The Complex Challenge of Foreign Interference in Research Administration and Compliance

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ABSTRACT

Recently, foreign interference has emerged as an important compliance issue for U.S. research institutions, due to efforts by foreign governments to misappropriate intellectual property and research. Consequently, federal funding agencies are now requiring research institutions to ensure compliance with foreign component regulations and to implement protections against foreign interference. This paper offers an analysis of foreign interference cases and recommendations from national committees and leading academic institutions, summarizing the geopolitical context, compliance risks, risk management strategies, and future challenges in this area. The key risks identified were the diversion of IP and research and non-disclosure of foreign sponsorship. Recommended compliance and risk management strategies include centralized work groups, monitoring and auditing, integration of foreign component compliance into research misconduct and conflict of interest and commitment policies, staff training, and security controls. Special attention should be paid to future regulations and industry standards for dual appointments and foreign talent recruitment programs and compliance with federal deemed-export and equal employment opportunity laws. Finally, foreign interference management programs should also include measures to prevent racial profiling and xenophobia, while emphasizing a commitment to international collaboration, a diverse workforce, and America's open academic system.

INTRODUCTION

Given the complexity and ever-changing legal and regulatory environment in the United States (U.S.), research administrators must keep apprised of emerging developments in the field and constantly adapt policies and practices in order to reduce risk and ensure compliance for their institutions. Recently, a new and important area of compliance risk has come to the forefront for U.S. research institutions—foreign interference. In the past decade, there have been several well-publicized cases of research misconduct related to foreign interference at Duke University (McLaughlin, 2018), Medical College of Wisconsin (MCOW; Vielmetti, 2013), New York University (NYU; Weiser, 2013), Virginia Tech (VT; U.S. Department of Justice, 2019), MD Anderson Cancer Center (MD Anderson; Hvistendahl, 2019), and Emory University (Hart, 2019). Moreover, over the past year and a half, federal agencies have issued multiple notices warning research institutions that "foreign governments have initiated systematic programs to unduly influence and capitalize on U.S.-conducted research" (Balser et al., 2018, p. 5). Countries of concern include Russia, Iran, North Korea, China (Coleman & McPherson, 2019), Saudi Arabia (Mervis, 2019a), Syria, and Sudan (Bernstein, Sun, & Rein, 2019). Because of this threat to the integrity of the national research enterprise, federal funding agencies, including the Department of Defense (DOD), Department of Energy (DOE), National Science Foundation (NSF), and National Institutes of Health (NIH) have increased scrutiny of grantee organizations' disclosure and monitoring of foreign components in federally funded research projects, as well as institutional safeguards against the diversion of U.S. intellectual property (IP) and research (Pennsylvania State University, 2019c). Given the heightened federal attention to foreign interference and significant scientific, financial, and security risks, research administrators should proactively develop compliance strategies for foreign activities. This paper offers a review and analysis of recent cases of foreign interference at U.S. research institutions and guidelines from the Hoover Institution, Pennsylvania State University (Penn State), MD Anderson, Association of Public and Land-Grant Universities (APLU), Association of American Universities (AAU), and the NIH Advisory Committee to the Director (ACD) Working Group for Foreign Influences on Research Integrity. Here, we will: (1) provide an overview of the larger geopolitical context of foreign interference in U.S. research; (2) identify high-risk compliance areas related to research misconduct involving foreign interference; (3) recommend compliance measures to mitigate these risks; and (4) summarize future challenges. The overall goal is to assist research administrators with the development and implementation of policies, procedures, and controls to ensure compliance with federal foreign component

regulations and to protect the integrity of the research enterprise.

OVERVIEW

Geopolitical Context: China

Since the majority of recent public cases of foreign interference have involved China, research administrators should have a basic understanding of the geopolitical context behind Chinese attempts to increase its influence at U.S. research institutions in order to recognize the full scope of this risk. (In this paper, "China" refers to the central government of the People's Republic of China [PRC], not to individuals of Chinese descent [Diamond & Schell, 2018].) Since "Xi Jinping came to power in 2012" (Diamond & Schell, 2018, para. 1), China has made a concerted effort to become a leading economic and military power in the world (Office of U.S. Senator Charles E. Grassley, 2018a), with the overarching goal to "transform . . . from a manufacturing hub to a world leader in innovation" (Federal Bureau of Investigation, 2015, p. 1) through increased investment in research and development (R&D; Federal Bureau of Investigation, 2015). China has identified "information technology, biotechnology, aerospace, materials and manufacturing, sensors and optics, energy and environment, and basic sciences" (Federal Bureau of Investigation, 2015, p. 3) as key disciplines for R&D growth. As one of the cornerstones of scientific and technological innovation in the U.S., universities and research institutions have become a strategic target for Chinese interference (Ellis & Gluckman, 2019).

Foreign influence is not inherently illicit or destructive. In international relations, countries often exert influence globally through "normal public diplomatic" practices (Diamond & Schell, 2018, para. 8), such as "visitor programs, cultural and educational exchanges, paid media inserts, and government lobbying" that are "transparent" and, therefore, "accepted and legitimate" (Diamond & Schell, 2018, para. 8). While China does engage in acceptable diplomacy like other countries, U.S. intelligence and security agencies are concerned about increasing efforts by China to use "improper interference" (Diamond & Schell, 2018, Report Sections sect., para. 2) to gain access to U.S.-funded research (Ackerman, 2019a). Examples include "enlisting students and visiting scholars to [divert] IP from confidential grant applications, [incentivizing] scientists to run 'shadow laboratories'" (Ackerman, 2019a, para. 5) in China, and utilizing talent recruitment programs to [impel] researchers to misappropriate IP in exchange for personal benefits (Diamond & Schell, 2018; Federal Bureau of Investigation, 2015). The scale of China's interference campaign in the United States is substantial and should not be underestimated. "China is believed to be responsible for 50-80% of cross-border IP theft worldwide, and over 90% of cyber-enabled economic espionage in the United States" (Office of U.S. Senator Charles

Grassley, 2018a, para. 8), "costing the U.S. as much as $600 billion annually" (Ackerman, 2019a, $600B in thefts sect., para. 1).

Compared to the private sector, academic institutions present a difficult challenge for federal agencies and research administrators to protect from foreign interference. The American academic model is based on the shared values of "openness, collaboration" (Goldberg, 2019a), and the free exchange of ideas. China has exploited this "open, collaborative" culture in order to gain unlawful access to U.S.-funded R&D to drive its economic and military expansion (Diamond & Schell, 2018). Further complicating this challenge, the rise of Chinese interference has been simultaneously accompanied by U.S. research institutions' increasing reliance on a global workforce and international collaborations (Ellis & Gluckman, 2019). As federal funding of research in the U.S. has plateaued in the past decade, academic institutions have increased recruitment of foreign pre- and post-doctoral trainees and faculty and nurtured international collaborations in order to maintain the production of cutting-edge scientific and technological discovery. Currently, 360,000 Chinese citizens are enrolled at U.S. universities (Blanchard, Martina, & Liangping, 2019). "In November 2018, the U.S. and China were each other's top research collaborators, according to the Nature Index, which tracks natural science collaborations in papers published in 82 top science journals" (Ellis & Gluckman, 2019, para. 23). Since 2000, "39 percent of the Nobel Prizes in physics, chemistry, and medicine won by Americans have gone to foreign-born scientists" (Balser et al., 2018, p. 5). Within academia, there is a general consensus that global engagement is advantageous for the national research enterprise and should continue to be fostered (Balser et al., 2018). However, recent geopolitical developments necessitate strengthening management of our scientific and academic relationships with foreign entities in order to protect American IP and research and the integrity of U.S. research institutions and the national research enterprise (Ellis & Gluckman, 2019).

Federal Funding Agencies

Because foreign influence activities have the potential to compromise taxpayer-funded research at research institutions, "members of Congress and national security officials" (Mervis, 2019b) have exerted pressure on the federal science agencies to improve oversight of foreign components in federally funded projects and foreign interference at grantee organizations (Mervis, 2019b). In response, since the start of 2018, the DOD, DOE, NSF, and NIH have issued several policies and notices to grantee organizations related to undue foreign influence. These mandates include measures to curb foreign interference and loss of classified and export controlled research, to manage participation in foreign government-sponsored talent recruitment programs, to

mitigate conflicts of interest (COI) and commitment (COC), and to ensure compliance with foreign component regulations (Pennsylvania State University, 2019c; U.S. Department of Defense, 2018; U.S. Department of Health and Human Services, 2018). Of all the federal funding agencies, the NIH has been the most proactive and comprehensive in its efforts to address undue foreign influence and interference. After being alerted by the Federal Bureau of Investigation (FBI) in 2016 about an MD Anderson faculty member serving as an NIH reviewer who was forwarding confidential grant applications to foreign entities (Anderson, 2019; Mervis, 2019c,d), the NIH initiated a two-year investigation of foreign component compliance at grantee organizations (Mervis, 2019c). Through reports from the FBI, whistleblowers, and grantee institutions (Anderson, 2019) and, predominantly, "the agency's routine monitoring of [grantee] progress reports" (Mervis, 2019c, Connecting the dots sect., para. 6), the NIH discovered pervasive non-disclosure of foreign components at research institutions nationwide. In particular, NIH staff found consistent discrepancies between foreign components listed on grant applications and progress reports and those acknowledged on NIH-funded publications (Mervis, 2019c,d). Subsequently, on August 20, 2018, NIH Director, Dr. Francis Collins, issued an unprecedented memo to the 10,000+ recipient institutions of NIH funding, "warning them of 'systematic' efforts by foreign nations to steal IP . . . and remind[ing] them of [agency] rules that bar peer reviewers from sharing confidential grant proposals and requir[ing] researchers to report ties to foreign institutions, funders, and companies" (Collins, 2018; Hvistendahl, 2019, Specific allegations sect., para. 1). Director Collins' letter was followed by notifications for possible non-compliance with foreign component regulations being sent to over 60 universities and research institutions, involving 180 NIH-funded principal investigators (PI; Mervis, 2019d,e). Of these 60+ cases, the NIH has referred 18 to the U.S. Department of Health and Human Services' (HHS) Office of Inspector General for further investigation (Mervis, 2019d).

While the NIH's investigation of foreign component violations in the extramural research community is still ongoing and the full details are not yet known, initial reports have revealed serious infractions of regulations mandating disclosure of foreign activities, including sponsorship, contracts, affiliations, and collaborations. Examples include operating a dual laboratory at a foreign institution (Mervis, 2019d), receiving "a $5 million startup package from a Chinese university" (Mervis, 2019c, Initial resistance sect., para. 5), and failing to disclose participation in China's Thousand Talents Program (Mervis, 2019c). In some instances, undisclosed foreign activities had been going on for years (Mervis, 2019d), were selective for specific countries (Mervis, 2019c), or concealed over-commitment of researcher

effort in excess of 12 months per calendar year on sponsored projects (Mervis, 2019d). Moreover, some foreign contracts contained concerning provisions prohibiting sharing of research with the PI's home institution or requiring mandatory acknowledgment of the foreign institution in all publications (Mervis, 2019c). The majority of implicated researchers have been well-funded—i.e., hold more than one NIH grant, engaged in diverse fields of study, including oncology, "mental health, cardiology, neurology, [and] . . . cell biology" (Mervis, 2019c, What NIH has learned sect., para. 3), and employed at research institutions throughout the U.S. (Mervis, 2019c). In addition, while the NIH audit was driven by the identification of disclosure inconsistencies and not the location of foreign entities or demographic background of PIs, the preponderance of cases have involved sponsorship and agreements with Chinese entities (Mervis, 2019d), although not all including some significant violations (Anderson, 2019; Mervis, 2019d). Disturbingly, many researchers also failed to disclose their foreign activities to their primary institution, as well as the NIH (Mervis, 2019d). Consequently, grantee institutions were unaware of the extent of foreign activities engaged in by their own faculty and unable to effectively oversee compliance with federal regulations (Mervis, 2019d).

The NIH's investigation of foreign component compliance has resulted in serious, adverse consequences for grantee researchers and institutions. While most of the 60+ implicated institutions have not been identified, the University of Texas Health Science Center, Baylor College of Medicine, MD Anderson (Hvistendahl, 2019), and Emory (Hart, 2019) have been reported publicly. At these institutions, the NIH audit led to the termination of three tenured faculty members at MD Anderson and two at Emory for violating NIH peer review confidentiality and failure to disclose significant foreign sponsorship and research activities (Hvistendahl, 2019; Offord, 2019). Moreover, Dr. Michael Lauer, the NIH's Deputy Director for Extramural Research, has stated that additional universities have dismissed faculty "in cases that have remained confidential" (Mervis, 2019d, p. 14). Foreign component non-compliance also has impacted negatively institutions' funding portfolios. Some organizations have returned hundreds of thousands of dollars in NIH grant awards, including salary funds for researchers with over-commitment of effort in excess of 12 months per calendar year or for whom committed effort on NIH-funded projects could not be corroborated (Mervis, 2019d). Furthermore, Dr. Lauer has stated that particularly grievous infractions may result in future debarment from federal funding (Mervis, 2019d).

Foreign Interference & Research Misconduct: Case Studies

In order to learn from prior instances of foreign interference at U.S. research

institutions, the author analyzed case studies from Duke University (Budd, 2019), MCOW (Associated Press, 2013; Marshall, 2013), NYU (U.S. Department of Justice, 2013), Virginia Tech (U.S. Department of Justice, 2019), MD Anderson (Ackerman, 2019a,b), and Emory (Malakoff, 2019; Offord, 2019) for commonalities in violations, contributing factors, and compliance risks. Among these cases, the most disturbing form of interference was the inappropriate diversion of U.S. IP and fundamental research, sometimes with the intent to replicate work at Chinese research institutions. In one case at MD Anderson, an NIH-funded faculty member exchanged IP in an effort to gain access to a Chinese talent recruitment program (Goldberg, 2019b). At NYU, three researchers, including a federally funded PI, were paid bribes by a Chinese company and government research institution for NIH-funded research data (Weiser, 2013). In alignment with China's aim to improve its standing in the world through military, economic, and scientific advancement, the types of research product targeted for diversion included work with defense, biomedical, and commercial applications, including metamaterials technology (Federal Bureau of Investigation, 2015), an oncology-related compound (Vielmetti, 2013), and magnetic resonance imaging technology (Weiser, 2013). Reinforcing the need for precautions against foreign interference across operational units, a wide range of research-related materials were misappropriated from electronic data to technical expertise, material products, laboratory facility and equipment specifications, and grant applications. Moreover, diversions were committed by diverse perpetrators, including trainees, federally funded faculty and personnel, NIH grant reviewers, and visiting scientists. Another common form of undue foreign influence was material non-disclosure of sponsorship from the Chinese government, foundations, and universities to federal funding agencies and home institutions. At NYU, an NIH-funded PI was receiving sponsorship simultaneously "from the Chinese government for a research project similar" (U.S. Department of Justice, 2013, para. 9) to his federally funded work. At Virginia Tech, a "professor submitted fraudulent grant proposals to the NSF for work that he had already completed in China" (U.S. Department of Justice, 2019, para. 5). Sponsorship received by U.S.-based researchers included research funding and resources, tuition, housing, sponsored travel, and salary for positions held at Chinese institutions.

Institutional Security Failures

While some cases involved active concealment by researchers, at Duke, MCOW, and MD Anderson, significant warning signs were ignored and warranted further investigation. At MCOW, the research associate had been "previously reprimanded for placing [proprietary] laboratory data on his personal computer . . .

and was discovered to have posted on the web that he discovered the cancer fighting compound [that he later stole] and intended to bring it back to China for further stud[y]" (Federal Bureau of Investigation, 2015, p. 3). At Duke, the graduate student "used pictures and information related to his PI's research to market a business he started" (Federal Bureau of Investigation, 2015, p. 4). Additionally, he facilitated the publication of a metamaterials book that listed the PI as a co-author; the investigator had unknowingly consented to co-authorship by signing documents written in Chinese translated by the graduate student (Federal Bureau of Investigation, 2015). At MD Anderson, a faculty member shared confidential NIH grant applications with five employees, whose "assistance was 'more substantive than administrative in nature'" (Goldberg, 2019b, p. 6). The same individual also did not disclose foreign collaborators to the NIH, although these individuals served as co-authors on publications acknowledging NIH support (Goldberg, 2019b). Moreover, all three cases involved significant failures to adhere to standard security controls. These include not locking an unattended office, not storing investigational compounds securely, not reporting the loss and possible theft of IP for four days, not terminating access to information systems enabling a suspended researcher to delete evidence of theft remotely (Vielmetti, 2013), signing contracts in a foreign language without institutional legal review, participating in foreign collaborations without proper vetting and implementing a memorandum of understanding (MOU) in advance, not executing non-disclosure agreements for non-restricted research of significant value (Federal Bureau of Investigation, 2015), and lack of monitoring for foreign components on NIH-funded publications (Goldberg, 2019c).

As demonstrated by these cases, the consequences of failing to monitor and control for foreign interference can be serious for all parties involved from individual researchers to research institutions and the national research enterprise. For researchers and staff engaged in foreign interference, possible risks include suspension of current federal funding, debarment from future funding (Pennsylvania State University, 2019c), termination of employment, and criminal prosecution. Of the six cases studied, five were referred to federal or state law enforcement agencies with three moving forward to official charges and convictions. Charges leading to conviction included "accessing a computer without authorization, obtaining information worth at least $5,000" (Associated Press, 2013, para. 3), "making false statements on [COI] forms for an NIH grant" (Ax, 2015, para. 2), and "conspiring to commit federal grant fraud, making false statements, and obstruction by falsification" (U.S. Department of Justice, 2019, para. 1). As evidenced by MD Anderson and Emory, tenure may not provide protection against termination of

employment in cases involving serious violations. For researchers and institutions targeted by foreign interference, a major risk is the loss of IP and basic research in terms of both professional credit and financial compensation for discoveries with potential commercial applications (Goldberg, 2019a). As stewards of federal funds, research institutions also have a responsibility to ensure compliance with foreign component regulations. Failing to do so could "threaten … overall funding" (Pennsylvania State University, 2019c, Importance sect., para. 2) for the institution by damaging relationships with federal agencies and public trust (Goldberg, 2019a). On a national level, foreign interference threatens the integrity of the U.S. research enterprise and academic model (APLU/AAU, 2019; Zaveri, 2019). Diversion of taxpayer-funded research can "undermine America's commercial, military, [and scientific] advantages" (Diamond & Schell, 2018, Report Sections sect., para. 6) while also "unfairly benefit[ing]" (Ellis & Gluckman, 2019, para. 8) foreign governments. Moreover, violations of peer review confidentiality and non-disclosure of foreign sponsorship impair the ability of federal agencies to apportion taxpayer dollars in a "fair and unbiased" manner (Goldberg, 2019c, p. 21). Given the potential risks to national interests, Congress, including members of the Senate Appropriations and Finance Committees, have raised concerns about the ability of federal funding agencies to oversee foreign activities at grantee organizations (Goldberg, 2019a; Office of U.S. Senator Charles Grassley, 2018b, 2019a,b). Furthermore, both the House of Representatives and Senate have introduced legislation—e.g., Securing American Science and Technology Act (H.R. 3038) and the Secure American Research Act (S. 2133) respectively—aimed at mitigating foreign interference in federally funded research (American Council on Education, 2019; Mervis, 2019f). Failure to address foreign interference could endanger federal appropriations to the major funding agencies, such as the DOD, DOE, NSF, and NIH (Pennsylvania State University, 2019c).

Risk Mitigation & Compliance Recommendations

Because of the significant compliance risks, research administrators should work collaboratively with leadership, faculty, and departmental managers to design and implement policies, procedures, and controls to protect universities and research institutions from foreign interference. Foreign interference presents a complex and difficult compliance challenge for research administrators, since it necessitates a high level of coordination between multiple areas of research operations, including grants administration, technology and innovation development offices, general counsel, human resources, immigration and visa offices, export controls, security and facilities, information systems, research integrity, and staff communications and training. In order to learn from the experiences of academic

leaders in this area, like MD Anderson and Penn State (Budd, 2019; Goldberg, 2019c) and from national expert committees and academic organizations, such as the Hoover Institution, APLU, AAU, and the NIH ACD Working Group for Foreign Influences on Research Integrity, this section summarizes guidance and recommendations from these sources to provide a broad framework to help research administrators develop effective risk management programs for foreign interference.

Organizational Infrastructure

The recent NIH audit for foreign components compliance revealed that many institutions are not effectively overseeing international funding, collaborations, and affiliations of faculty (Ellis & Gluckman, 2019). In his August 20, 2018 letter to the 10,000+ NIH grantee institutions, Director Collins explicitly stated the agency's expectations that recipient organizations ensure that foreign components are appropriately disclosed in grant applications and progress reports (Collins, 2018). In an interview published in *Science*, Deputy Director Lauer conjectured that other federal funding agencies may "follow [the NIH's] lead" (Mervis, 2019c, para. 5) in proactively monitoring for and investigating non-compliance with foreign component regulations (Mervis, 2019c). Taking this into account, one of the first steps that research institutions should take is to conduct a comprehensive evaluation of current capabilities and areas of improvement related to foreign interference compliance and risk management (Budd, 2019). To accomplish this objective, some research institutions have designated "high-level working groups and task forces consisting of senior administrators and faculty to discuss, develop, and implement strategies to better coordinate and address concerns regarding security threats and undue foreign influence" (APLU/AAU, 2019, p. 1). Large research institutions with a significant percentage of foreign sponsorship and collaborations should also consider the development of a centralized foreign compliance office to manage international research activities, including identifying and improving weaknesses in monitoring and internal controls (APLU/AAU, 2019; Goldberg, 2019a).

Monitoring and Auditing

Because federal funding agencies are scrutinizing foreign component compliance more closely, research institutions should determine if an audit of the international activities of faculty members, in particular investigators receiving federal funds, is warranted. After a classified meeting between FBI officials and local research institutions in Houston, Texas in August 2018, Baylor College of Medicine (BCM) initiated "an audit of [its 500] faculty members with current NIH funding" (Mervis, 2019a, para. 2), which is expected to be completed at the end of 2019. Factors that should be considered to decide if an audit is needed include if the institution has been

cited for violations of foreign component regulations and the severity of those infractions, the amount and percentage of federal funding awarded to the institution, and the degree to which the institution and its faculty are engaged in foreign activities. While many institutions will probably not require an enterprise-wide audit, research administrators should consider conducting selective audits of high-risk projects—e.g., classified or export controlled research (Pennsylvania State University, 2019c) or types of research often targeted for diversion by foreign governments—e.g., information technology, energy, biomedical etc. (Balser et al., 2018). Since the NIH identified possible non-compliance through verification of foreign components reported in federally funded publications in its recent nationwide investigation (Goldberg, 2019c), another key auditing mechanism is to randomly sample journal articles and compare foreign components acknowledged against those disclosed in grant applications and progress reports (Goldberg, 2019c; Mervis, 2019b). The results of these selective audits can help to determine if a larger probe is necessary (Goldberg, 2019c). Research institutions also should consider permanently incorporating foreign component compliance into ongoing monitoring and auditing practices for federal awards. Undisclosed foreign components should be divulged promptly to the appropriate funding agency (Collins, 2018).

Staff Education: Research Misconduct and COI/COC

In order to improve compliance in this area, research institutions also should develop an educational program to clarify institutional and federal foreign component policies and to raise awareness about how these policies relate to research misconduct and conflicts of interest and commitment (Balser et al., 2018). As a first step, institutions should review their research misconduct and COI/COC policies to determine if the guidelines should be updated to clarify requirements to disclose all monetary and non-monetary compensation related to one's professional duties; examples include funding, resources, sponsored travel, gifts, prizes, talent recruitment program membership, and positions held and research activities conducted at an institution other than the primary employer (Balser et al., 2018). In light of recent violations at MD Anderson, institutions also are advised to "explicitly address . . . the need to uphold peer review integrity and [the] consequences of violations of NIH peer review" (Balser et al., 2018, p. 15). The revised institutional guidelines and pertinent federal regulations should be communicated in writing and in-person across the enterprise and via multiple forums to key personnel, such as faculty, postdoctoral fellows, graduate students, associate researchers, and departmental and central office administrators (Balser et al., 2018). Efforts can be integrated into existing communication and educational modalities, including newsletters, websites, departmental meetings, faculty councils,

responsible conduct of research (RCR) seminars, research administrator grand rounds, and new employee orientations (Goldberg, 2019a,b).

Security Controls

Concurrent to efforts to improve regulatory compliance, research institutions should assess security policies, procedures, and measures to protect the institution against diversion of IP and research. As evidenced in the case studies analyzed, failure to observe security protocols was a contributing factor in the misappropriation of research and data by foreign entities. This underscores the importance of staff training to increase awareness of foreign interference security threats, security policies and procedures, and their obligation to adhere to security protocols in order to protect themselves and the institution (Coleman & McPherson, 2019). Recommended training modalities include memoranda, webpages (Coleman & McPherson, 2019), newsletters (APLU/AAU, 2019), enhanced security and export control updates for senior and faculty leadership, and RCR curricula (APLU/AAU, 2019). Security policies and procedures also should be reviewed and strengthened as needed in the areas of facilities, information systems, hosting of foreign visitors—especially individuals on short-term visas that are not routinely processed by immigration services, IP, and international collaborations (Ackerman, 2019a; APLU/AAU, 2019; Balser et al., 2018). Suggested measures to prevent security breaches include advanced notice to institutional officials when hosting foreign visitors, use of software to screen foreign visitors against "restricted and denied parties lists" (APLU/AAU, 2019, p. 4), non-disclosure agreements, and "collaboration agreements that include legal and IP sharing provisions" (Ackerman, 2019a, $600B in thefts sect., para. 6). Another similarity among the case studies was a failure to recognize and respond appropriately to warning signs of foreign interference. Therefore, research institutions should educate staff about red flags for foreign interference and strengthen systems for reporting and investigating possible security threats, including designating a single point of contact (POC) for foreign interference concerns (APLU/AAU, 2019)). The POC also should help to facilitate collaboration with "local law enforcement and regional federal security officials, including . . . the FBI, Department of Homeland Security (DHS), and Defense Security Service (DSS)" (Coleman & McPherson, 2019, p. 2), given that some foreign interference incidents may fall within the jurisdiction of Title 50 agencies (U.S. Department of Health and Human Services, 2019). The NIH has highlighted MD Anderson, in particular, as a model of effective partnership between research institutions and law enforcement agencies (Budd, 2019).

Information security warrants special attention by research institutions and foreign component compliance officers. While

electronic systems have increased productivity, advanced innovation, and facilitated collaboration in academia, these tools also have made it easier to misappropriate IP and research without authorization as demonstrated in the violations of NIH peer review confidentiality at MD Anderson (Balser et al., 2018). In its December 2018 report, the NIH ACD Working Group for Foreign Influences on Research Integrity recommended, "as a precondition to grant awards, requiring recipient organizations to provide independent certification of full adherence to and compliance with specific control and security frameworks" (Balser et al., 2018, p. 13), such as the National Institute of Standards and Technology (NIST) Special Publication 800-53 (Balser et al., 2018). Policies, protocols, and controls that should be evaluated and fortified, as needed, include network and data security, systems and network monitoring, security breach reporting (Coleman & McPherson, 2019), "data handling and management" (APLU/AAU, 2019, p. 3), and international travel (Coleman & McPherson, 2019). Recommended precautions include "encryption, multi-factor authentication, virus scanning" (APLU/AAU, 2019, p. 3) and information security training for staff who travel internationally for business. Two institutions at the forefront of information security compliance are MD Anderson and Penn State. MD Anderson has pioneered the use of a predominantly cloud-based data management system with controlled use of external storage devices, allowing for enhanced monitoring of unauthorized transfers of data (Budd, 2019). Additionally, MD Anderson has mandated the use of encrypted loaner computers and mobile phones when staff travel internationally to prevent loss of IP (Ackerman, 2019a). Penn State has implemented an "information-centric defense strategy" (Pennsylvania State University, 2019a, Tools for Researchers sect.) with unified guidelines across departments with controls applied according to degree of risk—e.g. restricted, high, moderate, and low (Pennsylvania State University, 2019b). In addition to this framework, Penn State has created a central information security website that provides information and tools to help researchers protect their work; examples include an "information classification decision tool" (Pennsylvania State University, 2019b, Tools for Researchers sect.), and online forms to request data storage compliant with federal regulations and to report suspected security breaches (Pennsylvania State University, 2019a,b). Finally, because information security infrastructure is cost-intensive, research institutions should consider resource-sharing through participation in national information security collaborations, like the Research and Education Networking Information Sharing and Analysis Center (REN-ISAC) and Omni Security Operations Center (OmniSOC; APLU/AAU, 2019).

FUTURE CHALLENGES

Dual Appointments & Foreign Talent Programs

Since 2018, Congress has exerted increased pressure on federal funding agencies to tighten monitoring of foreign interference at grantee institutions (Mervis, 2019e; U.S. Department of Health and Human Services, 2019). Therefore, research administrators should stay current with new policies issued by federal science, intelligence, and security agencies in order to maintain compliance with federal regulations and to protect institutions from foreign interference. Two contested issues that administrators should keep a watchful eye on are dual appointments at foreign institutions and foreign talent recruitment programs, specifically China's Thousand Talents Program (Balser et al., 2018; Mervis, 2019a). While not illegal, these activities have raised concerns about unauthorized transfer of IP and research to foreign entities, conflicts of interest and commitment, and oversight and jurisdiction of faculty conduct and activities outside of the home institution (Ellis & Gluckman, 2019; Federal Bureau of Investigation, 2015; Mervis, 2019a). Some organizations have already started placing restrictions on dual appointments and talent programs. "Baylor is revising [institutional] policy to prohibit researchers from having two laboratories at two locations, domestic or foreign" (Ackerman, 2019a, 'Serious violations' sect., para. 9); moreover, "legacy agreements" are unlikely to be renewed (Ackerman, 2019a, Stretched too thin? sect., para. 1). Penn State is advising faculty who are already participating in foreign talent programs to consult with their deans, regardless of prior disclosure and institutional approval (Pennsylvania State University, 2019c). "Depending on an individual's research portfolio, [they] may be advised to terminate [their] affiliation" (Pennsylvania State University, 2019a, Best Practices for Disclosing Foreign Relationships and Activities sect.). In early 2019, the DOE notified grantee organizations that "the Department plans . . . to mandate that 'federal and contractor personnel fully disclose and, as necessary, terminate affiliations with foreign government-supported talent recruitment programs'" (Pennsylvania State University, 2019c, Rising Concern (Background) sect). Research institutions should continue to gauge the benefit-to-risk ratio of these activities in light of the current political climate, federal regulations, and accepted academic practices.

Classified and Export Controlled Research

Research institutions engaged in classified or export controlled research face a complicated challenge due to the need to comply with both federal deemed-export and equal employment opportunity (EEO) laws. Federal deemed-export regulations prohibit foreign nationals from working on, or even accessing, classified or controlled research (University of California, 2019). Correspondingly, federal agencies that fund

classified or export controlled research, like the DOD, DHHS, DOE, National Security Agency (NSA), and National Aeronautics and Science Administration (NASA), prohibit grantee institutions from employing foreign nationals on these projects (Rivard, 2014). However, institutions that exclude foreign nationals from applying to job opportunities related to classified or export controlled research may inadvertently violate federal EEO laws, specifically Title VII and the Immigration Reform and Control Act (IRCA), which prohibit employment discrimination based on national origin or citizenship (U.S. Equal Employment Opportunity Commission, 2009). Due to the incongruity between federal deemed-export and EEO laws, research administrators should make sure PIs applying for federal grants for classified or controlled research are well informed about and have fully considered the consequences of any terms and conditions that restrict employment based on national origin or citizenship. Prior to applying for funding, it may be helpful to consult with human resources and general counsel offices to determine whether recruitment and hiring practices can be implemented in accordance with the regulations of both the funding agency and the U.S. Equal Employment Opportunity Commission.

Balanced Approach

In this area of compliance, research institutions have a difficult balance to negotiate between safeguarding against foreign interference, nurturing beneficial foreign collaborations and a diverse workforce, and preserving the openness and freedom that are the hallmarks of the American academic system (Ackerman, 2019a; Balser et al., 2018). Academic leaders and professional organizations have raised concerns that overemphasis on foreign interference may hurt institutions by impairing their ability to recruit talent and to conduct research internationally (Balser et al., 2018; Budd, 2019). Moreover, recent news stories about researchers, students, and staff of Chinese descent feeling unwelcome at U.S. research institutions and being stereotyped as spies (Feng, 2019) are troubling (Hvistendahl, 2019; Redden, 2019). Negative public perceptions of the American academic community may already be impacting our ability to recruit scientific talent internationally. "In March [of 2019], the number of Chinese students in the [U.S] was down 2% from the previous year, according to [DHS] statistics - after years of increases" (Normile, 2019, p. 415). Leadership and research administrators at U.S. research institutions should take care that communications, policies, procedures, and actions are objective and evenhanded, do not over-amplify threats, and do not promulgate racial profiling and xenophobia (Diamond & Schell, 2018). The tone and language of communications should emphasize institutional support for a global workforce and international collaborations, while simultaneously "reinforc[ing] the importance

of disclosure and appropriate review" (Pennsylvania State University, 2019c, Best Practices for Disclosing Foreign Relationships and Activities sect.) to safeguard the integrity of the institution. Senior leadership also should consider issuing statements of support for international faculty, trainees, and collaborations, with specific examples of how diversity and working across borders have benefited the institution and the nation overall (Ellis & Gluckman, 2019). The presidents of several universities, including the Massachusetts Institute of Technology, Stanford University, Yale University (Dolgin, 2019), and University of California, Berkeley (Mervis, 2019g), have already released public letters confirming institutional commitment to their international staff and students and condemning discrimination based on national origin or citizenship. Diversity offices also can assist with cultural competence training and serve as an ombudsman when staff and students have concerns about biased treatment. When investigating incidents of possible foreign interference, the process and documentation should concentrate on the objective facts of the case and not the racial or ethnic background or citizenship status of the individuals involved and follow established due process protocols for investigating research misconduct in a fair and unbiased manner. A careful and balanced approach will be fundamental in efforts to protect against foreign interference, while preserving the strengths and core values of the U.S. research enterprise.

CONCLUSION

Recently, foreign interference has emerged as an important compliance issue for research institutions as a result of systematic, organized efforts by some foreign governments to take advantage of the open academic system in the U.S. to misappropriate IP and research (Balser et al., 2018). Federal intelligence, security, and science agencies and Congress are exerting increased pressure on federally funded institutions to ensure compliance with foreign component regulations and to implement protections against foreign interference (Pennsylvania State University, 2019c). An analysis of recent foreign interference cases and recommendations from national expert committees and leading academic organizations points to issues arising from geopolitical contexts, foreign interference compliance risks, risk management strategies, and future challenges. Among the case studies, the key risks identified were the diversion of U.S. IP and research and non-disclosure of foreign sponsorship. Recommended compliance and risk management strategies include working groups or centralized units focused on foreign interference, enhanced monitoring and auditing of foreign components, integration of foreign component compliance into research misconduct and COI/COC policies, awareness and educational campaigns, and heightened security policies,

protocols, and controls with a particular focus on information security (APLU/AAU, 2019; Balser et al., 2018; Coleman & McPherson, 2019; Mervis, 2019a). Currently, legislative and regulatory agencies and academic institutions nationwide are deliberating on how to best address foreign interference in the national research enterprise, requiring research administrators to keep abreast of new federal guidelines and industry standards. Special attention should be paid to future regulations and recommendations about dual appointments and foreign talent recruitment programs (Balser et al., 2018; Mervis, 2019a) and compliance with federal deemed-export and EEO laws. Finally, the development and implementation of foreign interference management programs should take into consideration measures to prevent racial profiling and xenophobia, while emphasizing a commitment to international collaboration, a diverse workforce, and the open academic system of the U.S (Balser et al., 2018; Budd, 2019).

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