March 2026

Defense Health Agency Strategic Research Plan: Directed Energy and Radiation Health (DE/RH)*

Defense Health Agency ®

*This version is an excerpt of the DHA Strategic Research Plan (SRP) for Directed Energy (DE)/Radiation Health (RH) dated March 2026. This excerpt only addresses radiation health, that is, ionizing radiation. No additional updates or changes have been made to this plan beyond those made in the March 2026 revisions.

REVISION HISTORY

Revision	Entered by	Reason	Date
1	David Evans	• Streamlined SRP hierarchy elements • Removed SRP hierarchy elements outside of DHP S&T scope	March 2026
1.1	David Evans	• Generate SRP version for [ionizing] Radiation Health, Unclassified information only for sharing with stakeholders. No edits to content or structure made in revision 1.1**.	July 2026

Note: **Some terminology and references to DERH (for example, references to Capability Requirements, S&T Paths, and Capabilities) are retained for consistency. Some numbering in tables, etc. may not be sequential.

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1. OVERVIEW AND ORGANIZATION

The Defense Health Agency (DHA) Research and Engineering (R&E) Directorate leads the discovery and development of innovative medical solutions responsive to the needs of Combatant Commands, the Military Services, and the Military Health System (MHS). DHA R&E provides oversight and management of the Defense Health Program (DHP) Science and Technology (S&T) research budget to support priority medical research which includes the appropriation for research, development, test, and evaluation (RDT&E) Budget Activities (BA) 6.1-6.3 (Basic Research, Applied Research, Advanced Technology Development). The cornerstones of the DHA S&T management approach are as follows:

- Portfolio Managers directly accountable for the health and performance of their research Portfolios
- Alignment of research investments to validated medical capability gaps, operational requirements, and the needs of the Joint Force
- S&T efforts that focus on areas where DHP investments can make the most impact and accelerate delivery of knowledge and materiel products to product development and other transition partners or end users
- Informing multi-year program plans that allow adaptation to emerging (or declining) requirements

The DHA Deputy Assistant Director (DAD) for R&E employs Strategic Research Plans (SRPs) to inform and describe how Department of War (DoW) medical capabilities will be developed over time. SRPs are not investment plans, but drive recommendations for Future Years Defense Program (FYDP) plans and serve as a critical tool for aligning investments with military medical health priorities. SRPs include information that will enable the Portfolio Manager to perform the following activities:

- Develop, on an annual basis, the FYDP plans in alignment with SRPs and anticipate the resources that will be required for the respective Program Objective Memorandum (POM) cycle
- Provide the oversight and concurrence of Year of Execution (YOE) spend plans that Program Managers (PMs) will be responsible for developing as a recommendation to the Portfolio Manager
- Facilitate discussion with leadership (e.g., DHA and Assistant Secretary of War – Health Affairs) and stakeholders regarding the research activities required to address Capability Requirements

The following DHP S&T criteria apply to scope for inclusion in an SRP and associated SRP-based S&T program planning:

- Medical research providing knowledge or materiel products relating to preventing, stabilizing, preserving, repairing, and/or resolving diseases or injuries affecting Service members across military operational environments
- Medical research addressing Joint MHS capability requirements or gaps
- Research that is operationally relevant, transition oriented, traceable to clinical practice, informs military doctrine, and/or informs health or product development

Research areas that do not meet these criteria and are excluded from SRPs include:

- Human performance enhancement (beyond baseline)
- Medical surveillance

- Non-research infrastructure maintenance
- Healthcare policy assessments
- Personal protective equipment/weapon systems evaluation
- Non-medical Military Occupational Series (MOS) training
- Clinical practice implementation science

SRPs are organized into four levels:

- **Capability Areas** (CAs) reflect the highest structural elements that encompass broad areas of medical research within an SRP
- **Capability Requirements** (CRs) are derived from key source documents (e.g., Joint Capabilities Integration and Development System – JCIDS) and outline Capabilities (knowledge or materiel) required to meet current or future military medical needs
- **S&T Paths** (STPs) describe the high-level research activities needed to support the transition of Capabilities to product development, other transition partners, or end users
- **Capabilities** describe the S&T knowledge and/or materiel products to be transitioned to product development or end users

Figure 1-1 shows the hierarchical relationship between the components of the SRP with the associated reference schema. 2026 SRP Revision Note: The CR numbering may not be sequential as a result of movement, deletion, and/or consolidation of SRP hierarchy elements.

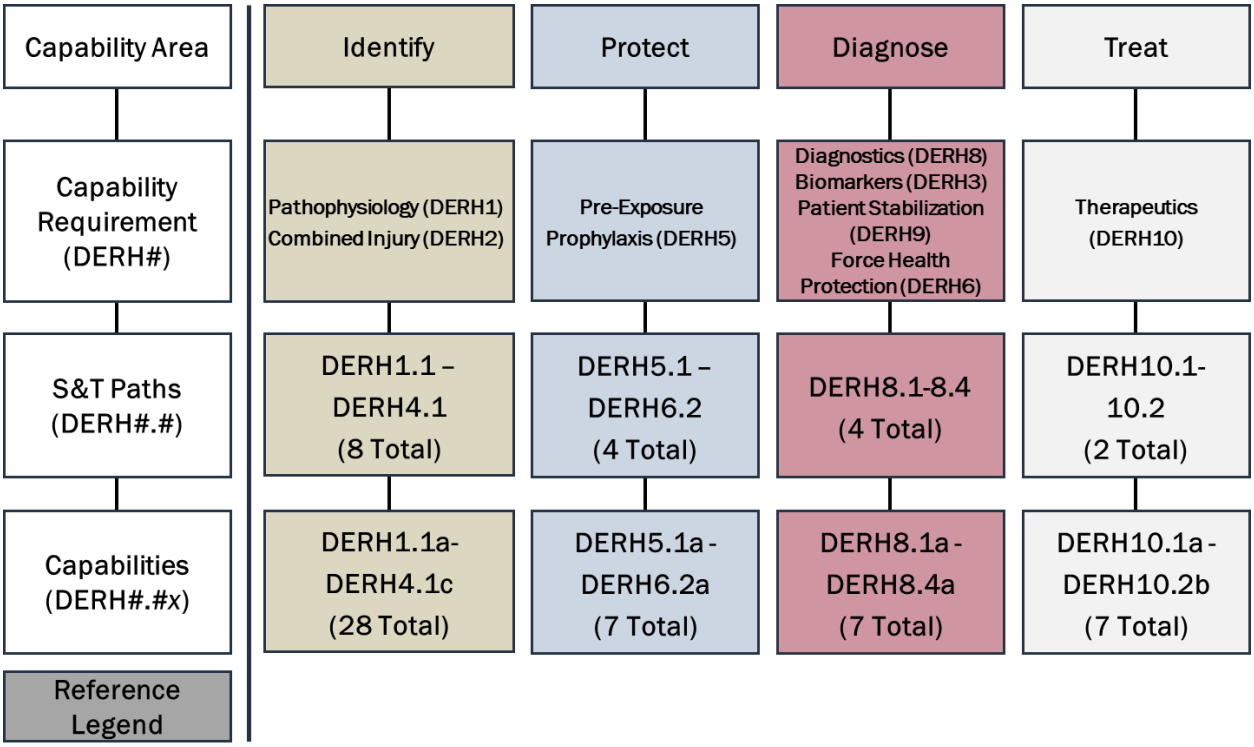


Figure 1-1 DHA RH SRP Hierarchy

The scope of the DHA RH SRP includes CRs relating to the injuries and adverse health effects from exposure to ionizing radiation. *Radiation health* promotes warfighter health and readiness through activities that support the discovery and development of medical capabilities to counter the threat of harmful ionizing radiation exposure. These CRs serve the overall goal of maintaining unit and individual readiness, preserving operational effectiveness, and accelerating return to duty. SRPs only outline the CRs deemed as priorities. These priorities have been identified based on assessment of the current and future medical and operational needs and/or existing research gaps of the military medical community. Inclusion

of a CR in the SRP does not guarantee that funding will be aligned to its respective STPs or Capabilities. A complete set of RH CRs are included in Appendix B. Prioritized RH CRs are organized into the following four Capability Areas:

- **Identify:** Characterize adverse health effects resulting from ionizing radiation exposure, enabling capability development for protection, detection, diagnosis, stabilization, treatment, rehabilitation, and performance improvement
- **Protect:** Decrease incidence or severity of injuries from warfighter exposure to ionizing radiation
- **Diagnose:** Provide validated diagnostic tools and technologies that can be used in any environment to diagnose injuries resulting from exposure ionizing radiation
- **Treat:** Provide effective medical countermeasures to treat radiation injuries and reverse their adverse health effects

Prioritized RH CRs are listed in Table 1-0, with each CR noted via a number (e.g., DERH1, DERH2). Section 2 describes the STPs leading to defined Capabilities for each CR. The numeric labeling schema is not meant to represent relative priority and is only intended to organize the CRs for ease of reference.

Table 1-0 Capability Requirements Included in the RH SRP

DERH No.	CR Name	CR Description
DERH1	Pathophysiology	Characterize the natural history, pathophysiological mechanisms and sequelae of injury resulting from ionizing radiation exposure (energy propagation, interaction, absorption/loading, and physical response of the body) to inform injury detection, protection, and treatment [3, 6, 20, 23]
DERH2	Combined Injury	Characterize health effects of combined/complex ionizing radiation exposure in the presence of other traumatic injuries [3-5]
DERH5	Pre-Exposure Prophylaxis	Develop validated biomedical pre-treatment and prophylactic strategies to prevent or protect against the adverse health effects of relevant ionizing radiation exposures [3,6–11]
DERH8	Diagnostics	Identify and validate radiation health-specific biomarkers to support diagnosis and differentiation and inform effective treatment modalities. Identify, differentiate, and classify the clinical signs, symptoms, and outcomes correlated to ionizing radiation exposures in order to support medical care [3, 4, 6, 13, 14]
DERH10	Therapeutics	Develop radiation health treatments to include pharmacologic, physical, and neurocognitive therapies to mitigate effects following ionizing radiation exposure [3, 6, 20. 23]

2. CAPABILITY REQUIREMENTS AND ASSOCIATED S&T PATHS

This section outlines the RH priority CRs, STPs, and Capabilities. The Capabilities described are expected to transition to product development or other end users (e.g., members of the clinical or operational community) to aid in fulfillment of the requirement when they reach the appropriate Technology Readiness Levels (TRLs) and Knowledge Readiness Levels (KRLs). Product development will then perform, as appropriate, additional development activities required to mature these Capabilities to the extent to which they can be delivered for full clinical or operational use by the intended end user. Each CR and their respective STPs and Capabilities are depicted as a figure in the format shown in Figure 2-1.

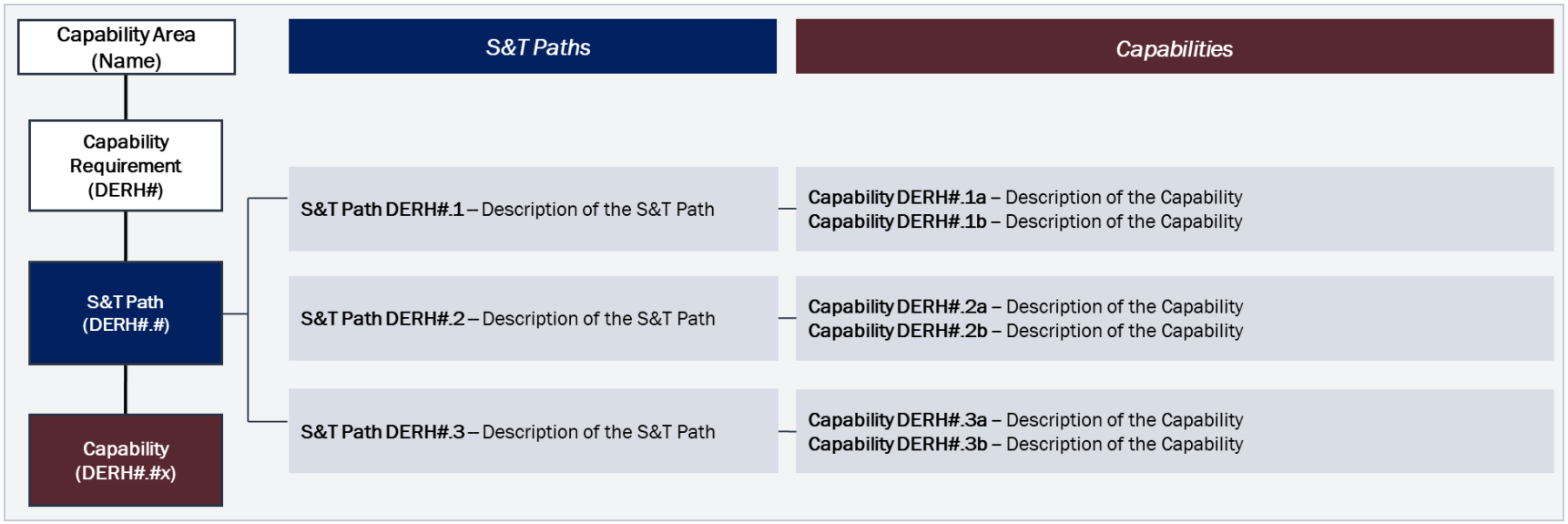


Figure 2-1 Capability Requirement Graphic Example

2.1 Pathophysiology

Exposure to acute levels of ionizing radiation is likely for those proximal to an improvised nuclear device, radiological exposure device, nuclear weapon, or reactor accident. The results of acute radiation exposure may be catastrophic; exposures are not fully understood and can result in multiple organ injuries. Therefore, understanding and characterization of the pathophysiological mechanisms and sequelae of injury resulting from ionizing radiation exposure (e.g., energy propagation, interaction, absorption/loading and physical response of the body) is critical to inform injury detection, protection, and treatment.

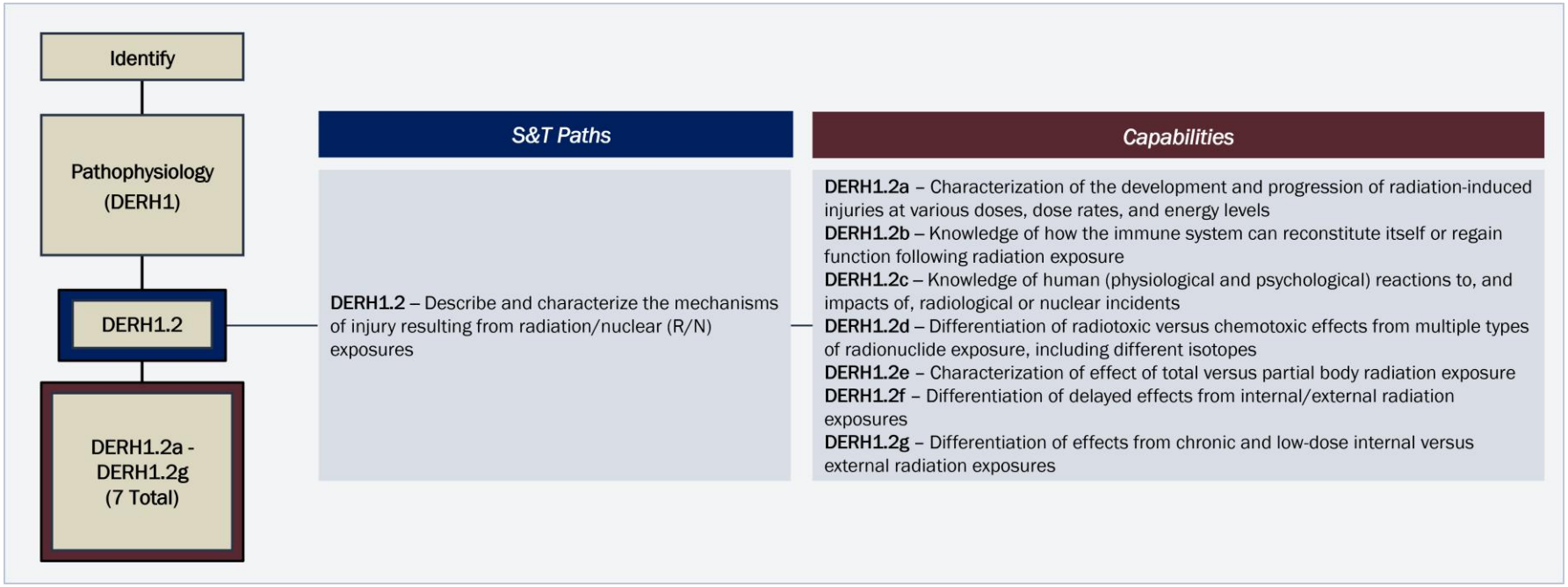


Figure 2-2 Pathophysiology S&T Paths and Capabilities

2.2 Combined Injury

World War II nuclear weapons exposure data highlight the compounding effect of radiation on combined injury which often results in unanticipated higher rates of co-morbidity and mortality and complicates triage, diagnosis, and treatment. Knowledge and understanding of the health effects of combined/complex radiation exposures and traumatic injuries (e.g., hemorrhage, blast overpressure, thermal, infection, fracture, traumatic brain injuries, wound injuries) is necessary for accurate triage, diagnosis, and treatment [3,4]. Development of capabilities for radiation combined injuries will be closely coordinated with development of capabilities for chemical combined injuries described in the Combat Casualty Care SRP.

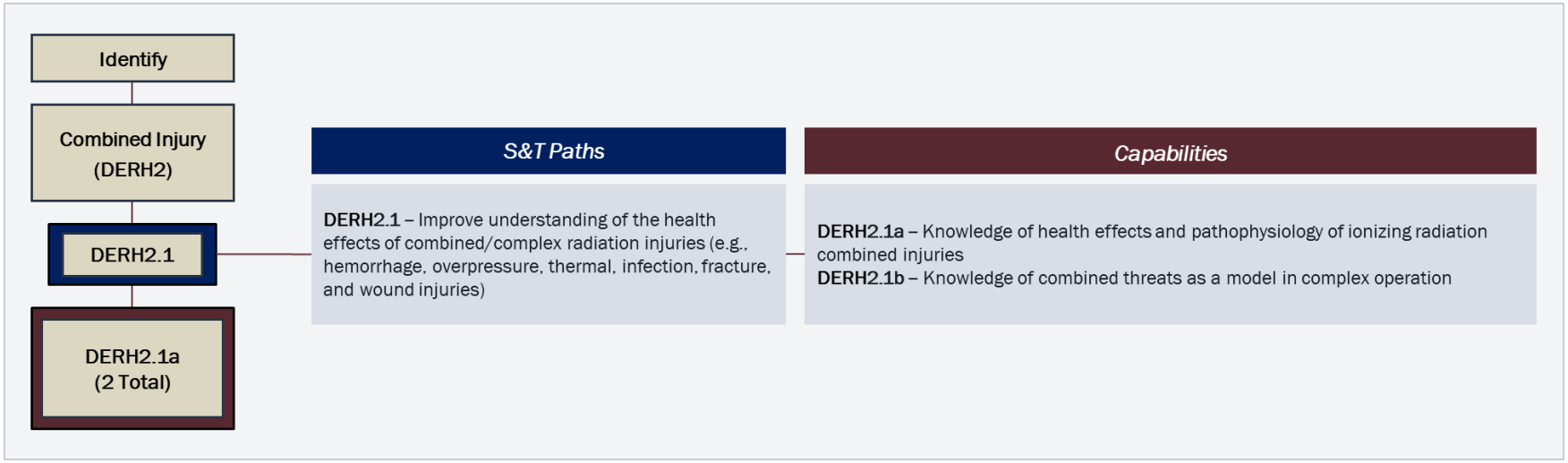


Figure 2-3 Combined Injury S&T Paths & Capabilities

2.3 Pre-Exposure Prophylaxis

Preventing or minimizing the effects of ionizing radiation exposures will enhance warfighter readiness. Validated biomedical pretreatment and prophylactic strategies help to protect or prevent against the adverse health effects of ionizing radiation exposure [3,6,10-11]. Pre-exposure prophylaxis capabilities may include multiple complementary approaches and will enable capabilities that are effective and suitable for military operational settings. 2026 Revision Note: Some Capabilities have been renumbered due to movement, deletion, and/or consolidation of SRP hierarchy elements.

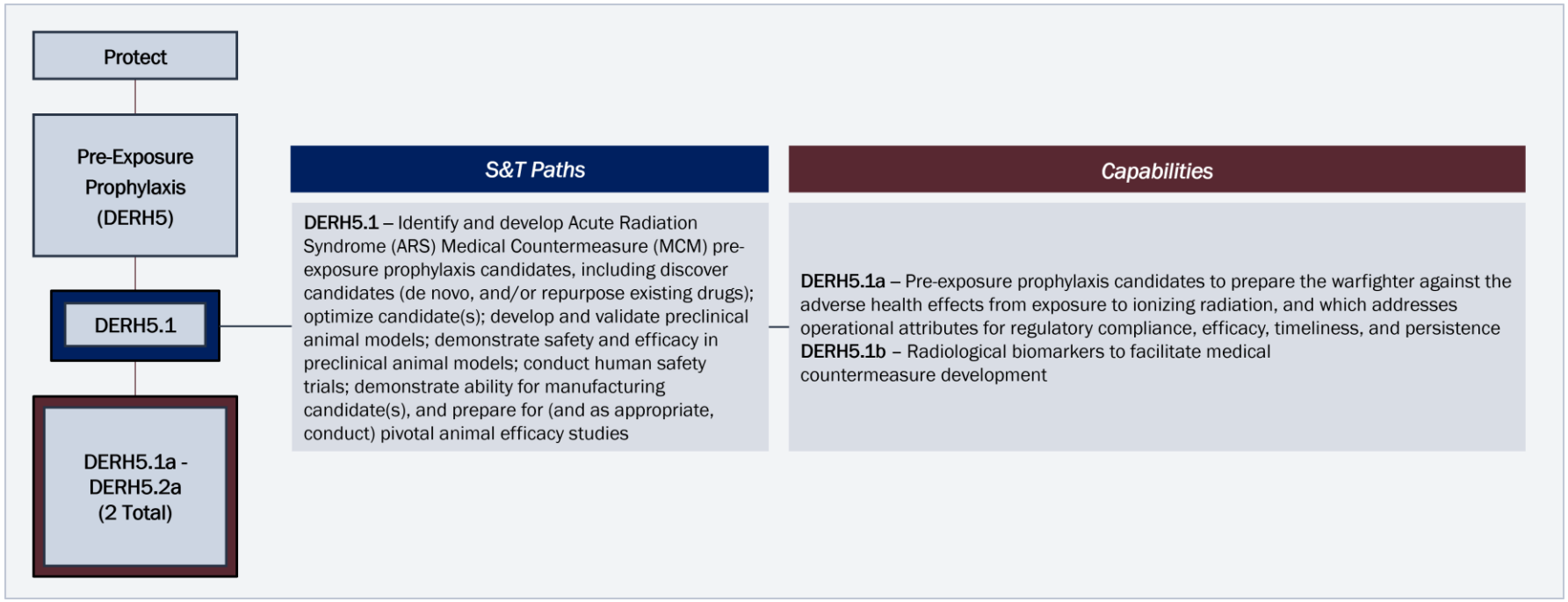


Figure 2-4 Pre-Exposure Prophylaxis S&T Paths and Capabilities

2.4 Diagnostics

Biomarkers are objective, quantifiable characteristics of biological processes. Many biomarkers have clinical utility providing diagnostic and prognostic information. Identifying and validating specific biomarkers will enable Capabilities to support RH requirements for enhanced survival and decreased morbidity. Patient stabilization involves clinical protocols to include technologies, knowledge, skills, and tools to stabilize and treat adverse health effects or injury from exposure to ionizing radiation. These Capabilities will be closely linked with prophylaxis and therapeutics Capabilities to enhance survival and improve return to duty. Diagnostics provide for the identification, differentiation, and classification of the clinical signs, symptoms, and outcomes correlated to ionizing radiation exposure to support medical care decisions [4, 6, 7, 13, 14]. These capabilities may include multiple complementary approaches that will facilitate triage and treatment of exposed personnel as well as monitor injured personnel for effective care.

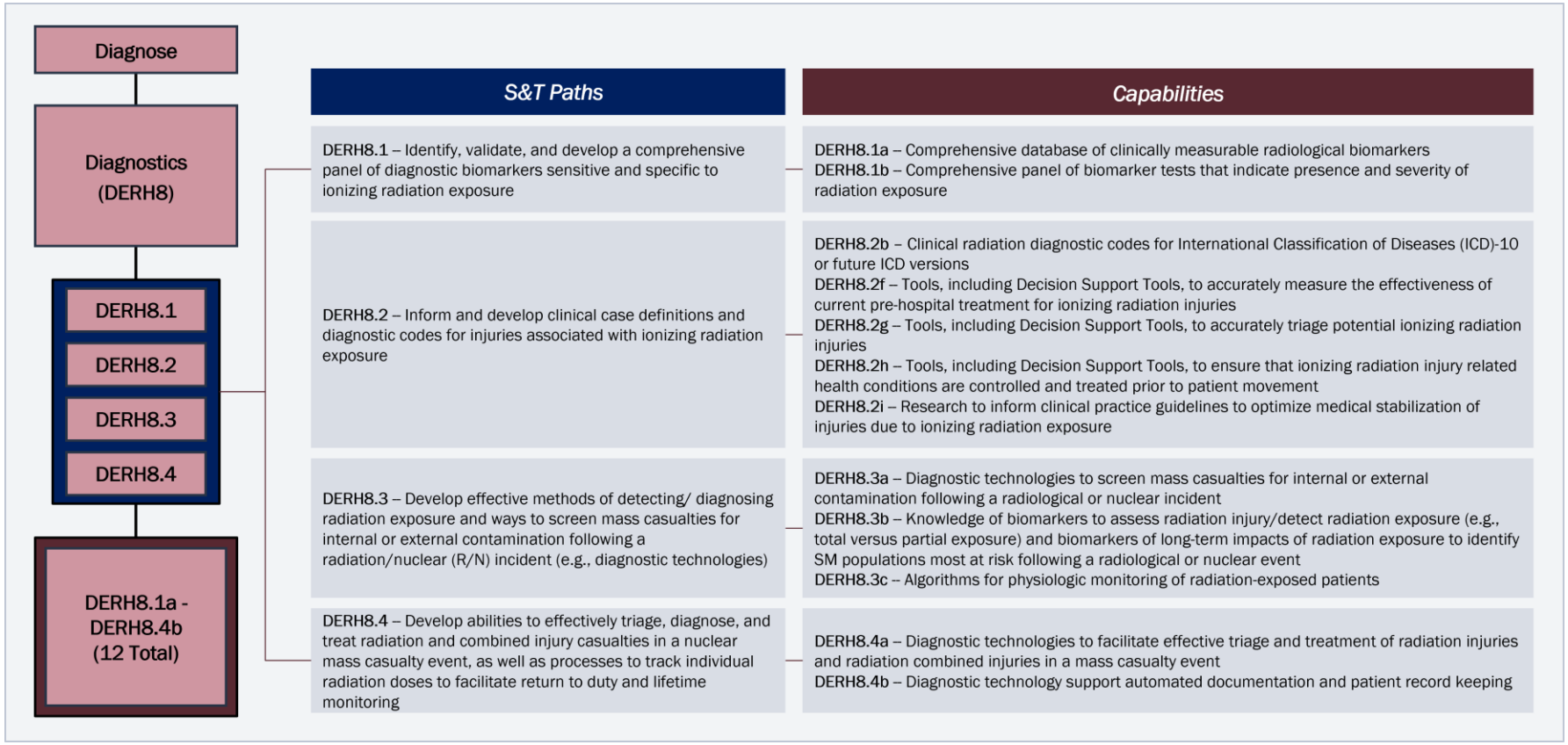


Figure 2-5 Diagnostics S&T Paths and Capabilities

2.5 Therapeutics

RH-specific therapeutics include pharmacologic, physical, and neurocognitive therapies [7,10,11]. Treatments may include multiple complementary approaches that may be administered pre- or post-symptomatically. Treatments will focus on those that may be used in Joint All-Domain Operations (JADO) environments, with an emphasis on treatment as close to the POI as possible, starting with role of care (RoC) 1 and continuing through RoCs 2 and 3. Clinical Practice Guidelines (CPGs) will be developed or improved for validated Joint Trauma System management, diagnosis, and treatment of injuries related to ionizing radiation exposure.

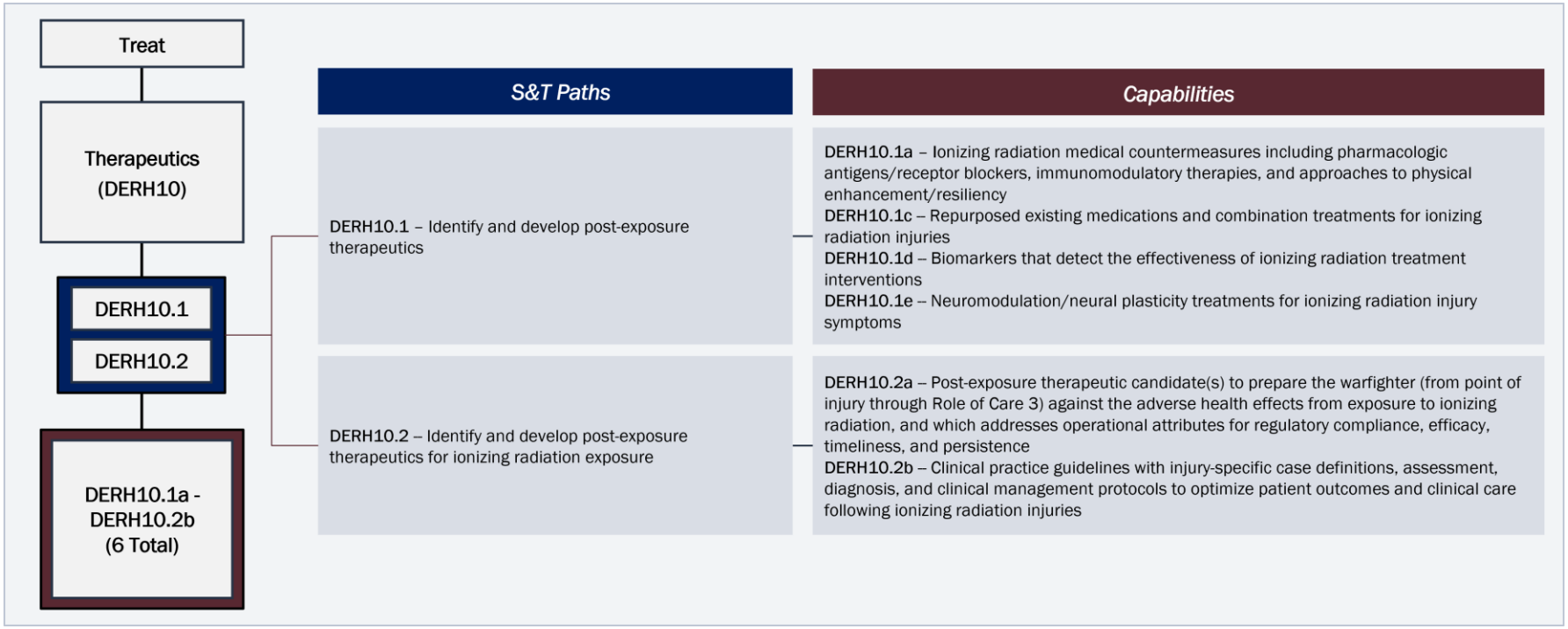


Figure 2-6 Therapeutics S&T Paths and Capabilities

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APPENDIX A. KEY DEFINITIONS

Term	Definition
6.1	BA for Basic Research increases knowledge/understanding: discovery; hypothesis testing. ~TRL 1–2
6.2	BA for Applied Research is the refinement of concepts into solutions: pre-clinical studies; drug formulation; device defined in animal model. ~TRL 2–3
6.3	BA for Advanced Technology Development is candidate solution development; proof of concept and product safety demonstrated (e.g., Phase 1–2a trials). ~TRL 3–6
Budget Activity	Categories within each appropriation and fund account that identify the purposes, projects, or types of activities financed by the appropriation or fund
Capability Area	Reflects the highest structural element that encompasses broad areas of medical research within a Portfolio
Capability Requirement	Derived from key source documents, and outlines capabilities (knowledge or materiel) required to meet current or future military medical needs
Capability	The S&T knowledge and/or materiel products to be transitioned to product development or other end users
Detect	Provide validated, approved, and acceptable tools or technologies to detect and quantify, if possible, the presence of ionizing radiation in the environment for force health protection
Diagnose	Provide validated diagnostic tools and technologies that can be used in any environment to diagnose injuries resulting from exposure to ionizing radiation
Identify	Characterize adverse health effects resulting from ionizing radiation exposure, enabling capability development for protection, detection, diagnosis, stabilization, treatment, rehabilitation, and performance improvement
IL5 (Impact Level 5)	DoW Impact Level 5 for CUI that requires higher level of protection than that afforded by IL4. DoD IL4 contains five primary types of information: CUI, Personally Identifiable Information, Personal Health Information, Non-Critical Mission Information, and Non-National Security Systems
Interdependency	Reliance of one S&T progression on the outcome of another or more S&T activities
Joint Capabilities Integration and Development System	JCIDS is the process by which the military develops and validates CRs for joint (more than one Service) use and interoperability
Long-Term Rehabilitation	The potential capability to enable long-term rehabilitation of injured or wounded warfighter and mitigation of long-term and late effects that limit the return to duty

Term	Definition
Medical Readiness	Ensuring warfighters are healthy, protected from potential threats, and ready for operations or contingencies
Military Community	Warfighters, DoW civilians, and beneficiaries
Operational Effectiveness	The ability of an individual warfighter, unit, or force to successfully conduct its assigned tasks and accomplish its mission
Protect	Decrease incidence or severity of injuries from warfighter exposure to ionizing radiation
Radiation Health	Promotes warfighter health and readiness through activities that support discovery and development of medical capabilities to counter the threat of harmful ionizing radiation exposure
Rehabilitate and Improve	Provide validated, approved, and acceptable means to aid warfighter recovery from radiation injuries and enhance their performance
S&T Path	Describes the high-level research activities needed to support the transition of Capabilities to product development or other end users
Stabilize	Stabilize combat casualties at the POI and as they are prepared for evacuation to the next RoC
Subject Matter Expert	An individual who has accumulated great knowledge in a particular field or topic
Treat	Provide effective medical countermeasures to treat radiation injuries and reverse their adverse health effects

APPENDIX B. ABBREVIATIONS

AHP	Analytical Hierarchy Process
ARS	Acute Radiation Syndrome
BA	Budget Activity
CPG	Clinical Practice Guideline
CR	Capability Requirement
DAD	Deputy Assistant Director
DEARE	Delayed Effects of Acute Radiation Exposure
DHA	Defense Health Agency
DHP	Defense Health Program
DoD	Department of Defense
DoW	Department of War
EMEDS	Expeditionary Medical Support System
EMR	Electromagnetic Radiation
FDA	Food and Drug Administration
FY	Fiscal Year
FYDP	Future Years Defense Program
ICD	Initial Capabilities Document
ICD-10	International Classification of Diseases 10th Edition
IL5	Impact Level 5
JCIDS	Joint Capabilities Integration and Development System
JCM	Joint Casualty Management
JADO	Joint All-Domain Operations
KRL	Knowledge Readiness Level
MHS	Military Health System
MILDEP	Military Department

ML	Machine Learning
MTTP	Multiservice Tactics, Techniques, and Procedures
POI	Point of Injury
POM	Program Objective Memorandum
R&E	Research and Engineering
R/N	Radiological/Nuclear
RH	Radiation Health
RoC	Role of Care
S&T	Science and Technology
SCG	Security Classification Guide
SME	Subject Matter Expert
SRP	Strategic Research Plan
STP	Science and Technology Path
TRL	Technology Readiness Level
YOE	Year of Execution