2011 LASKER AWARDS HONOR MEDICAL RESEARCH PIONEERS

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FROM: The Albert and Mary Lasker Foundation
New York, New York

CONTACT: Rubenstein Communications, Inc.
Alison Hendrie 212-843-8029 ahendrie@rubenstein.com
Charles Zehren 212-843-8590 czehren@rubenstein.com

Franz-Ulrich Hartl and Arthur L. Horwich for discoveries concerning the cell's protein-folding machinery, which helps proteins fold into their biologically active structures.

Tu Youyou for discovering artemisinin, the most effective treatment against malaria currently available.

The Clinical Center of the National Institutes of Health for serving as a model research hospital where scientific advances are translated into innovative therapies.

New York, Sept. 12, 2011 – The Albert and Mary Lasker Foundation, which for 66 years has championed the greatest advances in medical research, announced today the winners of the *2011 Lasker Awards*: **Franz-Ulrich Hartl** and **Arthur L. Horwich** for basic medical research, **Tu Youyou** for clinical research and **The Clinical Center of the National Institutes of Health** for public service. The Lasker Awards – considered among the most respected science prizes in the world – honor visionaries whose insight and perseverance have led to dramatic advances that will prevent disease and prolong life.

The Lasker Awards, which carry an honorarium of $250,000 for each category, will be presented at a ceremony on Friday, September 23 in New York City. Since 1945, the Lasker Awards program has recognized the contributions of scientists, physicians, and public servants who have made major progress in understanding, diagnosing, treating, curing, and preventing human disease worldwide.

Hartl of the Max Planck Institute of Biochemistry, Martinsreid, Germany and Horwich of Yale University School of Medicine, New Haven, Connecticut will receive the 2011 Albert Lasker Basic Medical Research Award for discovering a cellular machine that controls how newly-manufactured proteins fold into their biologically active structures. Tu of the China Academy of Chinese Medical Sciences, Beijing, will receive the 2011 Lasker~DeBakey Clinical Medical Research Award for saving millions of lives by discovering artemisinin, the most effective treatment now available against malaria, one of the world's most deadly diseases. The Clinical Center of the National Institutes of Health, Bethesda, Maryland will receive the Lasker~Bloomberg Public Service Award for serving as a model institution that has transformed scientific advances into innovative therapies and provided high-quality care to patients.

"The intellectual skill, vision, and clarity of thought displayed by this year's prizewinners extended the scientific community's understanding of how cells operate, led to new treatments that prevented millions of deaths, and has stemmed human suffering," said Maria Freire, President of the Lasker Foundation. "Creativity, innovation, and determination have allowed them to pursue novel paths in medical research."

"This year's Lasker Awards highlight groundbreaking basic and clinical investigations and a commitment to innovative patient care that have had a tremendous effect on people all over the world," said Alfred Sommer, Chair of the Lasker Foundation Board of Directors. "The Awards further underscore the ways in which research advances deepen our knowledge of the fundamentals of biology and have had a transformative effect upon the lives and health of people all over the world."

"In granting these awards, the Lasker Foundation recognizes a breakthrough in understanding how proteins reach their functional forms and honors the work of a scientist who charted a new course of inquiry into the treatment of malaria," said Joseph L. Goldstein, Chair of the Lasker Medical Research Awards Jury.

"In recognizing the NIH Clinical Center, the Foundation has highlighted the vital role that this research hospital has played in advancing the state of medical research over almost six decades, and in training a generation of leaders in biomedical science," said Harvey V. Fineberg, Chair of the Lasker Public Service Award Selection Committee.

Hartl and Horwich Cited for Elucidating Chaperonin-Assisted Protein-Folding

The 2011 Albert Lasker Basic Medical Research Award honors Franz-Ulrich Hartl, 54, and Arthur L. Horwich, 60, for discovering that proteins cannot fold inside cells by themselves. They determined that a protein-dubbed "chaperonin" because of its assisting role – acts as a cage-like folding "machine" that provides a safe place for proteins to fold, away from outside interference.

The folding process converts linear amino-acid chains into the three-dimensional forms that determine the molecules' function. Beginning in the late 1950s, scientists thought that newly synthesized proteins in cells folded spontaneously without energy input, as they can in the test tube. But in the late1980s, Hartl and Horwich discovered an apparatus that encases an unfolded protein and promotes folding by harnessing the energy of ATP, the small molecule that drives reactions inside cells. Once inside this machine, proteins can safely fold without sticking to one other.

Hartl and Horwich have shed light on how a previously unknown process involving folding machines isolates young proteins and helps them transform into mature molecules. By unraveling the mysterious workings of these amazing machines, they gave the medical world a key understanding of how proteins reach their biological potential.

Subsequent work suggested that protein folding activity may provide therapeutic benefit for such neurodegenerative illnesses as Parkinson's disease, Alzheimer's disease, Huntington's disease, mad cow disease and amyotrophic lateral sclerosis, which occur when clumps of entangled

misfolded proteins cause neurological symptoms. In addition, a particular protein-folding mutation has been associated with hereditary spastic paraplegia, an illness in which the legs weaken and stiffen.

Tu Youyou Honored for Clinical Research Leading to the Best Treatment for Malaria

The 2011 Lasker~DeBakey Clinical Medical Research Award honors Tu Youyou, 81, for saving millions of lives by discovering artemisinin, the most powerful anti-malarial drug currently available. An artemisinin-based drug combination is now the standard regimen for the disease, and the World Health Organization (WHO) lists artemisinin and related agents in its catalog of "Essential Medicines."

Tu's seminal work on malaria began amid the Cultural Revolution when the Chinese government launched a clandestine military project aimed at finding a remedy for the deadly scourge. The operation, dubbed Project 523 for the day it was announced – May 23, 1967 – set out to battle chloroquine-resistant malaria.

In keeping with Chairman Mao Zedong's desire to "explore and further improve" the "great treasure house" of traditional Chinese medicine, Tu combed ancient texts and folk remedies for possible leads. She collected 2000 recipes, which were then winnowed. By 1971, her team had made 380 extracts from 200 herbs. The researchers then assessed whether these substances could clear the malaria-causing parasite from infected mice.

One of the extracts from Qinghao – *Artemisia annua L.*, or sweet wormwood – dramatically inhibited parasite growth in the animals. The results were not reproducible, so Tu once again scoured the literature for possible explanations. Following clues, she and her team performed the extraction process at low temperatures. Tu's team also removed a harmful acidic portion of the extract that did not contribute to antimalarial activity and refined the preparation of the material in other ways. These innovations boosted potency and slashed toxicity. At a March 1972 meeting of the Project 523 group's key participants, she reported that the neutral plant extract wiped out the malarial-causing agent in the blood of mice and monkeys. A pure substance was obtained later that year which proved effective in treating people with malaria.

The first English-language scientific literature citing successful clinical trials for artemisinin appeared in late 1979, but as was customary in China at the time, the authors were anonymous. The paper drew attention and in 1981, Tu appeared at an international meeting where she presented her findings on artemisinin and its chemical derivatives that form the foundation of today's life-saving therapies.

Malaria remains a killer. The mosquito-borne parasites that cause the disease infected 247 million people in 2008 and caused almost one million deaths. Pockets of resistance have cropped up and since 2006, the WHO has recommended treatments that combine an unrelated chemical with an artemisinin-based compound. Today it is clear that Tu's insight and vision have saved millions of lives, particularly in the developing world, and continues to yield long-term medical benefits in the ongoing fight against this deadly disease.

The Clinical Center of the National Institutes of Health - Providing Innovative Therapies and Training New Generations of Physician-Scientists

The 2011Mary Woodard Lasker Public Service Award honors the Clinical Center of the National Institutes of Health for creating a research hospital where doctors develop innovative therapies and explore new ways to diagnose, treat, and prevent a wide variety of diseases. Since its inception in 1953, the Center has spearheaded major advances in a wide array of medical arenas and has distinguished itself as a model research institution that has trained thousands of investigators, many of whom have gone on to lead their own organizations.

Today, research scientists from 18 of the 27 NIH Institutes and Centers, each of which focuses on a particular biomedical realm, collaborate with the Center, which has treated more than 450,000 patients from 149 countries since it opened. It does so – providing state-of-the-art care – at no cost to patients. In 2010, the Center treated 10,086 individuals, and its physicians are currently following 575 unique diseases. The Center's Undiagnosed Diseases Program, which aims to help individuals whose conditions have stumped the medical community, has received more than 4000 charts to review since launching in 2008.

Medical innovations from the Center have targeted the full spectrum of human illness, from common plagues like tuberculosis to extremely rare ones such as cystinosis, a genetic disorder that harms many parts of the body, but especially the kidneys and eyes. The Center's doctors have developed novel treatments for patients suffering attacks on the entire range of the body's systems, from endocrine, neurological, blood, vision, and autoimmune disorders to adrenal problems, vitamin deficiencies, infectious diseases, and behavioral conditions such as schizophrenia and depression. The Center played a central role in studying and treating AIDS; as part of that enterprise, its scientists developed AZT, the first effective drug for the disorder.

For six decades, the Clinical Center of the National Institutes of Health Center has brought together scientists and clinicians to untangle basic biological processes, sparking insights and innovations, often on sicknesses that eluded diagnosis and treatment in conventional settings. The Center has offered hope to patients and provided a template and inspiration for clinical research institutions throughout the world.

Additional information:
The Albert and Mary Lasker Foundation fosters the prevention and treatment of disease and disabilities by honoring excellence in basic and clinical science, by educating the public, and by advocating for support of medical research. Founded in 1942, the Lasker Foundation presents the prestigious Lasker Awards, which recognize the world's leaders in basic and clinical medical research, and individuals with outstanding public service. For much of the 20th Century, the Foundation was led by Mary Lasker, who was America's most prominent citizen-activist for public investment in medical research. She is widely credited with motivating the White House and the Congress to greatly expand federal funding for medical research, particularly through the National Institutes of Health.

About the Lasker Awards: The Lasker Awards are among the most respected science prizes in the world. Recipients of the Lasker Medical Research Awards are selected by a distinguished

international jury chaired by Joseph L. Goldstein, recipient of the 1985 Lasker Award for Basic Medical Research and the Nobel Prize in Medicine. The Public Service Award Selection Committee is chaired by Harvey V. Fineberg, President of the Institute of Medicine of the National Academies of Science. Lasker Laureates receive a citation highlighting their achievements and an inscribed statuette of the Winged Victory of Samothrace, the Lasker Foundation's traditional symbol representing humanity's victory over disease, disability, and death. Eighty Lasker Laureates have received the Nobel Prize, including 28 in the last two decades. More details on the 2011 Lasker Award recipients, the full citations for each award category, video interviews and photos of the awardees and additional information on the foundation are available at www.laskerfoundation.org.