSTEIN, DOUGLAS L.	UNIVERSITY OF ILLINOIS AT CHICAGO	Blood Toxicity (Coagulopathy; Brodifacoum)
Product Development Support Services (PDSS)				
IAA (NTR26004-001)*	Division of Preclinical Innovation (DPI) - Translational Science Support and Resources	HENDERSON, MARK (PI) & FORD-SCHEIMER, STEPHANIE (PM)	NATIONAL CENTER FOR ADVANCING TRANSLATIONAL SCIENCES (NCATS/NIH)	How to Collaborate with NCATS DPI
CONT_IDV_75N93020D00011_7529	Preclinical Development Resources (PDR) for Candidate Medical Countermeasures	CHANG, POLLY & GREEN, CAROL (PIs) MAI, BONNIE (PM)	SRI (MENLO PARK, CA)	-

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