



Statement of Peter Young, President and CEO of AlphaVax, Inc.

on Behalf of BIO, the Biotechnology Industry Organization

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Subcommittee on Health

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Good afternoon and thank you for the opportunity to testify before the Committee today on behalf of BIO, the Biotechnology Industry Organization. My name is Peter Young, and I am the President & Chief Executive of AlphaVax, Inc. AlphaVax is a privately held pre-revenue biotechnology company based in North Carolina that is working to develop and commercialize a vaccine technology that was originally invented in part at the US Army Medical Research Institute for Infectious Diseases. In addition to vaccine development funding we receive from the Division of AIDS in the National Institute of Allergy and Infectious Diseases (NIAID) at the National Institutes of Health (NIH), my company has since 2002 received four NIH peer-reviewed biodefense vaccine early development grants for the Marburg virus, botulinum toxin, viral encephalitis viruses, and small pox, as well as grants against SARS and pandemic influenza. These six grants represent \$38 million in total awards, not including clinical support funded separately by the NIH on some of the programs. My company consists of 70 people.

BIO represents more than 1,100 biotechnology companies, academic institutions, state biotechnology centers and related organizations across the United States and 31 other nations. BIO members are involved in the research and development of healthcare, agricultural, industrial and environmental biotechnology products

I wish to preface my general remarks by noting that if it were not for Project Bioshield and the government's grant funding in this arena, my company would not be working on biodefense vaccine targets at all. We have no sales and no profit: the only money we have is money from people who believe we might be able to produce important new vaccines for diseases they are interested in. Biotechnology companies like mine have a limited amount of time, people, and money with which to show they can deliver on these expectations. If they don't deliver, they can't attract investment capital, and they die. If I were a big company with my own sales and profits, I would have a little more leeway, but I would still be critically answerable to the expectations of investors and the capital markets.

The intrinsic risks and costs of developing biodefense vaccines are not different from other vaccines the private sector invests in. However, to justify working on biodefense vaccines, the private sector – big company or small - must ask itself additional questions before pursuing countermeasures:

- Is the potential market big enough to be attractive?
- Are the risks no greater?
- Are the costs subsidized or covered?

- Are there technical or financial leverages that advance the technology?

If the answer to these questions are negative or absent compared to other opportunities, companies won't participate.

As we consider the progress to date in medical countermeasure development and the actions needed to improve preparedness, we must recognize the enormous challenges and the successes to date. The magnitude of the public-private partnership necessary to protect the nation from bioterrorist and pandemic threats is unprecedented in the area of biopharmaceutical development. This is an enormous task for the Department of Homeland Security (DHS) and the Department of Health and Human Services (HHS) and its agencies, and much hard work by dedicated individuals was needed to build the initiative from the ground up several years ago. These efforts and accomplishments must be recognized. HHS has contracts underway for vaccines for anthrax and countermeasures for acute radiation syndrome and other radiological indications. Over 180 million doses of a smallpox vaccine have been delivered to the Strategic National Stockpile. Additionally, NIH, through NIAID, has issued numerous grants for millions of dollars that have been essential to spur early stage research in biodefense products. Grants have also been issued to foster the construction of biosafety containment facilities necessary for the research and development of countermeasures for harmful pathogens. Dedicated personnel from many agencies have devoted countless hours to this effort in national security.

However, as important as these contributions have been, more must be done. Essential enhancements to the commitment of a public-private partnership are necessary to enable the successful development of biodefense and pandemic countermeasures. The urgency of timing must be reinforced. As a nation we have faced a heightened threat of terrorist attacks, and the threat of an influenza pandemic and news of the spread of avian influenza grows each day. We must approach these reforms with a recognition that we currently do not have nearly enough vaccine and therapeutics to protect all Americans from a pandemic. With this in mind, I would like to offer perspectives on three key areas of need:

- Clear and predictable identification of needs that are developed in a public/private partnership with dialogue.
- Strong leadership and coordination.
- Strong and predictable funding that addresses both development and acquisition of critical medical countermeasures.

In order to understand what changes are necessary to better engage industry in the development of medical countermeasures, an understanding of the factors that affect the drug development process is helpful. The development process for drugs and biologics is complex, time-consuming, and costly. It often involves many partners through different stages, and it includes a number of complicated intellectual property and licensing agreements. The development of a biopharmaceutical product can cost tens or hundreds of millions of dollars and take years from initial research to commercialization.

Companies interested in drug development typically engage in sophisticated market analysis to assess what demands exist for products before engaging in costly and time-consuming research and development. An understanding of the market is important not just at the time of manufacturing and sale - it is a critical component that drives risk assessments through the product development cycle. Because the costs of drug development generally increase substantially as the product moves from one phase to the next, careful risk assessments are made during all phases of development. It is a reality that the stability and robustness of the final market is a key determinant in these risk assessments and the viability of product development.

Understanding of the final market includes information on volume of demand and economic factors. But important technical considerations are also incorporated into the development cycle. For example, the mode of administration, dose and formulation requirements, and shelf-life requirements are important factors in product development. Uncertainty in these specifications, or a change late in the development cycle, can have a profound impact on risk assessments, and ultimately the time and cost of development. It is also important to recognize that even with clear market needs, few products move from early development to licensure without some technical changes. This is expected, as a goal of advanced development is to optimize the product for the best effectiveness and safety.

While these considerations exist for all biopharmaceutical development, biodefense and pandemic products face heightened challenges. The government will generally be the only or primary purchaser, and thus will set the market demands. Lack of clarity and stability of government requirements translates directly to lack of clarity and stability in development goals. This in turn has a direct impact on whether or not companies can step forward and contribute the expertise of the private sector.

Biodefense and pandemic products also face increased risks for liability claims, so liability protections and an injury compensation program are necessary to spur industry to participate in these challenging markets at the government's request. These products will likely be administered in the face of an emergency to otherwise healthy individuals.

Companies must be assured that they will not face financial ruin due to unforeseen and unavoidable adverse reactions. The Public Readiness and Emergency Preparations Act (PREP Act), passed as part of the 2006 Defense Appropriations Act, provides responsible liability protections, coupled with a compensation program for those injured by medical countermeasures. It is important to note that liability protections are necessary to enable all stages of development – not just final sale of product. Small companies must attract investors and capital to move products through the development cycle. The ability to attract such capital is severely constrained if strong, responsible, and stable liability protections are not in place.

Bearing in mind these factors that influence biopharmaceutical investment decisions and the competition for investment dollars, there are a number of critical and inter-dependent

areas that need to be addressed. Incentives must be in place to both engage and sustain industry participation in this important partnership.

First, we need clear and predictable identification of needs that are developed in a public/private partnership with dialogue and coordination. A predictable demand is needed to allow companies to consider and assess their ability to enter this market.

Without this, the ambiguity and uncertainty will cause investment dollars to be directed to other efforts. As noted earlier, effective product development requires an understanding of the end goal.

To date, there have been only a handful of material threat assessments that have resulted in requests for proposals (RFPs) and acquisitions. There have also been instances where expected needs were dramatically reduced upon solicitation of a contract. Lack of clarity and predictability of technical requirements, such as expiry dating and filling and storage requirements, can further frustrate planning and execution. This creates uncertainty in the market, and severely challenges business planning necessary for commercialization of countermeasures. Demand drives the product development process, and realistic requirements, developed with dialogue with industry, need to be incorporated early into the drug development process. Countermeasures cannot be developed in the absence of clear and reliable articulation of needs and commitments to purchase successfully developed products.

To enable an effective public/private partnership, requirements should be developed through dialogue with industry. It is essential that industry and government have a shared understanding of objectives, and that purchase solicitations are developed in a framework that addresses the complexities of the biopharmaceutical industry and contain the appropriate level of specifications and delivery terms.

Second, strong leadership, coordination, and sufficient funding and flexibility in staffing are essential to success. The public/private partnership required for successful countermeasure development includes numerous government departments and agencies, each playing a key role in the process. The objectives and requirements of the various agencies must be aligned and coordinated with solicitation terms and must be part of the early dialogue. These activities include funding for early and late stage research and development, regulatory support, and contract management. For example, production and delivery of products are inherently affected by regulatory requirements. The expectations of regulators for licensure and emergency use authorization should be coordinated with the contract terms. Ambiguous, additional and unforeseen requirements that arise outside of contract terms magnify companies' financial risk. Strong and clear leadership is required to coordinate the many agencies and objectives.

Also, the challenges and complex nature of countermeasure development, coupled with the urgent need to prepare, require that critical staff level positions be adequately funded and staffed. In order to sufficiently expedite the procurement processes, HHS needs sufficient resources. Flexible hiring authorities can also help ensure that key positions

are staffed with expertise and understanding of the biopharmaceutical industry and the functioning of both small and large companies. In order for a true public/private partnership to succeed, both sides must be resourced to rapidly address the full array of development issues with experienced judgment to reach effective, expeditious outcomes.

Third, the funding for biodefense and pandemic countermeasures must be strong and consistent, and should recognize the shared-risk of a public/private partnership. A

comprehensive preparedness strategy is needed that addresses the various threats for which we must prepare, and sufficient funding to achieve their commercialization.

Potentially life-saving products are at risk of dying in the gap between the “push” of early stage development and “pull” of commercialization – a gap referred to as the “Valley of Death”.

Shared risk in advanced development should be incorporated into the funding plans, as it is another important element of a successful public/private partnership, and critical to bridging the “Valley of Death”. Biopharmaceutical development is inherently risky, and as noted earlier, costs go up significantly through each development phase. Because of this, companies carefully evaluate investment decisions at each phase. Important products for biodefense and pandemic preparedness may not survive these risk calculations without sufficient government partnering and transparency in interactions with government entities.

In non-biodefense/non-pandemic markets, in which there is a “natural” market for products without government participation, venture capitalists, partnering companies, and company equity are vehicles used to fuel the development of these expensive phases based on marketing and risk-assessment forecasts. It is very difficult to attract and justify these vehicles for biodefense and pandemic products in the absence of a predictable and robust market. Even with clear and predictable identification of government needs, the reality is that the overall market for many of these life-saving products that are essential to national security may be relatively small.

Because of this, many promising technologies stall in early and mid-stage development, not due to technical failure, but because the market “pull” is not sufficient. Again, it is important to recall that biodefense and pandemic countermeasures must compete for investment dollars that can be directed to other markets. Funding of advanced development to bridge the “Valley of Death” is a key element in a successful and meaningful effort to produce countermeasures essential for our national security.

The comprehensive strategy should include an appropriate array of diagnostics, preventatives, and therapies against threat agents. Research tools that facilitate our understanding of targeted pathogens and facilitate product development are also an important component of a comprehensive strategy.

The task before us is large. Prior to the events of 9/11 and the subsequent anthrax attacks that fall, there was no significant demand for biodefense products for the civilian

population. Facing the growing threat of an influenza pandemic, based on our current vaccine technology and manufacturing capabilities, we are currently simply unable to produce enough vaccine for all Americans. The good news is that with sufficient investment, promising biotechnologies in development offer potential advances in multiple dimensions. New recombinant and cell-culture vaccine technologies have the potential to greatly enhance capacity and production efficiencies. New antivirals are being developed with the potential to treat multiple strains of influenza, and diagnostic tools are in development to rapidly detect bioterrorist agents and pandemic strains and allow for faster response and containment efforts.

When considering the cost of funding countermeasure development and purchase, full consideration must be given to the cost of not making this investment – in terms of lives, health, and economic costs. For example, economists from the CDC have estimated that the impact of a pandemic in the United States could be 90,000 to 200,000 deaths, hundreds of thousands of hospitalizations, and tens of millions of outpatient visits and illnesses. They estimate the economic impact in our country could be between \$71 billion to \$166 billion – excluding disruptions to commerce and society.<sup>i</sup> A World Bank leading economist estimated that the worldwide cost of an influenza pandemic could be \$800 billion, with \$550 billion of this affecting industrialized nations.<sup>ii</sup> The costs to life, health, and the economy could be overwhelming, and these staggering numbers don't express the societal challenge of recovery.

Additionally, the public health synergies of investing in robust anti-infective and diagnostic markets must be recognized. If a pandemic does not arise or a bioterrorist event does not occur by a certain date, our investments should not be considered misguided. These investments should be viewed as a pathway to securing our future and assuring that the United States will be poised to deal with future threats. In addition to responsibly preparing for public health emergencies and national security, new technologies and manufacturing and infrastructure capacities fostered through these efforts will likely yield public health benefits in other infectious diseases that face market challenges.

Investments are also needed in animal models and other research tools. Pandemic and biodefense countermeasure development is characterized by constraints on human efficacy trials, tight controls of pathogen agents, and rapid changes in potentially pandemic strains. Because of this, the development of knowledge and tools that will allow us to anticipate, approximate, and characterize the agents, and model the effects of the agents and their countermeasures in humans, is an essential part of pandemic and biodefense preparedness. In addition to animal models, investments in assay development and standardization, correlates of protection, predictive toxicology, host response, and other tools are an important part of an effective countermeasures program. As with the countermeasures themselves, the market for research and diagnostic tools in this area has generally been too uncertain and too small to warrant any significant investment by commercial firms.

In conclusion, enactment of the modest reforms outlined above will spur bioterrorism and pandemic countermeasure development more than is the case at this moment. Because of Project BioShield, more companies like mine are now doing research into these countermeasures. Without reform, however, clarity, coordination, and predictable commitment within the government will still be lacking. Without reform, many companies will find themselves in the Valley of Death, unable to bring their ideas from the bench to the bed, and many others, both big and small, will stay on the sidelines.

Once again, thank-you for the opportunity to testify before the committee today on behalf of BIO. BIO and its member companies are committed to addressing the public health needs of the Nation and look forward to working with this Committee to address these priorities as potential legislation moves forward.

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<sup>i</sup> M. Meltzer, et al., "The Economic Impact of Pandemic Influenza in the United States: Priorities for Intervention," *Emerging Infectious Diseases*, 5, no. 5 (September-October 1999): 659.

<sup>ii</sup> "Bird Flu Will Cost \$800 billion, says World Bank," Times Online, accessed on November 7, 2005 at <http://www.timesonline.co.uk/article/0,,25149-1861483,00.html>.