# MILITARY MEDICINE ON THE THRESHOLD OF TOMORROW



THE WALTER REED ARMY INSTITUTE OF RESEARCH THE NAVAL MEDICAL RESEARCH INSTITUTE WALTER REED ARMY MEDICAL CENTER, FOREST GLEN, MD



The dramatic atrium is one of the many architectural features designed to encourage an atmosphere of openness so important to successful collaborative research.

Welcome to the future! This 474,000 square foot building is the New Home of one of the oldest medical research communities in America, WRAIR — the Walter Reed Army Institute of Research. WRAIR, a subordinate laboratory of the U.S. Army Medical Research and Materiel Command, has been leading the field of military medical research and graduate medical education since 1893. Now embarked on its second century, WRIAR, and its co-tenant, the Naval Medical Research Institute (NMRI) will move from multiple locations in Washington, D.C. and Nearby Maryland.

ESTABLISHED IN 1942, DURING THE WAR YEARS, NMRI'S INITIAL INVESTIGATIONS WERE FOCUSED ON IMMEDIATE OPERATIONAL PROBLEMS. THESE NAVY-SUPPORTED MEDICAL RESEARCH EFFORTS HAVE INFLUENCED THE MILITARY AND CIVILIAN PRACTICES OF MEDICINE, ASSISTED MINISTRIES OF HEALTH IN DEVELOP-ING NATIONS, AND PROVIDED TECHNOLOGY FOR OTHER FEDERAL INITIATIVES.

## DETAILS OF THE NEW BUILDING

Designed by Haines Lundberg Waehler, a New York Architectural and Engineering firm noted for its innovative and successful research facilities, and built by manhattan construction company of fairfax, va, the structure represents many hours of input from current and past staff members, as well as comparison studies of other recently constructed laboratories around the country. The building is sited on the grounds of the Walter Reed Army Medical Center's historic Forest Glen Annex, to make optimal use of five recently renovated buildings that already support biomedical research functions.

This will really be WRAIR'S first research building built from the ground up, not converted from a school or warehouse structure. The final product represents the best and most useful ideas in work-center design, internal communication, biomedical laboratory design, and interfaces between scientific disciplines and technologies. The ideas that went into the building design reflect not only the best in LAB layout, but a new approach to conducting research: Emphasis on interaction between disciplines, and on technological advances. In addition there are highly visible concepts in building design that reflect respect for the people who will give the building its life.

17,000 DUMPTRUCK LOADS OF EARTH WERE EXCAVATED FROM THE CONSTRUCTION SITE

IN 1893, ARMY SURGEON GENERAL GEORGE M. STERNBERG CREATED THE ARMY MEDICAL SCHOOL, TO TEACH THE UNIQUE ASPECTS OF MILITARY MEDICINE, AND TO EXPLORE BETTER WAYS OF DELIVERING HEALTH CARE TO AMERICA'S SOLDIERS. MAJOR WALTER REED WAS A MEMBER OF THE FIRST FACULTY. IN ADDITION TO HIS TEACHING DUTIES, HE SERVED AS FACULTY SECRETARY, AND CURATOR OF THE ARMY MEDICAL MUSEUM (NOW THE NATIONAL MUSEUM OF HEALTH AND MEDICINE). WRAIR'S FIRST HOME WAS ON THE SECOND FLOOR OF THE MUSEUM, THEN LOCATED IN DOWNTOWN WASHINGTON, DC.

#### HISTORY

In 1900, while a member of the faculty, Major Reed was named president of the board investigating yellow fever in Cuba. There he and his colleagues proved the theory that mosquitos were the determining link in the transmission of yellow fever. Working where the problems were to be found, Major Reed defined forever the role of soldier/scientist. From that time to this, the Walter Reed Army Institute of Research has continued to conduct research which has advanced the quality of health care for service men and women around the world.



"The Schoolhouse" - WRAIR's first purpose-built facility, was constructed between 1923 and 1932. In 1933 it was dedicated as the Army Medical School. It was known as the Army Medical Service Graduate School from 1950 until 1955, when it was renamed in honor of Walter Reed.

Before the construction of this most modern facility, the WRAIR occupied more than 20 buildings, ranging from a 100-year old former summer hotel and school, to prefabricated, leased facilities in three Maryland counties and the District of Columbia. The combined military and civilian research and teaching staff have made unparalleled contributions to military and international health. This has been accomplished despite working in diverse locations, and under less-than-ideal conditions.

CONCRETE USED TOTALED 24, 325 CUBIC YARDS, EQUAL TO 3,040 TRUCK LOADS: TWO SOLID LANES OF TRUCKS BETWEEN FOREST GLEN AND THE MAIN CAMPUS



The central portion of the main building was NMRI's first home. The work now accomplished in this multiwing complex will soon be housed in the new research center to be shared with WRAIR.

The Naval Medical Research Institute, the flagship of Navy medical research, was established in Bethesda, MD, on a site selected by President Franklin D. Roosevelt. The institute was commissioned on Navy Day, 27 October, 1942, under the command of Rear Admiral (select) William L. Mann (MC)USN. The position of research executive was assigned to Captain Albert R. Behnke (MC)USN, who, as a young medical officer stationed in the Pacific, envisioned what was to become the Naval Medical Research Institute.

IN 1945, NMRI was commissioned to study the Japanese survivors of the atomic bomb and develop methods for use in treatment of radiation exposure. Under the direction of Dr. George Hyatt, the first tissue bank in the world was established in 1950, which led to freeze-drying techniques for the preservation of human tissue for grafting. With the assistance of Charles A. Lindbergh in the 1960s, NMRI scientitsts redesigned a heart-lung machine and pioneered advances in the use of hypothermia for open heart surgery.

## WRAIR'S CO-TENANT

IN 1981, NMRI CONSOLIDATED ITS ROLE AS AN INTERNATIONAL CENTER FOR DIVING RESEARCH WITH COMPLETION OF THE ALBERT R. BEHNKE HYPERBARIC RESEARCH CENTER. LATER THE NATIONAL BONE MARROW REGISTRY WAS ESTABLISHED IN NMRI, AND HAS BEEN INSTRUMENTAL IN SAVING THE LIVES OF COUNTLESS CANCER PATIENTS. DURING OPERATION DESERT SHIELD/DESERT STORM, NMRI ESTABLISHED THE NAVY FORWARD LABORATORY IN SAUDI ARABIA, FOR IDENTIFICATION OF ENDOGENOUS INFECTIOUS DISEASE THREATS AND POTENTIAL BIO-WARFARE AGENTS.

NMRI has been a partner in the nation's space flight program, beginning with primate and astronaut training. This legacy continues today with NMRI experiments in space shuttle missions that are designed to determine the cause of anemia among astronauts after prolonged space flight. The Naval Medical Research Institute continues a heritage of world-class medicine which will evolve into the 21st century.

THERE ARE 1,600 DOORS AND 636 EXTERIOR WINDOWS

#### THE PRODUCTS OF THE PAST

### NMRI

- 1943 A METHOD WAS DEVELOPED FOR DESALINATION OF SEA WATER.
- 1944 Advanced Navy protective clothing: immersion and exposure suits, flight goggles, and safety belts.
- 1955 DEVELOPED PHYSIOLOGICAL TELEMETRY TECHNOLOGY.
- 1956 HIGH FREQUENCY DENTAL DRILL DEVELOPED.
- 1968 Advanced survival in Harsh environments.
- 1986 ELUCIDATED THE BIOCHEMICAL FUNCTION OF THE T-CELL COSTIMULATORY RECEPTOR, CD28, REFERRED TO AS THE "HOLY GRAIL" OF IMMUNOLOGY
- 1992 DISCOVERED COSTIMULATORY RECEPTOR-BASED TECHNIQUE FOR GROWING HUMAN T-CELLS.
- **1993** PATENTED TECHNIQUES FOR GROWING HUMAN BONE MARROW STEM CELLS.
- **1996** DETERMINED THE THREAT OF HEPATITIS C AND E FOR U.S. MILITARY POPULATION.
- **1996** DEVELOPED AND DEPLOYED "HAND-HELD ASSAYS" FOR IDENTIFICATION OF BIOLOGICAL WARFARE AGENTS.
- 1997 PATENTED DNA PRIMER SET FOR PCR-BASED DIAGNOSIS OF CAMPYLOBACTER ENTERITIS.
- **1997** Documented safety and immunogenicity of first candidate oral anti-Campylobacter vaccine.
- **1998** DEMONSTRATED FIRST INDUCTION OF CYTOTOXIC T-LYMPHOCYTES IN HUMANS BY A DNA VACCINE; COMPLETED FIRST GENOMIC SEQUENCE OF MALARIA CHROMOSOME.

#### WRAIR

- 1898 Typhoid Board showed poor sanitation as cause of transmission.
- 1900 Yellow Fever Board proved mosquito as mode of transmission.
- 1910 MAJ. C. R. DARNALL DEVELOPED CHLORINE TO PURIFY DRINKING WATER.
- **1925 COL. C**ALVIN **H. G**ODDARD FOUNDED THE SCIENCE OF FORENSIC BALLISTICS.
- **1933** Atabrine was introduced as a substitute for quinine in combating malaria.
- 1940-45 Work by CPT. D. B. Kendrick developed systems for blood collection, rapid typing, storage, shipment and use; used albumin to treat shock.
- 1955 JET INJECTOR DEVELOPED FOR MASS IMMUNIZATION.
- 1957 INFLUENZA VIRUS ISOLATED AND USED TO MAKE THE FIRST VACCINE.
- 1962 RUBELLA VIRUS ISOLATED.
- 1970 VACCINE DEVELOPED AGAINST TYPE C MENINGITIS.
- 1972 MEFLOQUINE INVENTED FOR TREATMENT OF DRUG-RESISTANT MALARIA.
- 1983-86 HIV SCREENING AND SERUM REPOSITORY BEGUN.
- 1986 VACCINE DEVELOPED AGAINST HEPATITIS A.
- **1993** DISCOVERED PATTERN OF BRAIN ACTIVITY UNDERLYING MENTAL PERFORMANCE DEFICITS DURING SLEEP LOSS.
- **1996** Developed self-contained, wrist-worn device to measure sleep, and predict performance capacity in the field.
- **1997** PROMISING CANDIDATE IDENTIFIED FOR FIRST TRULY EFFECTIVE MALARIA VACCINE.

The building contains 5,500 tons of structural steel, 360,000 concrete blocks and 380,000 face bricks

Externally, the building features red brick with pre-cast concrete trim, consistent with the Walter Reed Army Medical Center Installation Design Guide. The construction costs per unit area are below national norms. Usable space will be an above average fraction of the total area. As an overall response to the goal of medical design standards, the building presents a mixture of conservation measures in heating, ventilation, air conditioning, electrical and mechanical systems, and in the use of architectural features that include a passive sun screening system to reduce glare and heat gain through the perimeter windows.



The use of glass is both structural and architectural, as here in the front corridor. In addition to admitting light, the windows frame dramatic views of the site.

#### BETTER BY DESIGN

The New Building Will have a Below-ground, self-contained animal facility; three above-ground floors for laboratories, offices and research activities; and a full-filtered, non-recirculating air system. Laboratories and research offices will be organized in standard-sized modules that, combined with a between-floors utility distribution system, will provide maximum flexibility to accommodate current and future military medical research and development as program evolution and consolidation continue.

> At the heart of the new building, both in purpose and in plan, are the laboratories. These are designed to put the latest technologies at the service of the best minds and most skilled hands.



THERE ARE 85 MILES OF PLUMBING PIPE, 126 MILES OF ELECTRICAL CONDUIT, 611 MILES OF WIRE AND 26,000 ELECTRONIC CONTROL POINTS

THE BUILDING IS DESIGNED TO ACCOMMODATE THE OPERATIONS OF FIVE MAJOR RESEARCH AREAS, INCLUDING INFECTIOUS DISEASE, COMBAT CASUALTY CARE, OPERATIONAL MEDICINE, CHEMICAL DEFENSE, AND BIOLOGICAL DEFENSE. IT CONTAINS SUPPORT SERVICES THAT INCLUDE logistics and audio-visual, a dining room, and the administrative offices of  $\mathsf{WRAIR}$  and NMRI.

WITH SEATING FOR 306 PEOPLE, THE AUDITORIUM HAS A LEVEL FLOOR AND EASILY REMOVABLE SEATS ALLOWING FOR MULTIPLE USES BY THE WRAIR, NMRI AND THE LOCAL COMMUNITY.

> STATE-OF-THE-ART AUDIOVISUAL AND **TELECOMMUNICATIONS CAPABILITIES** ARE PROVIDED IN THIS ROOM AND IN

FIVE ADJOINING CLASS AND

CONFERENCE ROOMS.

Research

Areas of Forest Glen, the **BIOMEDICAL RESEARCH LIBRARY** FEATURES INDIVIDUAL STUDY

AREAS WITH SKYLIGHTS. THE

FACILITY WILL PROVIDE THE MOST



The latest in presentation technology will help project WRAIR's leadership in research.

CURRENT ADVANCES IN INFORMATION TECHNOLOGY, AND AN EXTENSIVE COLLECTION OF BOOKS, JOURNALS, AND MICROFILM.

THE LIBRARY WILL HOUSE THE INSTITUTE'S COLLECTION OF RARE BOOKS, AS WELL AS THE LIBRARY MATERIALS FROM THE GORGAS LABORATORY IN PANAMA.



The new dining room will provide an environment conducive to discussions, as well as refreshment.



The new library will provide access to information from world-wide resources.

1,600,000 POUNDS OF SHEET METAL DUCTWORK CIRCULATE 2,268,000 CUBIC FEET OF AIR PER MINUTE

THE WALTER REED ARMY INSTITUTE OF RESEARCH AND THE NAVAL MEDICAL RESEARCH INSTITUTE CONDUCT RESEARCH AND DEVELOPMENT OF PRODUCTS, PROCEDURES AND PRACTICES WHICH PROTECT THE AMERICAN MILITARY FROM INFECTIOUS DISEASES, COMBAT INJURIES, OPERATIONAL MEDICAL PROBLEMS, CHEMICAL AND BIOLOGICAL THREATS.



WRAIR AND NMRI WILL CONTINUE THE TRADITION OF RESEARCH AT HOME AND ABROAD, AND COLLABORATIVE WORK WITH ACADEMIA AND INDUSTRY. THE NEW RESEARCH LABORATORY CENTER WILL SERVE AS THE FOCAL POINT FOR COMBINED ARMY-NAVY MEDICAL RESEARCH.