Homeland Insecurity:

Building the Expertise to Defend America from Bioterrorism

PARTNERSHIP FOR PUBLIC SERVICE

About the Partnership for Public Service

The Partnership for Public Service (www.ourpublicservice.org) is a nonpartisan, nonprofit organization dedicated to recruiting and retaining excellence in the civil service through an aggressive campaign of public-private partnerships, focused research, communications and educational efforts, and legislative advocacy.

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Building the Expertise to Defend America from Bioterrorism

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In this report assessing the federal government's efforts to find, hire, manage and retain critical biodefense employees, the Partnership for Public Service seeks to give voice to those on the front lines of the country's biodefense - federal employees and biodefense experts in academia and the private sector.

Therefore, the Partnership acknowledges with great appreciation the time federal agency officials and biodefense experts granted us to conduct interviews and gather the information needed to complete the research and writing of this report. In particular, the Partnership would like to recognize the following biodefense experts in academia and the private sector who offered invaluable input into this report:

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- Dr. Elin Gursky, Senior Fellow for Biodefense and Public Health Programs, ANSER Institute for Homeland Security
- Dr. Margaret A. Hamburg, Vice President for Biological Programs, Nuclear Threat Initiative
- Dr. D.A. Henderson, Senior Science Advisor to the Secretary, Department of Health and Human Services and Distinguished Service Professor at Johns Hopkins University
- Dr. Thomas Inglesby, Deputy Director of the Johns Hopkins Center for Civilian Biodefense Strategies
- Dr. Michael Osterholm, Director of the University of Minnesota's Center for Infectious Disease Research & Policy and Special Advisor to the Secretary, Department of Health and Human Services
- Dr. Tara O'Toole, Director of the Johns Hopkins Center for Civilian Biodefense Strategies

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PREFACE

The air hijackings of September 11, 2001 sensitized us to the risks of terrorist attacks on American cities. Within a month after that, a series of anthrax laden letters brought home the fact that biological materials (that is, bacteria, viruses and poisonous toxins produced by living things) were potentially potent weapons of terrorism. Since then, a great deal of effort has been invested in reducing or managing the risks of bioterrorism.

It has been natural to focus much of that effort on state and local "first responders" and on the local health systems that would bear much of the burden of a biological attack. Large sums of money have been requested for state, county and city police, fire, ambulance and hospital workers and for state National Guard units to improve their training and equipment for coping with biological, chemical and nuclear attacks. Billions of dollars are justifiably being spent on this effort.

But a bioterrorist attack - or even worse, a series of attacks - cannot simply, or even primarily, be a matter of state and local concern. To the contrary, in such a situation, there would be an overwhelming demand for federal action and guidance. After a biological attack, we would depend upon the Federal Bureau of Investigation (FBI) to track down the perpetrators, upon national intelligence agencies to help them in that task, and upon the federal Department of Health and Human Services (HHS), and particularly its subordinate organization, the Centers for Disease Control and Prevention (CDC), to allocate our pharmaceutical stockpiles. We would look to the Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) to advise us about decontamination and to the Food and Drug Administration (FDA) and the Department of Agriculture (USDA) to tell us what was safe to eat and drink. Just as hurricanes demand support from the Federal Emergency Management Agency (now a part of the Department of Homeland Security) and forest fires are fought not only by local citizens, but also by U.S. Marines and firefighters mobilized by the Forest Service and Department of the Interior (DOI), biological attacks will demand federal resources. Above all, we would depend on our President, supported by experts in the White House Office of Homeland Security and the Department of Homeland Security (DHS), to understand what was happening and to provide appropriate leadership.

As we build our defenses before an attack, we rely on the National Institutes of Health (NIH) and many Department of Defense (DOD) medical research centers to help us understand and thwart these weapons; on DHS and DOD to develop detection technologies that will alert us to attacks; on these same departments and on EPA to deploy these technologies; on the FDA to assess the efficacy and safety of drugs and vaccines; and on HHS to fund and procure those medical supplies that do not have a sustaining commercial market in normal times. Beyond this, of course, we depend upon innumerable agencies, starting with DOD, the Coast Guard, the Customs Service, FDA and USDA, to guard us against the introduction and use of such weapons in America.

It follows, then, that our federal government must employ individuals who understand this new threat and can think creatively about how to thwart it, how to cope with it, and how (if it occurs) to recover from it. This demands a federal workforce many of whose members are trained in genetics, infectious disease medicine, epidemiology, microbiology, bacteriology, pharmacology, the physics of aerosol attacks, emergency procedures, and related areas of knowledge. Much will depend upon how well we draw people with this expertise to public service, how effectively we retain them, and how successfully we support them in their work.

This report assesses our stock of federal "human capital" in light of this imperative. Many of its comments will also be relevant to how we prepare at the federal level for natural outbreaks, such as Severe Acute Respiratory Syndrome (SARS) or an influenza outbreak comparable to the 1918 pandemic. Focusing on five federal agencies, the report paints a gloomy picture. We have too few experts; they cannot keep pace with preparatory requirements. A small scale challenge like the anthrax letters in 2001 (which killed five people) overburdened our resources; a large scale attack would overwhelm them. We are steadily losing the experts we have - one in every two will be eligible to retire over the next five years. Limitations on pay, poor hiring procedures and unattractive work settings limit our ability to hire replacements.

In sum, at the very time we should be preparing for a period of most stressful and demanding activity, we are weakening. Despite the best efforts of many exceptional talents, our remaining strengths have every prospect of continuing to erode. Readers will likely conclude, as I do, that our national security requires a better effort to strengthen this aspect of our federal civil service. If this report stimulates that effort, it will do us all a service that may ultimately save our lives.

Richard Danzig
Former U.S. Secretary of the Navy

EXECUTIVE SUMMARY

Bioterrorism represents one of the gravest threats to our homeland security. As scientific and technological advances in the field of biology expand, the threat from biological weapons grows larger and more pressing. Knowledge that al Qaeda has been pursuing the plans and materials to develop biological weapons remind us that the possibility of a bioterrorist attack even more deadly than September 11 looms as a significant risk.

In our effort to respond to this threat, a critical element of preparedness is being consistently overlooked: the skilled medical and scientific employees who form the foundation of our federal civilian biodefense.

"The workforce challenges facing the government with respect to bioterrorism issues are so significant that resources alone will not address the need."

Dr. Michael Osterholm, Director of the University of Minnesota's Center for Infectious Disease Research & Policy and Special Advisor to the Secretary of the Department of Health and Human Services

In this initial review, the Partnership examines the challenges the government faces in attracting, developing, motivating and retaining critical biodefense talent by focusing on five federal agencies that contribute substantially to our biodefense. Three of these agencies are components of the Department of Health and Human Services (HHS) - the Centers for Disease Control and Prevention (CDC), the National Institute of Allergy and Infectious Diseases (NIAID) and the Food and Drug Administration (FDA). Two of these agencies are components of the Department of Agriculture (USDA) - the Animal and Plant Health Inspection Service (APHIS) and the Food Safety and Inspection Service (FSIS).

Based on interviews with officials from these agencies and in other areas of biodefense research, we found that the federal employees responsible for our defenses against bioterrorist attacks constitute a civilian "thin blue line" that is retreating both in terms of capacity and expertise. While the federal government employs a number of highly educated, high-performing employees committed to our biodefense, it is commonly the case that the current state of our civil service frustrates attempts to field an effective corps of biodefense experts.

Not only do current management systems contribute to our failings, they also mask inadequacies. Policymakers, agency leaders and others responsible for our biodefense do not regularly assess our needs for biodefense experts nor comprehensively measure our successes and failures in recruiting and retaining these experts. We say that we are fighting a war against terrorism, but the contrast between our military and our civilian systems could hardly be starker.

The continued vitality of our biodefense workforce is an essential precondition to an effective response to a catastrophic bioterrorist attack. Perhaps more than any other terrorist threat, bioterrorism will place huge burdens on small pools of medical, scientific and technical expertise. These organizations are already exhibiting hairline cracks - some would say fractures - that may presage disaster.

The Worsening Biodefense Talent Shortage

Biodefense agencies are finding it increasingly difficult to hire employees with the required scientific and medical expertise. The overall demand for biodefense talent will continue to rise for the foreseeable future - by as much as 25 percent through 2010 - while the supply of such talent will likely decline. The government is ill-equipped to prevail in the intensifying competition for such talent.

The Continued Loss of Key Biodefense Talent

Federal biodefense agencies are losing some of their most talented employees as a result of the limitations of current government pay systems. The fields of science and medicine are built on a foundation of merit - outstanding performance and discovery are recognized and rewarded by peers. Federal pay systems, however, are generally built for a slow-moving world where civil servants are progressively rewarded as they remain with the government for a lifetime.

For example, agency officials from CDC, NIAID and FDA report losing some of their most talented employees to academic and private sector organizations able to offer employees salaries "30 to 40 percent higher than their current salaries" due to the fact that personnel costs - salaries and expenses - are generally under-resourced.

The Graying of the Biodefense Workforce

Federal biodefense agencies will face significant and unavoidable hurdles maintaining current staffing levels as alarmingly large percentages of the workforce reach retirement age. Nearly half of the federal employees in occupations critical to our biodefense will be eligible to retire within the next five years.

The inordinate size of these "nearing retirement" cohorts are accompanied by notably small numbers of younger employees doing biodefense work. In the field of microbiology, there are 11 employees over 40 for every one under 40 at CDC. Among those with medical backgrounds at the CDC and FDA there are more than twice as many employees over 40 years of age as under 40. Taking our five agencies as a whole, OPM data shows that there are nearly twice as many biology professionals in these agencies over 40 years of age as under 40 years of age.

The Government's Struggle to Hire Biodefense Talent

Responding to short-term public health crises (e.g., SARS) prevents our federal public health agencies - the same agencies responsible for our biodefense - from focusing attention on long-term, strategic staffing and recruiting needs. Our research uncovered little evidence of a comprehensive inventory identifying the federal government staffing requirements and resources needed to meet these requirements. Although federal biodefense staffing levels have increased in recent years, the experts we interviewed doubt that the workforce includes the right employees - in number or in skills - to respond to a bioterrorist attack. On top of these difficulties, the federal government retains a Byzantine hiring process that is more likely to deter than attract top flight candidates.

"We have recruited an outstanding [federal biodefense] team, but we all recognize that it is still substantially below the numbers needed."

Dr. D.A. Henderson
Senior Science Advisor to the Secretary of the Department of Health and Human Services in a letter to the Secretary in March 2003

RECOMMENDATIONS

An effective federal biodefense requires that we inventory our needs, set goals and give agency leaders the tools and resources to build and expand a dedicated and skilled biodefense corps. The Partnership offers the following preliminary recommendations requiring further action on the part of Congress, the administration and biodefense agencies:

- **Conduct National Audit of Biodefense Needs** - Identify the size and composition of the biodefense corps needed to protect against and respond to bioterrorist threats - by individual agency and collectively government-wide. Create a single point of accountability to annually monitor agencies' biodefense staffing progress.

- **Focus Leaders on the Importance of Biodefense Talent to Homeland Security** - Integrate staffing issues into the strategic management of biodefense agencies by creating incentives and other management systems to hold agency leaders responsible for recruiting, developing and retaining the best biodefense talent available.

- **Launch Campaign to Recruit and Retain Biodefense Experts** - Increase bio-defense agencies' authority and resources to develop hiring and compensation systems that reflect labor market conditions and individuals' qualifications. Reform the government hiring process so that it is responsive to the needs of agencies.

- **Grow the First Generation of Biodefense Talent** - Invest in biodefense education - through scholarships, student loan repayment, ongoing biodefense training, and job rotations between the public and private sectors - to expand the pool of biodefense talent available to federal agencies.agencies.

In response to the nuclear threats of World War II and the Cold War, we hired and cultivated the best minds in physics for the Manhattan Project. So too, policymakers must commit to developing and attracting the best minds in medicine and biology to ensure our nation's defense against bioterrorism.

INTRODUCTION

As scientific understanding and manufacturing capabilities in the field of biology continue expanding, the availability, transportability, relative ease of use and potentially devastating consequence of biological weapons are likely to make them an instrument of choice for states, groups and individuals who wish to propagate terror. Given the scale of the possible negative consequences, ensuring our biodefense should be a national project of great priority.

In an effort to improve our homeland security against bioterrorist attacks, policymakers are completing the initial steps needed to build our biodefense: providing federal assistance to state and local "first responders;" stockpiling vaccines and antibiotics; improving laboratory, communications and emergency response and preparedness at all levels of government; establishing a system of monitors in major cities to detect bioweapons in the air; increasing incentives for the rapid development and purchase of critical vaccines and other medical supplies; enhancing the safety of the nation's food supply; and performing exercises and tests to assess and improve state, local and federal response efforts to bioterrorist attacks.[1]

However, one element of preparedness is being consistently overlooked - and is among the most critical: our federal civil service. Federal employees, particularly those in the fields of medicine and biology, form the foundation of our federal biodefense.

Since our inception in 2001, the Partnership for Public Service has been highlighting the vital functions performed by the public sector workforce. Unfortunately, we have also observed that these functions are often undermined by leaders' inattention to federal employment issues, managers who lack the training and skills to motivate and retain employees, insufficient resources and a federal personnel system that encourages attrition and discourages recruitment. We believe that important national security objectives are closely intertwined with the capacities of an increasingly beleaguered federal workforce. Given the increased attention to terrorist threats, we set out to explore the state of our workforce with respect to our nation's biodefense.

"Biological weapons are potentially the most dangerous weapons in the world. Last fall's [2001] anthrax attacks were an incredible tragedy to a lot of people in America… We must be better prepared to respond…"

President George W. Bush, Remarks by the President at the signing of the *Public Health Security and Bioterrorism Preparedness and Response Act of 2002*, June 2002

In this initial review, the Partnership examines the challenges the government faces in attracting, developing, motivating and retaining critical biodefense talent by focusing on five federal agencies that contribute substantially to our biodefense. Three of these agencies are components of the Department of Health and Human Services (HHS) - the Centers for Disease Control and Prevention (CDC), the National Institute of Allergy and Infectious Diseases (NIAID) and the Food and Drug Administration (FDA). Two of these agencies are components of the Department of

Agriculture (USDA) - the Animal and Plant Health Inspection Service (APHIS) and the Food Safety and Inspection Service (FSIS). In addition to biodefense, these same agencies are responsible for maintaining and improving our public health - e.g., preventing and addressing naturally occurring outbreaks of diseases, such as Severe Acute Respiratory Syndrome (SARS). Figure 1 includes a brief description of each agency's biodefense activities and workforce.

Based on interviews with officials from these agencies and in other areas of biodefense research, we found that the federal employees responsible for our defenses against bioterrorist attacks constitute a civilian "thin blue line" that is retreating both in terms of capacity and expertise. The retreat is, in part, a matter of numbers. As Dr. D.A. Henderson - a leader in the field of biodefense since the 1960s and Senior Science Advisor to the Secretary of Department of Health and Human Services - stated recently, "We have recruited an outstanding team, but we all recognize that it is still substantially below the numbers needed."[2]

Beyond this lies a more fundamental problem. Our federal human capital (i.e., personnel) systems and processes are broken - broken to the point that managers can neither attract nor retain the expertise we need. While the federal government employs a number of highly educated, high-performing employees committed to our biodefense, existing federal human capital management systems keep federal agencies from retaining talented employees and recruiting replacements with the necessary medical and scientific expertise. At times, one may find an innovative manager who invests energy and ingenuity into maneuvering around existing rules and regulations - often by drawing on temporary employees, contractors and other external resources. These managers produce pockets of excellence within their respective agencies, but these pockets occur at the expense of management resources and the long-term development and retention of institutional knowledge. It is commonly the case that a lack of government-wide strategic planning, an anachronistic application and hiring process, and rigid pay schedules frustrate attempts to recruit and retain an effective corps of biodefense experts.

Not only do current human capital management systems contribute to our failings, our inadequate systems also mask those inadequacies. Our human capital deficiencies are frequently unnoticed because policymakers, agency leaders and others responsible for our biodefense do not regularly assess our needs for biodefense experts nor comprehensively measure our successes and failures in recruiting and retaining these experts.

The federal government is losing much needed employees while inadequately recruiting the new talent required to maintain and improve our biodefense.

We say that we are fighting a war against terrorism, but the contrast between our military and our civilian systems could hardly be starker. The military has defined its requirements for soldiers, sailors, marines and airmen. It monitors recruitment every day and across every specialty. It measures attrition and, when necessary, implements incentives to retard it. In contrast, our civilian biodefense effort nowhere focuses on, regularly records or systematically addresses our human capital management problems. These agencies - like most other federal agencies - lack the resources to collect and monitor detailed data measuring the performance of human capital management systems. The biodefense agencies do not, so far as we can ascertain, compile such common metrics as the time needed to hire employees, the number of applicants accepting versus declining job offers, or the reasons employees commonly cite for leaving their agencies. The agencies do not know whether the performance of their human capital management systems is improving or deteriorating, and they do not compare themselves with private sector competitors.

In this report we make our best effort to compensate for the absence of agency-provided data, by interviewing agency officials and analyzing data from the Bureau of Labor Statistics (BLS), the Department of Education's National Center for

Educational Statistics (NCES) and the Office of Personnel Management (OPM).

Based on our interviews with those in biodefense and on our data analysis, this report details the workforce issues currently confounding the biodefense establishment and outlines some of the necessary next steps that agency leaders, Congress and the President should take to build our biodefense.

Figure 1: Federal Biodefense Agencies Included in the Report: Biodefense Activities and Full-Time, Permanent Employees

Agency	Biodefense Activities	Full-Time, Permanent Employees
	*Centers for Disease Control and Prevention (CDC) employees perform cutting edge health research and investigations. Also, CDC employees develop biodefense policies; build networks for communicating health alerts; maintain pharmaceutical stockpiles; and offer technical advice and training to states and localities. CDC is an agency within the Department of Health and Human Services (HHS).*	Approximately 8,500 employees span over 170 disciplines - including 1,800 medical professionals and 580 bioscience professionals.
	*In partnership with academic and private sector organizations, National Institute of Allergy and Infectious Diseases (NIAID) employees conduct basic research on biological agents and human immune system responses; develop tests for detecting biological agents; and develop vaccines, drugs and other medical countermeasures needed to treat the effects of a bioterrorist attack. NIAID is an agency within the National Institute of Health (NIH), which is itself a part of HHS.*	Approximately 1,200 employees, including physicians, nurses, biologists and chemists.
	*Food and Drug Administration (FDA) employees are responsible for ensuring that new drugs, vaccines and other medical countermeasures combating illness, including illnesses caused by a bioterrorist attack, are safe and effective for use among the general population. Also, FDA ensures that food (i.e., other than meat, poultry and eggs) and medical supplies in the United States have not been contaminated, including contamination with a biological agent, via testing and surveillance. FDA is an agency within HHS.*	Approximately 8,000 employees, including 2,800 medical professionals and 1,100 bioscience professionals.
	*The Animal and Plant Health Inspection Service (APHIS) is responsible for safeguarding our animals and plants from contamination by invasive pests and diseases, including biological weapons that could devastate our agricultural industries. APHIS is an agency within the U.S. Department of Agriculture (USDA).*	Approximately 5,700 employees, most of whom - 3,500 - are in the biosciences.
	*Food Safety and Inspection Service (FSIS) employees establish, investigate and enforce safety requirements that prevent the food we eat from being contaminated, including contamination from bioweapons. In addition to food safety inspections, FSIS assesses potential vulnerabilities and provides guidelines to the private sector on food security. FSIS is an agency within the USDA.*	Approximately 9,000 employees, including 6,600 inspectors.

Source: OPM Central Personnel Data File and interviews with agency officials

THE STRATEGIC IMPORTANCE OF OUR PUBLIC BIODEFENSE WORKFORCE

If a major biological attack occurs - as many think it will - the vitality of our biodefense corps will spell the difference between bad outcomes and catastrophic ones. The capability of our biodefense establishment will directly affect the survival, the health and the economic recovery of large numbers of our citizens.

The biodefense experts and agency officials with whom we spoke considered three types of bioterrorist attacks to be among the most likely near term threats - an attack using an infectious, though not contagious disease such as anthrax; an attack using an infectious and highly contagious disease such as smallpox; or an attack aimed at crippling our agricultural industry and food supply system with a bioweapon such as ricin or botulinum toxin. In the longer term, as knowledge of genetic engineering proliferates, so will the threats.

Federal medical professionals and scientists at CDC, for example, monitor health trends to distinguish normal outbreaks of infectious disease from something more sinister. CDC, in short, is charged with acting as the nation's principal bioterror "sentry" - working with state and local health departments, private hospitals and physicians to scan the horizon for evidence that virulent pathogens have been unleashed as a weapon of terror. As the recent international outbreak of Severe Acute Respiratory Syndrome (SARS) illustrates, this exacting work requires teams of committed individuals with broad experience, technical expertise and good judgment.[3] While generally focusing on longer term issues, the research capabilities of NIAID are mobilized upon the appearance of an unprecedented pathogen, whether natural (as with SARS) or terrorist (as with the 2001 anthrax attacks). Similarly, inspectors at FDA, APHIS and FSIS work to prevent domestic and imported agricultural products and food supplies from being contaminated with biological agents.

Much of the battle over these issues is determined by the work of these agencies before a bioterror attack is even detected. Our national response depends significantly upon the vaccines and medical countermeasures that federal medical professionals and scientists at NIAID and FDA are researching, developing and licensing.

The continued vitality of our biodefense workforce is an essential precondition to an effective response to a catastrophic bioterror attack.

Given the roles these agencies play, it takes little imagination to understand that the continued vitality of our biodefense workforce is an essential precondition to an effective response to a catastrophic bioterror attack. Perhaps more than any other terrorist threat, bioterror attacks will place huge burdens on small pools of medical, scientific and technical expertise. These organizations are already exhibiting hairline cracks - some would say fractures - that may presage disaster.

THE 2001 ANTHRAX ATTACKS

Two years ago, when anthrax was suspected of killing a photographer in Florida, a CDC team of pathologists were dispatched immediately to perform an autopsy and begin an investigation.[4] As the additional 21 cases of anthrax developed, CDC committed between 500 and 2,000 of its 8,500 employees to the anthrax attacks on any given day

and moved into operations 24 hours a day, seven days a week. According to Dr. Julie Gerberding, the CDC Director, a more massive release would have stretched CDC, as well as state and local health department, resources beyond capacity.[5]

CDC pathologists performed autopsies; CDC physicians and nurses assessed the health of Americans who might have been exposed; senior CDC officials advised on the antibiotic and other regimens that should be adopted for those at risk; CDC scientists performed the laboratory work that confirmed the presence of Bacillus anthracis in those suspected of having been infected by the bacterium. In an effort to prevent the spread of the disease, epidemiologists and infectious disease experts investigated alternative sources of the illness and, when it was determined that this was a terrorist attack, they supported Federal Bureau of Investigation (FBI) analysis of the infective agent. Additionally, CDC officials were deluged with requests from the media, the public, and federal, state and local officials for information about all aspects of this threat.

Agency employees were working around the clock, sometimes sleeping on mattresses placed in laboratories, to complete the work needed to respond to both the real cases, as well as the thousands of hoaxes. In all, CDC processed more than 5,400 anthrax-related specimens - while simultaneously working with external labs to manage more than 70,000 additional specimens.[6] As a result, the agency's efforts suffered - laboratories operating at capacity could not address any other public health issue. During the initial stages of the attacks, technical advisors were unaware of and therefore could not provide the public and medical personnel across the country with timely information regarding the possible benefits of treating those suspected of being exposed to anthrax with a combination of antibiotics and vaccination. Even as postal workers were infected with anthrax and began dying, CDC employees were unaware of a critical study performed by Canadian researchers regarding the dispersal of anthrax spores from sealed envelopes.[7]

The anthrax attack, a small scale attack according to most biodefense experts, stretched our resources to capacity because the limited supply of biodefense talent available to CDC has diminished in recent years. According to those we interviewed for this report, the CDC may employ only one to three experts in any given disease specialty.

Even after the attacks, CDC has lacked the resources to follow-up with those who survived the experience of inhaling anthrax-causing bacteria. The people who survived exposure to inhalation anthrax in 2001 are something of an anomaly; in the past, nearly everyone infected with, and untreated for, inhalation anthrax has perished.[8] While CDC "has drawn blood from survivors to measure changes in their immune systems, it has not conducted comprehensive follow-ups or physical examinations."[9] The reasons, officials say, "include a lack of trained personnel, red tape and a surfeit of competing demands."[10]

This shortfall is especially disturbing when one considers that the anthrax attacks may have been probing exercises designed to reveal our emergency preparedness plans and level of readiness. If this is true, then we have unfortunately already signaled our vulnerability to larger-scale, multiple or phased bioterrorist attacks.

One major goal for terrorists is to undermine confidence in our government's ability to respond to the disruption and fear provoked by an attack. The government lost several rounds in this battle for confidence during the anthrax threat. Confusing and contradictory communications to the public fueled widespread anxiety. Postal workers were infected because information was neither assimilated nor conveyed to decision-makers. Decision-makers need access to top scientific talent that is committed to public service to effectively execute their responsibilities during a bioterror event.

THE LESSONS OF DARK WINTER

The crucial importance of a robust corps of top medical and scientific talent was also underscored by a recent planning exercise that tried to simulate the policy decisions that would have to be made in

response to one of the most troubling bioterror scenarios: the deliberate release of the long-dormant smallpox virus. Smallpox killed hundreds of millions of people during the 20th century - "far more than all of the century's wars combined."[11] Although experts considered smallpox eradicated more than 20 years ago, the infectious disease has reemerged as a potential weapon of terror.

To prepare policymakers for this threat, several think tanks sponsored a planning exercise - dubbed "Dark Winter" - to simulate U.S. reaction to the deliberate introduction of smallpox in three states during the winter of 2002.[12] Under the chilling logic of the simulation, three terrorist dispersals of smallpox virus would need to infect only 1,000 people each to quickly produce a staggering one million deaths within six weeks. To prevent these outcomes, the participants quickly discovered that a number of extraordinarily difficult decisions would have to be made in highly compressed time frame to marshal an effective federal response. The CDC and other agencies would be asked to advise policymakers about which populations would need to receive vaccine and which areas would need to be quarantined and for how long. A smallpox outbreak of this kind would not permit the slow groping toward certainty and consensus that characterized our response to the anthrax mailings.

Among the lessons of Dark Winter was the realization that our leaders are generally unfamiliar with the character of bioterrorist attacks, which places a special emphasis on the role of the federal government's bioterror expertise. "Important decisions and their implications were dependent on public health strategies and possible mechanisms to care for large numbers of sick people - issues that the national security and defense communities have not typically analyzed in the past."[13] For example, the federal government would have to move quickly to recognize that a smallpox outbreak is occurring; to identify the areas of infection; to predict the likely size of the outbreak; and to track large numbers of people who will have been exposed, hospitalized and vaccinated.

Significantly, the Dark Winter participants also concluded that the lack of surge capability in the U.S. public health system could "impede public health agencies' analysis of the scope, source and progress of the epidemic, the ability to educate and reassure the public, and the capacity to limit casualties and the spread of disease."[14]

Instilling public confidence will require significant technical and scientific expertise that speaks credibly on behalf of the government. Only then will it be possible to assure citizens that recommended measures - vaccines, antibiotic prophylactic programs or quarantine efforts, for example - are warranted, that the government is providing the best treatment and advice, and that it is capable of maintaining the confidence of our citizens in the face of widespread fear and uncertainty.

THE THREAT TO OUR FOOD SUPPLY

The final category of bioterror threat - contamination of food or water supplies - could also be staggeringly lethal. Ricin, for example, is a deadly biological agent that can kill through the ingestion or inhalation of even small amounts. There is no antidote or vaccine for ricin. A small amount of this substance was discovered in the London apartment of six North African immigrants, raising fears that al Qaeda may be planning to disrupt water systems and food supplies. These fears were heightened when, two months later, small amounts of ricin were found inside a locker at the Gare de Lyon train station in Paris.

Botulinum toxin is another agent that poses a significant threat because of its "extreme potency and lethality; its ease of production, transport and misuse; and the potential need for prolonged intensive care in affected persons."[15] According to Johns Hopkins University's Center for Civilian Biodefense Strategies, botulinum toxin is the single most poisonous substance known.[16] In early 2003, the Pentagon received "credible information" that Iraqi operatives were planning to attack food and water supplies in this country with botulinum toxin. This was one of the factors that led to the heightened Code Orange alert status in February.[17] In March 2003, we also learned that al Qaeda has acquired plans and materials to develop botulinum toxin.[18]

According to a report by the National Research Council, the United States could not quickly respond to a large scale agricultural bioterrorist attack.

Biological agents would not even need to cause human casualties to exact an enormous economic and psychological toll. In 2001, foot and mouth disease (presumably from natural causes) broke out in Great Britain and forced the government to slaughter and burn approximately four million animals.[19] The disease devastated the country's food, agricultural and tourist industries - generating losses of approximately $5 billion in food and agricultural industries and that amount again in losses to tourist industries.[20] Intentionally infecting plants or animals with a disease, such as foot and mouth, could disrupt our interstate and international commerce, with the added effect of destroying confidence in the safety of all our food.[21]

The British experience underscored the importance of prompt detection. By the time the disease was detected and all animal movement stopped, the disease had already taken hold at over 50 locations throughout the country, each of which became the focus of a major outbreak.[22] The best estimates are that this initial spread occurred in a space of just three weeks. Efforts to contain the disease quickly swamped the British public health authorities. Staff had to be borrowed from other agencies and the military as well as recruited locally.[23] At the beginning of the outbreak, Britain only had enough laboratory capacity to conduct 400 serum tests per week for the presence of foot and mouth disease. By November 2001, this capacity had to be increased to 200,000 tests per week, which was key to allowing the government to declare areas free of contamination and lift onerous travel restrictions.[24]

In this country, APHIS and FSIS, agencies within the Agriculture Department, are responsible for safeguarding our animals, plants and food supply systems from contamination by bioweapons. Although APHIS is primarily focused on inspections, the agency's workforce also performs testing and research, as well as regulatory work.

FSIS employs veterinarians, consumer safety officers, microbiologists, chemists and other scientific professionals who not only analyze food samples to determine whether our system has been contaminated with a biological agent, but who also work proactively to assess potential vulnerabilities, provide guidelines to the private sector on food security, and coordinate any needed response to a bioterrorist attack on our food supply.

As in the other scenarios of bioterror attack, these agencies will face crushing burdens if it is discovered that our food or water supplies have been contaminated. According to a report by the National Research Council, the United States could not quickly respond to a large scale agricultural bioterrorist attack. An attack would likely overwhelm federal officials, as well as existing laboratory and field resources.[25]

THE BIODEFENSE WORKFORCE CRISIS

The five agencies featured in this report face a common challenge - obtaining and then retaining the right medical and scientific talent to ensure an effective biodefense and stay ahead of bioterrorists. While the demand for this talent is rising in the public sector, the supply of medical and scientific talent available is declining, and competition from the private sector and academia is increasing. In a dauntingly competitive environment, federal agencies will face significant hiring needs in the next few years just to replace the large percentages of their employees who will reach retirement age. Furthermore, many talented and experienced employees in the public biodefense sector are leaving for other job opportunities. Unfortunately, the agencies are burdened by a lengthy hiring process, inflexible pay systems and other management constraints that make successfully competing for the best biodefense talent available difficult at best.

A SHRINKING PIPELINE: THE WORSENING BIODEFENSE TALENT SHORTAGE

Bureau of Labor Statistics (BLS) data project that employment demand in occupations critical to our biodefense will grow rapidly through 2010. Demand for biologists is expected to be approximately 20 percent greater than in 2000. The demand for physicians and related occupations is expected to be approximately 25 percent greater. Just as the federal government needs physicians and scientists to meet its biodefense requirements, so state and local governments, academic institutions, pharmaceutical companies and consulting firms need physicians and scientists for biodefense and other, more traditional health-related work, including the explosion in genetic research and related product developments.[26]

On the supply side, colleges and universities are not graduating enough students in these fields to meet rising demands. According to data from the U.S. Department of Education's National Center for Education Statistics (NCES), the number of students graduating with advanced degrees in the biological sciences diminished throughout the 1990s. The number of students graduating with a master's degree in the biological sciences declined from 6,466 in 1996-1997 to 6,198 in 1999-2000; the number of students graduating with a doctorate degree in biological sciences essentially remained static at approximately 5,000 over the last five years.[27]

Similarly, the number of medical professionals entering the labor market has remained generally constant over the last 20 years. The number of students enrolling in and graduating from medical schools plateaued in the early 1980s at approximately 17,000 students each year.

Unfortunately, a significant fraction of this small pool is out of bounds to the government because of laws that largely limit federal hiring to U.S. citizens.[28] International medical graduates, for example, consistently account for about 25 percent of those in U.S. graduate medical education resident programs.[29]

To make matters worse, the types of highly specialized expertise that the biodefense establishment must hire are exceedingly hard to find. According to some biodefense experts, including Dr. Tara O'Toole, Director of the Johns Hopkins Center for Civilian Biodefense Strategies, "The field of biodefense did not even exist as recently as 1998. As a result, few college students can actually pursue studies in biodefense. Even when students study the biological sciences forming the foundation of

biodefense, they often lack practical clinical experience or an appreciation for biological agents as weapons rather than merely diseases."[30]

Our interviews with officials from CDC, NIAID, FDA, APHIS and FSIS confirm these difficulties. Officials consistently report a shortfall in available talent. A variety of other indicators point in the same direction. In a public statement NIAID officials note that a "dearth of investigators involved in research on some of the most important pathogens that could potentially be used in a bioterrorist attack."[31] An industry publication observes, "[college students are studying] hotter areas of biotechnology, such as tissue engineering, metabolic engineering, gene therapy, and cell therapy" - students do not perceive biodefense as a viable career option.[32] A medical student we interviewed offered, "I would consider working in the federal government. However, the private sector seems to offer far greater opportunity to pursue truly innovative work in the field of science and medicine. Work in the public sector, though valuable, just does not seem to be as high-impact or cutting-edge."[33]

"The field of biodefense did not even exist as recently as 1998. As a result, few college students can actually pursue studies in biodefense."

Partnership interview with Dr. Tara O'Toole, Director of the Johns Hopkins Center for Civilian Biodefense Strategies

ABANDONING SHIP: THE CONTINUED LOSS OF KEY BIODEFENSE TALENT

The fields of science and medicine are built on a foundation of merit - outstanding performance and discovery are recognized and rewarded by peers. Federal pay systems, however, are generally built for a slow-moving world where civil servants are progressively rewarded as they remain with the government for a lifetime.[34]

Federal systems are breaking down under both the stress of job mobility and the competition for workers trained in the fields of biology and medicine. The competition for biodefense talent is intense even among private sector organizations. According to one industry publication, a biochemical engineer with seven years of experience at a leading pharmaceutical company may get "…two to three calls a week from recruiters. Most of the job opportunities would be promotions with higher pay."[35] In such a fiercely competitive environment for talent, our biodefense agencies - government-wide - need the authority to effectively recognize and retain key talent.

In every interview we completed with members of the federal biodefense workforce - particularly those on the front lines - employees stated that federal pay systems are antithetical to the foundation of merit found in other sectors. According to one employee we interviewed, "Current federal pay systems reward the productive and the unproductive exactly the same. The result - employees feeling overworked and underappreciated, become demoralized, less productive, and more likely to leave to work for a competitor in the private sector or academia."[36] According to agency officials, even newer biodefense employees possess the skills and abilities valuable to academic institutions and the private sector after only a few years of federal service.

Each of the agencies included in this report - CDC, NIAID, FDA, APHIS and FSIS - describe challenges retaining some of their most talented employees as a result of current pay systems. Recent GAO reports, for example, document the fact that the FDA is losing mission critical employees due, at least in part, to federal pay systems.[37] According to GAO, FDA is experiencing high attrition rates among employees - especially those researching and evaluating new drugs and medical products. These professionals are intensely aware that they can "work in private industry and academia for higher salaries."[38]

One problem, according to agency leaders and human resources professionals, is the patchwork of compensation rules and regulations that are too

restrictive for agencies to effectively compete with the private sector and academia. Even within this context, agency leaders and human resources professionals report that budgetary limitations prevent them from using existing pay systems to the maximum extent.

In every interview we completed with members of the federal biodefense workforce - particularly those on the front lines - employees stated that federal pay systems are antithetical to the foundation of merit found in other sectors.

Title 5, U.S. Code - the traditional compensation system for federal employees - governs compensation at APHIS and FSIS. It imposes a rigid system in which over 75 percent of pay increases "bear no relationship to individual achievement or competence."[39] USDA agency officials stated in interviews that, between the GS pay scale and the flexibility afforded using physicians' comparability allowances, starting salaries for new USDA physicians can reach no higher than $110,000 - $115,000.[40] Survey data from Physicians Search - a national physicians placement service company - identify starting salaries for private sector physicians at $125,000 to $200,000, depending on specialty.[41]

Title 5 not only frustrates agencies' efforts to recruit employees, but to retain employees as well. According to APHIS and FSIS officials, experienced employees, as well as newer employees eager to achieve the highest levels of performance, often perceive the current pay system as unfair because financial rewards appear to be predetermined by the general schedule (GS), consisting of 10 steps and 15 grades, and not performance. In addition to annual "comparability" pay raises, an employee can expect to receive a standard and relatively modest pay increase every one to three years - whether high-performing or otherwise.

Even when agencies have the ability to use pay systems other than Title 5, budgetary constraints often prevent the effective use of those systems. For example, CDC, NIAID and FDA - all agencies within HHS - have the authority to offer certain physicians and scientists more market sensitive pay under Titles 38 and 42 of the U.S. Code.[42] Those exceptional, senior physicians who would hold key positions may be paid up to $200,000 annually. In interviews with the Partnership, these agencies have reported identifying and recruiting preeminent experts in the field of medicine and science, but being unable to hire the candidates due to budgetary constraints. As one agency official noted, "The flexibility to offer more competitive salaries can be helpful. However, current budget conditions constrain our ability to use these systems. If we have a fixed amount of money to spend on salaries, and we want to offer certain employees higher pay, we will be unable to maintain our current staffing levels. In other words, we run the risk of spending the same or a little more money on salaries for fewer employees."[43]

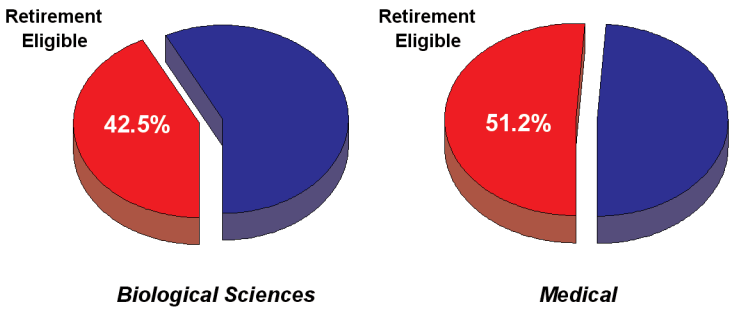
One problem, according to agency leaders and human resources professionals, is the patchwork of compensation rules and regulations that are too restrictive for agencies to effectively compete with the private sector and academia.

Agency officials from CDC, NIAID and FDA tell us that salaries and recruiting expenses are consistently under-resourced. As a result, they report losing some of their most talented employees to academic and private sector organizations able to offer employees salaries "30 to 40 percent higher than their current salaries."[44]

INEVITABLE ATTRITION: THE GRAYING OF THE BIODEFENSE WORKFORCE

The loss of mid-career talent, although significant from a qualitative standpoint, does not yet repre-

Figure 2: Retirement Eligible Biodefense Employees Through FY 2008



	Retirement Eligible Employees	
Agency	Biological Sciences	Medical
CDC	47%	45%
NIH	46%	54%
FDA	51%	52%
APHIS	37%	N/A
FSIS	49%	N/A

Note: Retirement eligibility statistics include full-time, permanent employees from CDC, FDA, APHIS and FSIS. NIAID is not included because the employee population is too small to accurately perform the calculations. Similarly, retirement eligibility statistics for medical employees in APHIS and FSIS are not included because the population is too small to accurately perform calculations.

Source: OPM

sent a very large percentage of the biodefense workforce. The federal biodefense sector, however, will face significant and unavoidable challenges in maintaining current staffing levels as alarmingly large percentages of that workforce reach retirement age.

Nearly half of the employees in CDC's most critical occupations - physicians and biologists - will be eligible to retire within the next five years. According to OPM data, 44.6 percent of CDC's approximately 1,500 employees with medical backgrounds will be eligible to retire by fiscal year 2008. Forty-seven percent of CDC employees in the biological sciences will be eligible to retire in five years as well.

Even as NIH and its sub-agency, NIAID, gear up to research the next generation of vaccines, drugs and other medical products needed for our biodefense, more than 54 percent of NIH employees in the medical field, and nearly 46 percent of its employees in the biological sciences, will be eligible to retire within the next five years.

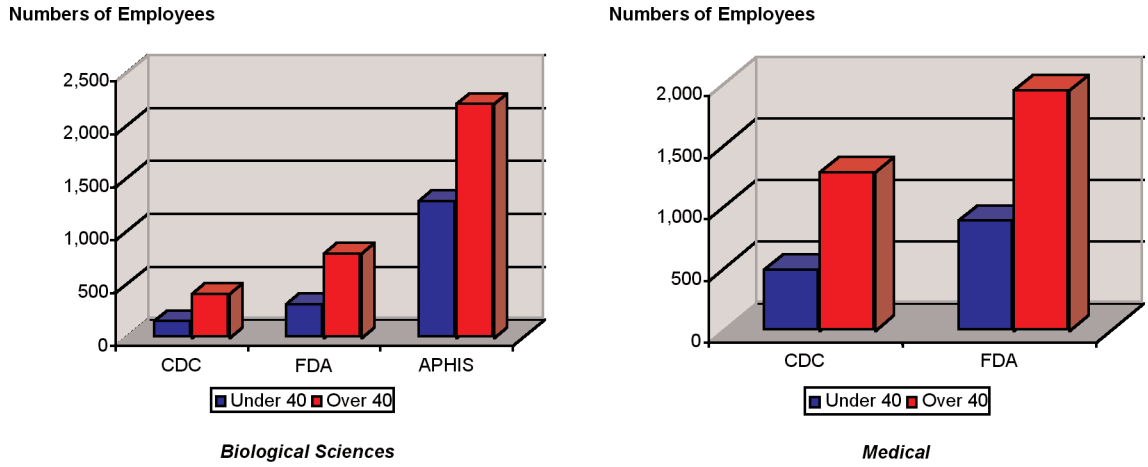
Similar retirement eligibility numbers appear at another HHS agency - FDA. Fifty two percent of employees in the medical field and nearly 51 percent of employees in the biological sciences will be eligible to retire by 2008. These two occupational categories represent two of the largest and most critical occupational categories to the FDA and its biodefense efforts.

At APHIS, 37 percent of all employees in the biological sciences - the most populous occupational group in APHIS - will be eligible to retire by the end of fiscal year 2008.

Nearly half of the employees in CDC's most critical occupations - physicians and biologists - will be eligible to retire within the next five years.

At FSIS, some of its most critical talent - including those needed for an effective biodefense - may be expected to leave within the next five years.

Figure 3: Biodefense Employee Age Ranges



Note: Employees are full-time permanent.

Source: OPM Central Personnel Data File (FY 2002)

Approximately 53 percent of the agency's employees will be eligible to retire by the end of fiscal year 2008, including more than 50 percent of employees responsible for inspecting food processing plants, and 49 percent of employees in the biological sciences - the occupational groups that carry out the agency's most critical biodefense responsibilities.

The inordinate size of these "nearing retirement" cohorts are accompanied by notably small numbers of younger employees doing biodefense work. At CDC, in the field of microbiology, there are 11 employees over 40 for every one under 40. Among those with medical backgrounds at the CDC and FDA there are more than twice as many employees over 40 years of age as under 40. Taking our five agencies as a whole, OPM data shows that there are nearly twice as many biology professionals in these agencies over 40 years of age as under 40 years of age.

Because experts in the biological sciences and medicine often require extended education and training, we would expect some skewing towards older populations in the workforce. However, the federal workforce is disproportionately older. Nearly 70 percent of the federal employees described in this report are over 40 years of age - a significantly older population than in the private sector where approximately 60 percent of private sector scientific employees are over the age of 40.[45]

ONE HAND BEHIND ITS BACK: THE GOVERNMENT'S STRUGGLE TO HIRE BIODEFENSE TALENT

In January 2001, GAO designated human capital management a government-wide high-risk area that, if left unaddressed, would severely and negatively affect the performance of the federal government. In spite of considerable progress over the past two years, GAO reported in January 2003 that federal human capital management remains a problem.[46] Government-wide, agencies must do more to assess staffing needs strategically relative to mission requirements and recruit new employees more effectively. Federal biodefense agencies are no exception to this general finding.

With our federal biodefense agencies engaged in what Dr. Georges Benjamin, Executive Director of

the American Public Health Association, describes as "a public health shell game" - shifting from "one headline-grabbing problem" to another - agency officials report that there is little time to focus attention on long-term, strategic staffing and recruiting needs.[47]

Individually, federal biodefense agencies have begun assessing their personnel needs. However, our interviews suggest that the planning efforts are suffering on at least two counts. First, there is no government-wide planning effort that develops a coordinated recruitment plan for the numerous federal agencies responsible for biodefense. Second, the isolated planning that does occur does not, to our knowledge, attempt to define the needed biodefense talent. We have seen no analysis that identifies the numbers and types of employees needed in response to the most likely bioterrorist threats. The result: although federal biodefense staffing levels have increased in recent years, the workforce may not include the right employees - in number or in skills - needed to respond to a bioterrorist attack.

There is no government-wide planning effort that develops a coordinated recruitment plan for the numerous federal agencies responsible for biodefense.

From their vantage point, human resources professionals report difficulty working with front line staff regarding their long-term staffing needs. Even when agencies' human resources functions possess the skills, if not the numbers, needed to support the organizations' staffing objectives, human resources staff state that managers do not view them as strategic partners. Line employees and human resources are not engaged in ongoing dialogue about short- and long-term staffing requirements, and agencies' critical talent requirements only become apparent when the need is greatest (e.g., when crises emerge or productivity declines).

As one human resources official we spoke with stated, "In the past, managers could recruit and hire employees whenever needed. Because the labor market - particularly the market for scientific and medical talent - is so competitive today, we cannot wait until an employee has left to begin searching for, identifying and recruiting candidates to fill critical needs in a timely fashion. Unfortunately, short-term demands prevent line staff and human resources from working together proactively. As a result, our personnel needs remain unknown until someone leaves and our work begins to suffer."[48]

Federal officials on the front lines of our biodefense complained that they lack the talented human resource professionals needed to ensure that the best employees are selected and hired in a timely fashion. Since 1992, human resource support to agencies government-wide has declined by approximately 27 percent, and by as much as nearly 50 percent in some biodefense agencies, according to officials.[49] Even at CDC, NIAID and FDA, agencies with more flexible personnel systems for hiring employees, officials reported that hiring has been delayed as HHS continues efforts to centralize the human resources function among agencies within the department.

As an official from one of the HHS agencies included in this report related, "There are simply not enough human resources professionals to perform the personnel work of the agency. We not only hire a lot of employees, but we must successfully screen a large number of applications to select the best. Unfortunately, we do not have enough human resources professionals with the scientific or technical understanding needed to provide managers with strategic advice or assistance. I have personally reviewed lists of candidates certified by human resources to be among the best qualified and been astonished to see that none of the candidates actually possessed the knowledge and skills needed to fill the position."[50]

APHIS and FSIS officials reported similar concerns about their human resources function. According to an official from one of these USDA agencies, too often the human resources function operates from a "defensive position - going the

extra mile to dot every 'i' and cross every 't' rather than going the extra mile to work with managers and supervisors interested in hiring the best biodefense talent available."[51]

Hiring challenges for CDC, NIAID and FDA, in particular, have increased within the past year as the overall human resources support available to the agencies has diminished as a result of efforts to centralize the human resources function within HHS. As noted earlier, centralization of the human resources function may lead to long-term efficiencies, but CDC, NIAID and FDA officials report that timely human resources support has been unavailable at times during the transition.

Considering the large numbers of employees agencies must hire to maintain and improve the nation's biodefense, the federal hiring process is more than a burden - it constitutes a strategic vulnerability.

The recruitment challenges resulting from this lack of strategic human capital planning are compounded further by a federal hiring process widely considered to be one of the most significant barriers to effective recruitment of new talent to the federal government. The recently published report from the National Commission on the Public Service, *Urgent Business for America: Revitalizing the Federal Government for the 21st Century*, describes a hiring process that is "heavily burdened by ancient and illogical procedures that vastly complicate the application process and limit the hiring flexibility of individual managers."[52] One official we interviewed bluntly stated, "I could go to any unit within my agency, and each manager would have at least one story about losing an applicant due to the hiring process."[53] Our assessment, after considering the large numbers of employees biodefense agencies must hire to maintain and improve the nation's biodefense, is that the federal hiring process is more than a burden - it constitutes a strategic vulnerability.

Applicants to biodefense agencies describe the hiring process as a time-consuming, unresponsive maze of paperwork. Agency officials also see the hiring process as an unresponsive exercise during which managers, supervisors and human resources professionals seek ways to overcome constraints to acquiring the talent needed for building our biodefense. The loss of critical talent - talent to develop new medical countermeasures, certify the efficacy of those countermeasures, ensure that our food and medical supplies are safe, and monitor our health and safety - is the cost imposed by a hiring process burdensome to both applicants and agency officials.

In the course of our research, the Partnership spoke with a sample of individuals who had applied for positions with some of the agencies discussed in this report. According to these individuals, the hiring process at a federal agency bears no resemblance to the hiring process at an academic institution or a private sector organization. As one individual we interviewed remarked, "When applying for a position in the federal government I had to complete any number of forms, including essays describing my KSAs [i.e., knowledge, skills and abilities]. The process lasted months, during which time I heard very little from the agency. Since that experience, I have worked in academia and the private sector. In both instances, my curriculum vitae and an interview were enough to demonstrate my abilities to the organization. I was offered a job within weeks [by these organizations]."[54]

Even those who persevered through the federal hiring process find the experience too flawed to forget. One federal biodefense employee we interviewed stated that, "After years of experience in academia, and prior to that in the federal government, I decided to return to the public service. I applied for about 10 jobs in biodefense agencies across government. I received postcards in response to about half of those applications - general postcards stating that the agencies had received my application. I never heard anything regarding the other five positions. One Friday morning, eight months later, I received my first phone call requesting an interview the following

Monday - an interview for a position I could barely remember applying for at that point."[55]

Agency officials from CDC, NIAID, FDA, APHIS and FSIS all reported losing candidates to competing organizations due to hiring times - the time between application and offer of employment - that can average more than six months. Allowing this to continue is symptomatic of the lack of strategic direction and accountability that plague federal human capital management.

CONCLUSION AND RECOMMENDATIONS

Bioterrorism represents one of the gravest immediate threats to our domestic security. Marshaling an effective response requires that we give agency leaders and managers the tools and resources they need to build and expand a dedicated and skilled biodefense corps. Sixty years ago, when our government needed to build an atomic bomb, it hired the best minds in physics through the Manhattan Project to build an atomic weapon. In just three years, we built an industrial complex that was as large as the entire prewar auto industry.[56]

Meeting this challenge may not require commitments of that scale, but it will require top policymakers to focus on the importance of a civil service populated with the kind of intellectual capital that is urgently needed for an effective bioterror defense. As Dr. Michael Osterholm, Director of Center for Infectious Disease Research & Policy at the University of Minnesota stated, "The workforce challenges facing the government with respect to bioterrorism issues are so significant that resources alone will not address the need."[57]

To address those challenges, the Partnership offers the following preliminary recommendations requiring further action on the part of Congress, the administration and biodefense agencies:

- **CONDUCT NATIONAL AUDIT OF BIODEFENSE NEEDS**

  The administration and biodefense agencies must undertake the individual agency and collective government-wide strategic planning necessary to identify the size and composition of a biodefense corps needed to protect against and respond to likely bioterror scenarios.

  Agency leaders must work in partnership with their Chief Human Capital Officers (CHCO) to rigorously define specific human capital needs, potential talent shortages and the strategies for recruiting and retaining employees in critical skill areas. Agencies must incorporate these findings into the budget planning process.

  Congress and the administration must create a single point of accountability with responsibility for annually monitoring individual agencies' and government-wide biodefense staffing progress.

- **FOCUS LEADERS ON THE IMPORTANCE OF BIODEFENSE TALENT TO HOMELAND SECURITY**

  To integrate staffing issues into the strategic management of biodefense agencies, Congress, the administration and agencies should create incentives and other systems

(e.g., performance contracts, monetary rewards, regular oversight hearings) for holding agency leaders, managers, supervisors and human resources professionals responsible for attracting, selecting, hiring and retaining the best talent available, as quickly as possible.

- **LAUNCH CAMPAIGN TO RECRUIT AND RETAIN BIODEFENSE EXPERTS**

  Congress should expand biodefense agencies' authority and resources to develop compensation systems sensitive to the market and individuals' performance. Additionally, agencies must implement performance management systems that allow them to recognize and to reward outstanding performance.

  Congress and the administration should continue working to enact the changes - legislative and regulatory - needed to improve the federal hiring process (e.g., reducing the amount of time required to hire people), greatly increasing the government's edge in an already intensely competitive war for talent.

- **GROW THE FIRST GENERATION OF BIODEFENSE TALENT**

  Congress and the administration should offer financial assistance - scholarships or student loan repayments tied to some minimum amount of federal service - to attract new students into the federal biodefense workforce. Members of Congress and the administration have already made similar investments with respect to other critical human capital needs, such as nurses (e.g., Nursing Reinvestment Act), information technology talent (e.g., CyberCorps) and other skills vital to national security (e.g., National Security Education Program).

  In partnership with other interested stakeholders, including academia and the private sector, Congress should establish and fund an American Biodefense Institute to provide biodefense training for those already in the fields of biology and medicine, as well as in the interdisciplinary fields supporting biodefense (e.g., public policy, international relations, intelligence). The federal government should spearhead development of the Institute and should provide ongoing funding, to be supplemented by the private sector, academia and foundations. Training and development initiatives would be focused on mid-level talent from across sectors committed to working in or with government.

  Congress and the administration should create a program to encourage job rotations among public sector, private sector and academic institutions to encourage collaboration among sectors and build expertise concerning public sector biodefense.

METHODOLOGY

Since its inception in 2001, the Partnership for Public Service has been highlighting the vital functions performed by our public sector workforce and the ways in which those functions are being undermined by a federal personnel system that encourages attrition and discourages recruitment. Time and again, we have found that important national security objectives are closely intertwined with the capacities of an increasingly beleaguered federal workforce. Given the increased attention to terrorist threats, we set out to explore whether similar connections existed with respect to our nation's biodefense.

The Partnership selected five agencies to include in this preliminary report: the Centers for Disease Control and Prevention (CDC), the National Institute of Allergies and Infectious Diseases (NIAID), the Food and Drug Administration (FDA), the Animal and Plant Health Inspection Service (APHIS) and the Food Safety and Inspection Service (FSIS). Although more than 20 federal agencies have significant responsibility for our biodefense, we selected these agencies based on their responsibilities for issues related to the most common bioterrorist threats identified by the experts - using highly-contagious infectious diseases (e.g., smallpox) as weapons, using non-contagious infectious diseases (e.g., anthrax) as weapons, or using poisons (e.g., ricin) to contaminate the food supply or agricultural industry.

Throughout the research and writing of this report, the Partnership conducted more than 30 interviews with senior federal biodefense officials, front-line federal biodefense employees, federal biodefense human resources management employees, biodefense experts in the private sector, biodefense experts in academia, and prospective federal biodefense job applicants. Due to the sensitive nature of the topics discussed during interviews, agency officials and certain non-agency experts were assured confidentiality in exchange for their interviews.

The Partnership used a structured guide to interview biodefense officials and experts that included questions regarding agencies' responsibilities for biodefense issues; requirements for mission-critical occupations; challenges encountered in hiring, managing and retaining key talent; and suggestions for meeting the federal government's biodefense talent needs.

To supplement interview and agency-provided data, the Partnership completed an extensive review of biodefense literature, as well as data available regarding labor market demand from the Bureau of Labor Statistics, graduation rates from the Department of Education and the American Medical Association, and federal agencies' workforce demographics from the Office of Personnel Management.

We asked the agency officials and biodefense experts we interviewed to review and comment on a draft of this report; these comments have been integrated into the text of the report as appropriate.

ENDNOTES

1. In May 2003, the Department of Homeland Security coordinated the TOPOFF 2 exercise to test state, local and federal response capacity to terrorist attacks, including an intentional release of pneumonic plague in Chicago and the detonation of a dirty bomb in Seattle. See Siobhan Gorman and Marilyn Werber Serafini, "Critics question value of huge homeland security exercise," *National Journal* (www.govexec.com) for an overview of TOPOFF 2.

2. Grady, Denise and Lawrence K. Altman, "Experts See Gains and Gaps in Planning for Terror Attack," *New York Times* (March 25, 2003), F1.

3. In March 2003, the World Health Organization (WHO) identified Severe Acute Respiratory Syndrome (SARS) as a sometimes fatal flu-like illness. Originating in China, SARS has infected thousands of people in more than a dozen countries, including the United States.

4. Preston, Richard. *The Demon in the Freezer*. New York: Random House, 2002, 5.

5. Gerberding, Julie L., M.D., M.P.H., "Lessons Being Learned: The Challenges and Opportunities," *Biological Threats and Terrorism: Assessing the Science and Response Capabilities.* Washington, DC: National Academy Press, 2002, 151. Also, see M.A.J. McKenna, "America Responds: At CDC, everything rearranged to put anthrax fight first," *Atlanta Journal Constitution* (October 28, 2001), A12, and Marilynn Marchione, "Public health agencies develop more bioterror tests, curb germ access," Knight Ridder/Tribute News Service (September 20, 2002).

6. Ibid.

7. See Sheryl Gay Stolberg and Judith Miller, "A Nation Challenged: The Response - Officials Admit Underestimating Danger Posed to Postal Workers," *New York Times* (October 24, 2001), A1; David Brown, "Canadian Study Shows Anthrax's Easy Spread - One Letter Could Cause Many Deaths," *Washington Post* (December 12, 2001), A27; and David Brown, "Agency With Most Need Didn't Get Anthrax Data - CDC Unaware of Canadian Study Before Attacks," *Washington Post* (February 11, 2002), A3.

8. According to CDC, case-fatality estimates for inhalation anthrax are extremely high, approximately 75% based on available information, even with all possible supportive care including appropriate antibiotics. See *Anthrax FAQ: Signs and Symptoms* at http://www.bt.cdc.gov/agent/anthrax/faq/signs.asp.

9. Broad, William J. and Denise Grady, "Science Slow to Ponder Ills That Linger in Anthrax Victims," *New York Times* (September 16, 2002), A1.

10. Ibid.

11. Brownlee, Shannon, "Clear and Present Danger," *Washington Post* (October 28, 2001), W08.

12. The Johns Hopkins Center for Civilian Biodefense Strategies, the Center for Strategic and International Studies (CSIS), the ANSER Institute for Homeland Security, and the Oklahoma National Memorial Institute for the Prevention of Terrorism held a "senior-level exercise entitled 'Dark Winter' that simulated a covert smallpox attack on the United States." See Tara O'Toole, Michael Mair, and Thomas V. Inglesby, "Shining a Light on 'Dark Winter'," *Confronting Biological Weapons* (February 19, 2002), 972, 979.

13. Ibid., 980.

14. Ibid., 982.

15. See the Johns Hopkins University, Center for Civilian Biodefense Strategies fact sheet on botulinum toxin on the World Wide Web at: http://www.hopkins-biodefense.org/pages/agents/agentbotox.html.

16. Ibid.

17. Daniel Klaidman and Christopher Dickey, "Can Iraq Hit America?," *Newsweek*

(March 17, 2003), 32.

18. Gellman, Barton, "Al Qaeda Near Biological, Chemical Arms Production," *Washington Post* (March 23, 2003), A1.

19. *Countering Agricultural Bioterrorism*, Committee on Biological Threats to Agricultural Plants and Animals, National Research Council of the National Academies (2002), 23.

20. U.S. General Accounting Office, *Foot and Mouth Disease: To Protect U.S. Livestock, USDA Must Remain Vigilant and Resolve Outstanding Issues*, GAO-02-808 (July 2002), 2.

21. Committee on Biological Threats to Agricultural Plants and Animals, National Research Council of the National Academies, 24, 31.

22. Department of Environment, Food and Rural Affairs, United Kingdom, *Government Memorandum addressing issues raised in the Framework Document of the Lessons Learned Inquiry* (March 2002), 4.

23. Ibid., 7.

24. Ibid., 8.

25. Committee on Biological Threats to Agricultural Plants and Animals, National Research Council of the National Academies, 6, 7.

26. Hecker, Daniel E., "Occupational Employment Projects to 2010," *Monthly Labor Review* (November 2000).

27. Ibid.

28. Executive Order 11935 restricts the employment of non-citizens in "competitive service" positions covered by Title 5 of the U.S. Code. Every year since 1939, Congress has also included language in its annual appropriations bills to prevent the use of appropriated funds in the continental United States to pay federal employees unless they are citizens of the United States. Although there are exceptions to these restrictions, they are not applicable to the vast majority of the positions in the federal government.

29. Whelan, Gerald P., Nancy E. Gary, John Kostis, John R. Boulet and James A. Hallock, "The Changing Pool of International Medical Graduates Seeking Certification Training In U.S. Graduate Medical Education Programs," *Journal of the American Medical Association*, 208 (2002), 1079-1084.

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31. Palmore, Tara, Greg Folkers, Carole Heilman, John R. La Montague and Anthony S. Fauci, "The NIAID Research Agenda on Biodefense: The National Institute of Allergy and Infectious Diseases faces new challenges in fighting the war on bioterrorism," *American Society for Microbiology News, Volume 68, Number 8* (2002).

32. Mallik, Ameet, Gary Pinkus and Scott Sheffer, "The Talent Challenge in Biologics Manufacturing," *In Vivo: The Business and Medicine Report* (July/August 2002), 65.

33. Interview 26 by Partnership staff, Washington, DC (April 9, 2003).

34. Office of Personnel Management, *A Fresh Start for Federal Pay: The Case for Modernization* (April 2002), v.

35. Mallik et al., 65.

36. Interview 25 by Partnership staff, Washington, DC (April 9, 2003).

37. Due to data inconsistencies between FDA and OPM, we are unable to identify and report the exact numbers of employees leaving the FDA in recent. For example, the FDA reported a loss of 588 full-time, permanent employees in fiscal year 2002. According to OPM data, FDA lost only 420 employees.

38. U.S. General Accounting Office, *Major Management Challenges and Program Risks: Department of Health and Human Services*, GAO-03-101 (January 2003), 51.

39. Parts of APHIS were recently merged into the newly-created Department of Homeland Security (DHS) and those components will likely see changes in the personnel system as a result. For a description of the current pay system under Title 5, U.S.C., see Office of Personnel Management, *A Fresh Start for Federal Pay: The Case for Modernization* (April 2002), v.

40. Congress has authorized, and OPM regulates, agencies' use of comparability allowance payments, known as physicians' comparability allowances (PCAs), under certain conditions to diminish the difference between public sector and private sector pay for physicians. Physicians with two years of experience or less may not be paid a PCA in excess of $14,000 annually. Physicians with more than two years of experience may not be paid PCA in excess of $30,000 annually.

41. See *First Year Starting Salary - National Average* at http://www.physicianssearch.com/physician/salary1.html.

42. Title 38 permits public health agencies, including CDC, NIH and FDA, flexibility to offer physicians with scarce skills, executive responsibilities or exceptional qualifications compensation as much as $30,000 above their base pay. Title 42 governs the Public Health Corps and establishes the pay rates public health agencies may offer certain physicians and scientists. Agencies' use of these provisions depends on certain conditions, including the complexity and responsibility of the work and the scarcity of employee available. Agencies may use both Title 38 and Title 42 to pay employees; however, the sum of all compensation is not to exceed $200,000 annually.

43. Interview 29 by Partnership staff, Washington, DC (April 13, 2003).

44. Interview 4 by Partnership staff, Washington, DC (September 19, 2002); Interview 7 by Partnership staff, Atlanta (September 26, 2002); Interview 8 by Partnership staff, Washington, DC (September 27, 2002).

45. National Science Board, *Science and Engineering Indicators - 2002, Volume 2* (Arlington, VA: National Science Foundation, 2002, NSB-02-1), 208-217.

46. U.S. General Accounting Office, *High-Risk Series: Strategic Human Capital Management*, GAO-03-120 (January 2003), 3.

47. Neergaard, Lauran, "SARS Battle Strains U.S. Health System," Associated Press (May 12, 2003).

48. Interview 32 by Partnership staff, Washington, DC (May 21, 2003).

49. Presentation by John M. Palguta, Director of Policy and Evaluation, U.S. Merit Systems Protection Board, *Federal Human Capital Crisis: The Federal Personnel Association of Metropolitan New York and New Jersey.* (June 12, 2001), 8.

50. Interview 14 by Partnership staff, Washington, DC (December 6, 2002).

51. Interview 13 by Partnership staff, Washington, DC (November 19, 2002).

52. Report of the National Commission on the Public Service, *Urgent Business for America: Revitalizing the Federal Government for the 21st Century* (The Brookings Institution, January 2003), 28, 29.

53. Interview 12 by Partnership staff, Washington, DC (October 31, 2002).

54. Interview 16 by Partnership staff, Washington, DC (January 21, 2003).

55. Interview 25 by Partnership staff, Washington, DC (April 9, 2003).

56. Kennedy, David M., *Freedom From Fear: The American People in Depression and War, 1929-1945* (Oxford University Press, 1999), 666.

57. Interview 3 by Partnership staff, Washington, DC (September 13, 2002).

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