# Malaria AC

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### Advantage 1

#### New vaccines have the potential to solve malaria, but will be patented

Hackett 4/17 [(Don, serves as the publisher for the Precision Vax information network. Don first entered the news industry in 1967, when he began selling the Philadelphia Bulletin after grade school in Ardmore, PA. His focus on vaccines began with the completion of the Human Genome project in 2003, which forecasted scientific breakthroughs and the future delivery a personalized medicine and vaccines. More recently, Donald has been publishing digital health information for patients and healthcare providers. Since 1996, Don has helped launch digital companies such as Physician Computer Network, drKoop.com, 1-800-Doctors, myDNA, Mirixa, Digital Pharmacist, and Precision Vax. Donald has served on the advisory boards of the FDA Vaccine Advisory Task Force, CDC Vaccine Information Project, University of Texas College of Pharmacy, Texas eHealth Alliance, CMS Pharmacist eCare Plan, CDC's Immunization Information System, and was a founding member of the HIPAA work-group in 1995.) “Yale Researchers Patent Next-Gen Malaria Vaccine Candidate” Precision Vaccinations, 4/17/2021. https://www.precisionvaccinations.com/yale-researchers-patent-next-gen-malaria-vaccine-candidate] BC

A Yale researcher has partnered with Novartis to develop an RNA vaccine to protect against the malaria parasite, reported Yale News.

According to the Yale research team, if the Malaria vaccine candidate is approved, it could be revolutionary to the pharmaceutical field.

The RTS,S vaccine, which was developed about two and a half years ago, grants about 30% protection, which decreases very quickly in about two to three years, said this Yale article written by Beatriz Horta.

The vaccine patent, originally applied for in 2014 by Yale researchers, was published by the U.S. Patent & Trademark office this year on February 4, 2021.

The Yale School of Medicine Chief of Rheumatology, Allergy and Immunology Richard Bucala, M.D., Ph.D., ’79 and his lab used self-amplifying RNA (saRNA) technology to improve the effectiveness and speed of production of the vaccine by decreasing the amount of genetic material needed in each shot.

sRNAs are pieces of genetic material that contain the code for the protein to be targeted by the body’s antibodies after getting the vaccine but also hold the code for an enzyme that allows the genetic material to replicate itself several times.

This means that a much smaller amount of genetic material needs to be injected for the vaccine to provide adequate immunization.

According to Dr. Bucala, one of the issues with developing a malaria vaccine is that there is no natural sterilizing immunity, which prevents reinfection in the long-term or, ideally, throughout a person’s lifetime.

This means that vaccines developed against malaria will usually provide only a short protection period or provide low immunity.

Malaria is a life-threatening disease caused by parasites transmitted to people through the bites of infected female Anopheles mosquitoes. It is preventable and curable.

Also, different from many other vaccine-preventable diseases, malaria is caused by the Plasmodium parasite rather than a virus, which means the organism has a more significant number of genes and has developed more mechanisms to trick the body’s immune system.

“The malaria parasite has evolved elaborate strategies to circumvent destruction by the host immune system, complete its life cycle, and be passed on by mosquitoes to another person so they can be infected,” Bucala added.

The main target of the saRNA vaccine is the parasite’s PMIF protein, which enables the organism to suppress the host’s immune response and prevents it from producing memory T-cells, which generate immunity. By inhibiting the activity of this protein, the vaccine will allow the body to attack the parasite naturally and generate longer-term immunity to the disease.

Bucala’s lab developed the new RNA vaccine in partnership with Andrew Geall, former RNA vaccine platform leader at Novartis Pharmaceuticals.

According to Geall, he had worked previously with Bucala on malaria research and has been interested in developing a vaccine for some time. However, the team faced challenges because of the novelty of the saRNA technology, which was tested for the first time in humans a year ago.

“The main challenge was getting the work published,” Geall wrote in an email to the News. “This is a new concept and the mode of action for the vaccine is very different to the current approaches. The reviewers required extensive data validation.”

According to Geall, the technology behind this vaccine could also significantly boost pharmaceutical companies’ abilities to produce the genetic material and distribute the shots, given the fact that less RNA is required in each dose. This aspect of the vaccine is critical for a disease that infects such a large number of people each year.

“[Malaria is] the second leading cause of infectious disease death in the world last year, about over 400,000 individuals died,” Bucala said. “They’re usually young children under the age of five.”

According to the World Health Organization, children under five account for over 67% of worldwide fatalities related to malaria each year. In 2019, there were an estimated 229 million cases of malaria worldwide.

Malaria vaccination is just one of several travel-vaccines suggested by the U.S. CDC when an international traveler visits certain countries. The CDC recommends travelers speak with a travel vaccine specialist one-month before traveling abroad.

#### IP prevents vaccine success:

#### Non-industry patents allow companies to over charge for malaria vaccines - that kills R&D and vaccine purchasing

Årdal and Røttingen 14 [(Christine, Department of International Public Health, Norwegian Institute of Public Health, Oslo, Norway. Section for Global Health, Norwegian Knowledge Centre for the Health Services, Oslo, Norway) (John-Arne, Division of Infectious Disease Control, Norwegian Institute of Public Health, Oslo, Norway. Department of Health Management and Health Economics, Institute for Health and Society, University of Oslo, Oslo, Norway. Department of Global Health and Population, Harvard School of Public Health, Boston, Massachusetts, United States of America) “An Open Source Business Model for Malaria” PLoS ONE, 2/6/2015. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0117150] BC

The standard protection measure for pharmaceutical R&D is the patent, used by both the public sector (including academia, national research institutes and PDPs) and the private sector. MMV is listed in The World Intellectual Property Organization’s patent database, Patentscope, as owning 15 patents, which encompass four different patent groups. Three of these are filed through the global Patent Cooperation Treaty, which includes the African Regional Intellectual Property Organization (ARIPO). This initial filing must be followed up by national or regional filings in order to obtain the actual patent for the designated country. Since ARIPO does not have up-to-date data in Patentscope, it is not possible to determine whether MMV has filed in African countries, and MMV does not itemize its patent ownership or costs in its annual reports

Based upon our results, we wonder if patenting of malaria treatments by non-industry organizations, like MMV, is justified. The cost of patenting is not immaterial, requiring patent applications to be filed and followed up in each individual country. Additionally the purpose of a patent is to protect against infringement, through costly lawsuits. The question is—why would a publicly or philanthropically funded body that has developed a new medicine to treat malaria (where there is market failure) want to monopolize a medicine with no or very modest revenues?

One possibility is that they may want to maintain control of the new medicine to ensure that only quality-assured manufacturers are allowed to produce it. However, this should rather be controlled through the regulatory approval process. Another argument is that a patent is necessary to incentivize the participation of industry in commercialization. Industry expertise is indeed valuable in development and necessary for manufacturing and distribution. However, early WHO prequalification may also be a large enough incentive to gain the participation of industry, particularly generic manufacturers or those located in low and middle-income countries. Many of the manufacturers that MMV works with are from middle-income countries. For a Chinese or Indian manufacturer a modest profit may be sufficient if they receive financial (and potentially technical) assistance for WHO prequalification. This too can be achieved without patents. MMV can partner with UNITAID and tender out WHO prequalification support to the most qualified applicant.

This is not to say that pharmaceutical manufacturers that develop a new antimalarial should not be allowed to patent. Of course, they should protect their private investment where relevant. But the utility of patenting publicly-funded innovation is questionable when the main aim of these public funds is to improve global public health.

Business model

To sum up, our analysis finds that malaria R&D could benefit from much greater transparency and openness. Since malaria R&D is largely publicly and philanthropically funded and the end result purchased by these same governments or philanthropies, efficiencies gained mean that these monies can be used elsewhere, potentially funding additional R&D or purchasing more medicines or vaccines. We would encourage publicly-funded institutions to re-evaluate their financing of patents and examine if similar benefits can be achieved with first-mover status on WHO prequalification.

#### “Patent thickets” delay the delivery of vaccines and prevent companies from experimenting with different antigen combinations which is necessary to develop the optimal vaccine

Shotwell 07 [(Sandra, Managing Partner, Alta Biomedical Group) “Patent Consolidation and Equitable Access: PATH’s Malaria Vaccines” Intellectual Property Management in Health and Agricultural Innovation: A Handbook of Best Practices, 2007. http://www.iphandbook.org/handbook/ch17/p21/] BC

2.3 IP challenges

The possibility of commercializing an effective malaria vaccine raises significant IP challenges. Many patents, some with overlapping claims, cover malaria antigens that may be needed for vaccine development. Such a “patent thicket” is daunting because it is likely that more than one antigen will be needed for an effective vaccine. Unfortunately, accessing many patents one at a time via traditional licensing or partnering could tie up resources needed to develop and deliver the vaccines. Moreover, the negotiations required to access key patents could delay the delivery of the vaccine. Indeed, access to key patents might not even be available, which would affect investment decisions upstream in the development pipeline about vaccine candidates. Because of this, it may not be possible to pursue the most powerful vaccine candidates if companies holding valuable malaria-vaccine IP are unwilling to license to others even if they are not developing a malaria vaccine themselves. Assessing the availability of access to key patents becomes a priority.

#### IPP prevents vaccine market development - that’s key to the development of affordable generics and boosting global vaccine supply

Aars et al. 6/16 [(Ole Kristian, Spark Street Advisors, New York) Clark (Michael, Spark Street Advisors, New York) Schwalbe (Nina, Spark Street Advisors, New York. Mailman School of Public Health, Columbia University. University of the Witwatersrand, Johannesburg-Braamfontein, Gauteng, ZA, South Africa orresponding author at: Heilbrunn School of Population and Family Health, Columbia University Mailman School of Public Health) “Increasing efficiency in vaccine Production: A primer for change” Elsevier, 6/16/2021. https://www.sciencedirect.com/science/article/pii/S2590136221000218#! ]

4.4. Market development

In theory, intellectual property incentivizes companies to make substantial investments in R&D and manufacturing. However, it also deters new entrants – both for existing products that are off-patent and for those that build on previous innovations [45].

Patents and other intellectual property protections for vaccine manufacturers are numerous and diverse and address most of the specificities of vaccine “knowledge” and “know-how” (trade secrets). For example, a study done in 2012 by the World Intellectual Property Organization [46] found that 11,800 patent families had been filed between 1921 and 2011 for active constituents of prophylactic vaccines against infectious diseases. Among these, 516 patent families related to flu vaccines, 165 patent families related to pneumococcal conjugated vaccines, and 36 patent families related to typhoid conjugated vaccines. Patents include technologies required for manufacturing (cell cultures, nucleic acid sequences, viral vector technology, virus/cell bank technologies, egg-based virus replication, etc.), active ingredients (antigens, adjuvants), production technologies, and processes (e.g., filtration, purification, conjugation, freeze-drying, etc.). The safeguarding of know-how and patenting of smaller components of the vaccine development process can be important to vaccine manufacturers as it extends protection in time far beyond the initial patent for active ingredients. However, when such patenting does not reflect substantial technological advancements, it may lead to unreasonably long patent protection. Such an unjustified extension of the exclusivity period can impede price competition and follow-up innovation, ultimately limiting access to potentially life-saving products [45]. This is an area that could benefit, for example, from additional scrutiny of regulatory authorities granting of an extension of protections.

Since patents are, for the most part, not transferrable across jurisdictions, vaccine developers will often need to file their patents in multiple jurisdictions. Specific licenses are also required before exporting a vaccine; for example, the importing country may require the manufacturer to conduct country-specific clinical trials [3]. Such barriers add to the difficulties around logistics and production economics for vaccine manufacturers [47]. Some patents are also the subject of complex licensing cross-agreements and royalty payments between several intellectual property rights (IPR) holders as a result of negotiations to terminate disputes [44]. This may generate high financial stakes for several patent holders and make potential IPR negotiations further complex [3]. For example, Bio-Manguinhos had to pay 4–5% running royalties on the Hib vaccine to GSK [48].

Despite the growth in manufacturing in India and China in recent years [49], [50], the IPR landscape for vaccines – from discovery to delivery – creates substantial obstacles for new players [2]. Understanding the landscape requires costly expertise, resources, and a capacity to undertake difficult and lengthy navigations around IPR. This could be in part addressed by a dedicated clearinghouse that focuses on reducing IPR-related barriers for DCVMN manufactures and potentially facilitates access to patent licenses. Activities to consider include: the creation of a vaccine patents database on strategically selected areas; supporting targeted freedom to operate analyses and solution-based resource tools; and, potentially, support DCMVN manufacturers with skills like legal expertise and negotiation strategy.

#### Malaria kills 2.7 million annually – climate change increases cases by 80 million

Buck and Finnigan 8/11 [(Emily, Madigan Army Medical Center) (Nancy, Campbell University) “Malaria” StatPearls, 8/11/2021. https://www.ncbi.nlm.nih.gov/books/NBK551711/] BC

Forty percent of the total global population resides in or visits malaria-endemic regions annually.[1] P. falciparum is present in Western and sub-Saharan Africa and displays the highest morbidity and mortality of the Plasmodia species.[2] P. vivax is present in South Asia, the Western Pacific, and Central America.[2] P. ovale and P. malariae are present in Sub-Saharan Africa.[2] P. knowlesi is present in Southeast Asia.[2] As many as 500 million cases of malaria occur annually, with 1.5 to 2.7 million deaths.[1] Ninety percent of fatalities occur in Africa.[1] Those at highest risk include children under age 5, pregnant women, and disease naïve populations, including refugee populations in Central and Eastern Africa, nonimmune civilian and military travelers, and immigrants returning to their place of origin.[2][1][4] Of the 125 million travelers who visit endemic locations each year, 10000 to 30000 develop malaria, and 1% of these will die from complications of their disease.[2][4] Rising average global temperatures and changes in weather patterns are projected to expand the burden of malaria; a rise of 3 degrees Celsius is postulated to increase malaria incidence by 50 to 80 million.[1]

#### China uses public health crisis as a means to expand soft power in the region, enhance its access to natural resources, and be owed political favors by African countries.

Lin et al. 18 [(Shuang, researcher affiliated with the School of International and Public Affairs at Columbia University) “China’s health assistance to Africa: opportunism or altruism?” Globalization and Health, 2016. Last updated 10/1/2018. https://globalizationandhealth.biomedcentral.com/articles/10.1186/s12992-016-0217-1#change-history] BC

China’s approach to aid: altruism or opportunism

Overall, it is estimated that at least 3 billion USD from 2000 to 2012 has been committed by China to about 255 projects in health, population and water and sanitation sectors in Africa [2]. The most typical form of China’s health assistance has been the dispatching of Chinese medical teams (CMT). In 2014 for example, there were 43 CMT sent to 42 African countries [3]. The CMT program operates at an estimated annual cost of 200 million to 409.6 million RMB (29.45 million to 60 million USD) [4, 5]. Apart from the CMT program, China also has assisted in the construction of health facilities, the contribution of medical equipment and drugs, and the training of African health care workers. By 2014, China had helped build 30 hospitals and 30 malaria prevention and control centers in Africa, invested 800 million RMB (123.9 million USD) in medical equipment, supplies and anti-malaria drugs, and trained over 3,000 health care workers from various African countries [3].

Policy and mechanisms

From its very beginnings, China’s health assistance has been perceived as opportunistic by some while at the same time as altruistic by others. Chinese overseas health assistance has its roots in the ideological concerns during the Cold War when China dispatched its first medical team to Algeria in 1963 [6]. Since that time, China has indicated that its aid was grounded in the “Eight Principles for Economic Aid and Technical Assistance to Other Countries” originally articulated by Premier Zhou Enlai in 1964, which were described as anchored in “equality, mutual benefit with no strings attached” [1, 7]. China’s current assistance and investment policies in Africa are largely guided by the 2006 document entitled, “China’s African Policy”, which indicates that China “will continue to send medical teams and provide medicines and medical materials to African countries, and help them establish and improve medical facilities and train medical personnel.” It also states that “China will increase its exchanges and cooperation with African countries in the prevention and treatment of infectious diseases including HIV/AIDS and malaria and other diseases, research and application of traditional medicine and experience concerning mechanism for public health emergencies” [8].

The 2006 document “China’s African Policy” granted the Forum on China-Africa Cooperation (FOCAC) a central role in shaping the China-Africa relationship. At each FOCAC summit since 2000, the Chinese government makes new assistance commitments, often including health-related aid. For example, at the Second Summit of the FOCAC in December 2015, Chinese President Xi Jinping announced a 60 billion USD package to support cooperation with Africa for the following three years, with public health being one of the areas to be covered [9].

Through FOCAC programs, China has established a series of other China-Africa health-related cooperation instruments. These include: the African Human Resources Development Fund in 2000; the first China-Africa Forum on Traditional Medicine in 2002; a 5 billion USD China-Africa Development Fund in 2006; and the first Ministerial Forum on China-Africa Health Development in 2013, which was timed to commemorate the 50th anniversary of the first CMT sent to Algeria in 1963.

Despite these many initiatives, a key limitation of China’s health aid approach is the absence of a cohesive approach and a coherent strategy of China’s health diplomacy. It should be noted that China’s health aid is primarily managed by the Ministry of Commerce, with the participation of the Ministry of Foreign Affairs, the Ministry of Finance and the National Health and Family Planning Commission, with oversight from the State Council [10]. While the Chinese national government takes the lead to initiate and negotiate bilateral agreements with African countries, the implementation of these agreements rests with China’s provincial or subnational governments. In addition, China’s existing foreign aid policies are based largely on ad hoc central ministerial documents and regulations, which are not subject to approval by the legislative branch [11]. Furthermore, competition within the Chinese government ministries and at provincial levels further undermines the overall cohesion and coordination of China’s aid [12]. For example, individual provincial Chinese governments are designated to provide specific African countries with medical teams, thus, this results in the allocation of different levels of resources to health projects based on provincial interest and their local capacity [13]. This has resulted in variations in the quantity and quality of the assistance provided to recipient African countries [14].

Measuring the magnitude and impact of China’s health assistance to Africa

One of the major challenges in understanding the scope and impact of China’s health assistance to Africa is the lack of information regarding the amount of such aid (or its overall foreign aid), the criteria for making aid decisions, and the mechanism for determining the impact of aid [15]. For example, Li found that it was difficult to find a consistent report of even the total number of CMTs dispatched to Africa [16]. Some have argued that the lack of transparency reflects China’s effort to avoid pressure both from African governments for more aid and from domestic criticism against supporting other countries while poverty remains a challenge at home [17]. Others pointed out that recipient African countries are also unwilling or incapable of informing other states on the amount of aid received from China [18].

AidData, a partnership between the College of William and Mary, Brigham Young University and Development Gateway, has attempted to track China’s foreign aid. AidData adopted a “Tracking Under-Reported Financial Flows (TUFF)” methodology [19] to collect comprehensive and standardized data on development finance flows between China and African countries. However, others have noted varying estimates of such aid by using different methods. Grepin et al., using data released from AidData, suggested that China had pledged health projects valued at 231 million USD per year over the past decade [2]. In contrast, using manually collected information, Liu et al. [5], estimated that China disbursed 150 million USD in health aid annually.

China’s approach to aid: altruism or opportunism

China’s engagement in Africa health aid has differed from aid provided by traditional Western donors, particularly in the way China builds on its own prior experiences in building its own health system as a developing country, and in the manner in which it places special emphasis on the issue of the national sovereignty of recipient countries.

A distinctive feature of China’s health aid that is frequently discussed in the literature is what has been referred to as the “no strings attached” altruistic approach which “never imposes ideology, values and development models on other countries, especially African countries” [20]. Concerns have been raised regarding this claim indicating that the vision of a democratic Africa where human rights are respected is challenged by China’s approach, particularly with its growing influence in the continent [21]. Some have noted that China legitimizes and encourages Africa’s most repressive regimes, which leads to enabling weak and failed states [13]. Critics have also expressed concern that despite its stated approach of “no strings attached”, China has its own expectations from recipient countries, including diplomatic loyalty on issues such as Taiwan, Tibet and the status of the Uyghur people [15].

Other observers claim that China’s health priorities in Africa aim to secure stable supplies of oil and other natural resources [22]. They point to the fact that China imports one-third of its oil from Africa and significant amounts of minerals and other raw materials, largely from Sudan, Angola, and the Democratic Republic of the Congo [23].

The Chinese government has responded to some of the criticisms cited above by denying that it has any intent of plundering Africa’s resources or that its sole interest rests on utilizing Africa’s markets for its products [24]. As evidence to the support, some have noted that China provides aid to all countries in sub Saharan Africa (except to those that do not follow the “One China Policy”, i.e. that recognize Taiwan). This has been contrasted by Chinese officials with the approach by traditional Western donors, where some countries are favored over others [25]. In addition, studies have indicated the lack of evidence to suggest that China targets health aid preferentially to resource-rich countries [2]. It is further argued that China’s Official Development Assistance (ODA) to Africa has been driven primarily by foreign policy considerations instead of economic interests [26].

China has also cited as evidence of its altruistic intent the fact that African governments have expressed gratitude for China’s medical teams lauding their strong commitment and their willingness to help the citizens of their countries [27]. It is estimated that by 2009, more than 21,000 Chinese medical workers have provided services to 260 million patients around the world [1]. In addition, as of 2013, about 1000 Chinese medical team members have received medals of appreciation from recipient governments [28]. Their efforts have been acknowledged as filling critical gaps, particularly through their service in rural areas, positions that have been difficult to fill with African physicians [29]. In addition, some have countered the criticism to China by indicating that the western approach to aid, that is often couched in altruism, has failed to take the African reality into consideration and reflecting an arrogant premise of “knowing what is best for Africa” [30].

Health aid as a diplomatic strategy

While policy dynamics behind China’s health aid attract relatively little attention from scholars, some studies have pointed out that China’s health aid has been an integral part of the country’s diplomatic strategy to expand international influence while improving its international image [6, 11]. A review [31] of China’s health diplomacy in Africa showed that in 1950s and 1960s, China’s relationship with African countries was framed as a counterbalance to the powers of United States and the Soviet Union. In the ensuing decades, China paid less attention to Africa as it sought to find its place in the international marketplace. In recent years, Africa has regained high prominence in China’s overall foreign policy, and the Chinese government has reinvigorated its commitment to health assistance for African countries as a means to strengthen its diplomatic relations.

It should be noted that China’s medical cooperation in Africa has corresponded to China’s diplomatic strategy [16]. For example, China began sending medical teams to Senegal in 1975, but withdrew such teams from 1996 to 2007, a period when diplomatic relations were severed. In addition, Thompson and Youde posited that providing healthcare resources not only helps China gain favorable trading terms and access to necessary resources, but also supports the government’s attempts to portray itself as a good international citizen [31, 32]. However, despite the fact that China has become more active in global health, Huang warns that China’s pursuit of health as primarily foreign policy could undermine its incentives and efficacy for greater international health engagement [6].

#### Increased Chinese and Russian influence in Africa kills US primacy – they don’t have control now, but military conflict lets them assert dominance in the region

Turse 19 [(Nick, contributing writer for The Intercept, reporting on national security and foreign policy. He is the author, most recently, of "Next Time They’ll Come to Count the Dead: War and Survival in South Sudan," as well as "Tomorrow's Battlefield: U.S. Proxy Wars and Secret Ops in Africa," and "Kill Anything That Moves: The Real American War in Vietnam." He has written for the New York Times, Los Angeles Times, San Francisco Chronicle, The Nation, and Village Voice, among other publications. He has received a Ridenhour Prize for Investigative Reporting, a James Aronson Award for Social Justice Journalism, and a Guggenheim Fellowship. Turse is a fellow at The Nation Institute and the managing editor of TomDispatch.com.) “U.S. GENERALS WORRY ABOUT RISING RUSSIAN AND CHINESE INFLUENCE IN AFRICA, DOCUMENTS SHOW” The Intercept, 8/13/2019. https://theintercept.com/2019/08/13/russia-china-military-africa/] BC

THE TRUMP ADMINISTRATION and the Pentagon have repeatedly warned that China and Russia are expanding their influence across Africa, where the two longtime American adversaries “interfere with U.S. military operations and pose a significant threat to U.S. national security interests,” national security adviser John Bolton said last December.

That view was echoed by the former head of U.S. Africa Command, Marine Corps Gen. Thomas Waldhauser, who left the job last month, and his replacement, Stephen Townsend, both of whom testified publicly before Congress earlier this year. But the two generals went further in written responses to Congress obtained by The Intercept via the Freedom of Information Act, describing an Africa ever more likely to fall under the sway of Beijing and Moscow — with Russia exerting influence in as many as 10 different African countries and China likely to open more bases across the continent.

Beijing and Moscow have steadily increased their economic ties across Africa and, with them, their diplomatic sway. Trade between China and Africa has risen from $765 million to more than $170 billion in the last 40 years, and 39 of 54 African nations have now signed on to Beijing’s Belt and Road Initiative – a trillion-dollar plan to link infrastructure and trade via a vast new network of roads, rail lines, ports, and pipelines across Eurasia, the Middle East, and Africa. Russia’s trade with Africa increased from $5.7 billion in 2009 to $17.4 billion in 2017, and the country has been aggressively promoting nuclear infrastructure and technology partnerships as well as oil and gas investments there.

Both nations have also aimed to increase their cultural influence. The number of Chinese-government-sponsored Confucius Institutes in Africa, which promote Chinese language and culture, have risen from zero in 2004 to 48 last year, according to data compiled by Development Reimagined, a Beijing-based international consulting firm. AFRICOM documents note that these centers are located in 20 different African countries. The Russian equivalent, Russkiy Mir Foundation, a nongovernmental and nonprofit organization, is active in nine African countries, according to AFRICOM.

Russia and China have also been forging stronger military ties with African nations through arms sales, security agreements, and military training programs. Russian private military companies are active in 15 African nations, according to AFRICOM.

Last month, Beijing hosted the first China-Africa Peace and Security Forum, which brought together nearly 100 security officials from 50 African countries and the African Union, including 15 defense ministers and chiefs of general staff, according to China’s Ministry of Defense. While that gathering was underway, the Russian news agency Tass announced that roughly 35 African leaders had confirmed their attendance at the first Russia-Africa Summit – co-chaired by Russian President Vladimir Putin and Egyptian President Abdel-Fattah el-Sissi — set to be held in Russia’s Black Sea resort city of Sochi in October.

IN HIS TESTIMONY before the Senate Armed Services Committee, Waldhauser mostly focused on Russia’s increasing inroads in Central African Republic and, to a lesser extent, Algeria, Libya, and Sudan. But in his written responses, Waldhauser mentioned six other nations that were also involved with Russia or susceptible to its influence including Angola, Guinea, Guinea-Bissau, Mali, Mauritania, and Tunisia. Russia is leveraging or seeking to leverage military aid in return for mining rights and energy partnerships, according to Waldhauser. “To thwart Russian exploitative efforts, USAFRICOM continues to work with a host of partners to be the military partner of choice in Africa,” he wrote.

In the Central African Republic, “Russia has bolstered its influence with increased military cooperation including donations of arms, with which it has gained access to markets and mineral extraction rights,” Waldhauser explained in his public testimony. “With minimal investment, Russia leverages private military contractors, such as the Wagner Group.” He noted that the president of the Central African Republic, Faustin-Archange Touadéra, had recently installed “a Russian civilian as his National Security Advisor. The President also promised the armed forces would be deployed nationwide to return peace to the country by forces likely trained, equipped, and in some cases, accompanied by Russian military contractors. Russia’s ability to import harsh security practices, in a region already marred by threats to security, while systematically extracting minerals, is concerning.”

Asked to privately explain these “harsh security practices,” Waldhauser mentioned reports of Russian contractor cooperation with militias and acquiescence to their human rights violations; the abuse of local security force trainees as well as civilians “who approach Russian mining interests”; and the possibility of involvement in the deaths of Russian journalists who were murdered in the Central African Republic while investigating the activities of Russian military contractors.

In his public testimony, Townsend ranked China just below Russia as a threat to U.S. primacy in Africa but said he expected the People’s Republic to eclipse Russia. “I think that they are after access and influence to our detriment,” the new AFRICOM commander said of China. Behind the scenes, Townsend also badmouthed China’s efforts on multiple fronts, including arms sales, and explained that the U.S. needed to emphasize the shoddy nature of Chinese military technology to African countries. “China has provided Nigeria with armed unmanned aerial systems … but the poor quality of the platforms has contributed to infrequent use,” he wrote. “Low cost and short delivery timelines entice African partners to purchase Chinese equipment, but purchases frequently do not address the underlying military need. We need to tell this story to a greater extent.”

In his written remarks, Waldhauser explained that current Chinese efforts in Africa were unlikely to inhibit U.S. military access and operations in the near term but warned that “China could gain that capability within the next decade.” While China only opened its first overseas military base, located six miles from the U.S. military’s Camp Lemonnier in the Horn-of-Africa nation of Djibouti in 2017, Waldhauser mentioned more Chinese facilities on the horizon. “China is actively working with African partners to open new bases in several locations across the continent,” he wrote. “By working with other [African] nations … we may be able to ensure that when China or Russia do gain military access to ports, bases, or airspace, that they are unable to take full advantage of that access to threaten U.S. freedom of maneuver in and around Africa.”

#### US primacy prevents great-power conflict — multipolar revisionism fragments the global order and causes nuclear war

Brands & Edel, 19 — Hal Brands; PhD, Henry A. Kissinger Distinguished Professor of Global Affairs at the Johns Hopkins School of Advanced International Studies. Charles Edel; PhD, Senior Fellow and Visiting Scholar at the United States Studies Centre at the University of Sydney. (“The Lessons of Tragedy: Statecraft and World Order;” Ch. 6: Darkening Horizon; Published by Yale University Press; //GrRv)  
Each of these geopolitical challenges is different, and each reflects the distinctive interests, ambitions, and history of the country undertaking it. Yet there is growing cooperation between the countries that are challenging the regional pillars of the U.S.-led order. Russia and China have collaborated on issues such as energy, sales and development of military technology, opposition to additional U.S. military deployments on the Korean peninsula, and naval exercises from the South China Sea to the Baltic. In Syria, Iran provided the shock troops that helped keep Russia’s ally, Bashar al-Assad, in power, as Moscow provided the air power and the diplomatic cover. “Our cooperation can isolate America,” supreme leader Ali Khamenei told Putin in 2017. More broadly, what links these challenges together is their opposition to the constellation of power, norms, and relationships that the U.S.-led order entails, and in their propensity to use violence, coercion, and intimidation as means of making that opposition effective. Taken collectively, these challenges constitute a geopolitical sea change from the post-Cold War era.

The revival of great-power competition entails higher international tensions than the world has known for decades, and the revival of arms races, security dilemmas, and other artifacts of a more dangerous past. It entails sharper conflicts over the international rules of the road on issues ranging from freedom of navigation to the illegitimacy of altering borders by force, and intensifying competitions over states that reside at the intersection of rival powers’ areas of interest. It requires confronting the prospect that rival powers could overturn the favorable regional balances that have underpinned the U.S.-led order for decades, and that they might construct rival spheres of influence from which America and the liberal ideas it has long promoted would be excluded. Finally, it necessitates recognizing that great-power rivalry could lead to great-power war, a prospect that seemed to have followed the Soviet empire onto the ash heap of history.

Both Beijing and Moscow are, after all, optimizing their forces and exercising aggressively in preparation for potential conflicts with the United States and its allies; Russian doctrine explicitly emphasizes the limited use of nuclear weapons to achieve escalation dominance in a war with Washington. In Syria, U.S. and Russian forces even came into deadly contact in early 2018. American airpower decimated a contingent of government-sponsored Russian mercenaries that was attacking a base at which U.S. troops were present, an incident demonstrating the increasing boldness of Russian operations and the corresponding potential for escalation. The world has not yet returned to the epic clashes for global dominance that characterized the twentieth century, but it has returned to the historical norm of great-power struggle, with all the associated dangers.

Those dangers may be even greater than most observers appreciate, because if today’s great-power competitions are still most intense at the regional level, who is to say where these competitions will end? By all appearances, Russia does not simply want to be a “regional power” (as Obama cuttingly described it) that dominates South Ossetia and Crimea.37 It aspires to the deep European and extra-regional impact that previous incarnations of the Russian state enjoyed. Why else would Putin boast about how far his troops can drive into Eastern Europe? Why else would Moscow be deploying military power into the Middle East? Why else would it be continuing to cultivate intelligence and military relationships in regions as remote as Latin America?

Likewise, China is today focused primarily on securing its own geopolitical neighborhood, but its ambitions for tomorrow are clearly much bolder. Beijing probably does not envision itself fully overthrowing the international order, simply because it has profited far too much from the U.S.-anchored global economy. Yet China has nonetheless positioned itself for a global challenge to U.S. influence. Chinese military forces are deploying ever farther from China’s immediate periphery; Beijing has projected power into the Arctic and established bases and logistical points in the Indian Ocean and Horn of Africa. Popular Chinese movies depict Beijing replacing Washington as the dominant actor in sub-Saharan Africa—a fictional representation of a real-life effort long under way. The Belt and Road Initiative bespeaks an aspiration to link China to countries throughout Central Asia, the Middle East, and Europe; BRI, AIIB, and RCEP look like the beginning of an alternative institutional architecture to rival Washington’s. In 2017, Xi Jinping told the Nineteenth National Congress of the Chinese Communist Party that Beijing could now “take center stage in the world” and act as an alternative to U.S. leadership.38

These ambitions may or may not be realistic. But they demonstrate just how significantly the world’s leading authoritarian powers desire to shift the global environment over time. The revisionism we are seeing today may therefore be only the beginning. As China’s power continues to grow, or if it is successful in dominating the Western Pacific, it will surely move on to grander endeavors. If Russia reconsolidates control over the former Soviet space, it may seek to bring parts of the former Warsaw Pact to heel. Historically, this has been a recurring pattern of great-power behavior—interests expand with power, the appetite grows with the eating, risk-taking increases as early gambles are seen to pay off.39 This pattern is precisely why the revival of great-power competition is so concerning—because geopolitical revisionism by unsatisfied major powers has so often presaged intensifying international conflict, confrontation, and even war. The great-power behavior occurring today represents the warning light flashing on the dashboard. It tells us there may be still-greater traumas to come.

The threats today are compelling and urgent, and there may someday come a time when the balance of power has shifted so markedly that the postwar international system cannot be sustained. Yet that moment of failure has not yet arrived, and so the goal of U.S. strategy should be not to hasten it by giving up prematurely, but to push it off as far into the future as possible. Rather than simply acquiescing in the decline of a world it spent generations building, America should aggressively bolster its defenses, with an eye to preserving and perhaps even selectively advancing its remarkable achievements.

#### Retrenchment causes nationalism, war, and protectionism – optimists falsely assume current cooperative trends will continue without the US security guarantee

Matthew Fay 17, Director of Defense and Foreign Policy Studies @ The Niskanen Center, 11/16/17, “America Unrestrained?: Engagement, Retrenchment, and Libertarian Foreign Policy,” https://niskanencenter.org/wp-content/uploads/2017/11/America-Unrestrained.pdf

A number of the arguments libertarians make in favor of retrenchment have merit, but the cost-benefit analysis derived from them is based on a deterministic view of international politics. Libertarian retrenchers assume that international politics would remain more or less the same absent American engagement and that America’s domestic politics would remain the same even if the international system become more conflict-prone. Given the inherent uncertainty of forecasting, the costs and benefits of engagement and retrenchment need to be considered in a more probabilistic fashion.86 This section begins by exploring a number of scenarios that could occur should the United States adopt a grand strategy of retrenchment. It then reassesses the costs and benefits of retrenchment for a free society.

In a system with more independent states balancing against one another, is war more or less likely? Libertarians are placing a bet that all else would remain equal in international politics if the United States retrenches. While they assume a world where an increased number of states are balancing against one another would remain peaceful, the reality is not entirely clear. Using basic realist premises about state behavior under international anarchy, it is easy to identify a number of scenarios less rosy than the one libertarians assume would occur should the United States retrench. These scenarios might include a world of increased nationalism, eroding norms against military aggression, increased economic autarky, and the further spread of nuclear weapons as states look to produce security for themselves. Some states may also fail to balance against threats in the wake of American retrenchment, increasing the likelihood the United States will be drawn into a major war.

Libertarians assume that in the absence of an alliance with the United States, other countries would simply increase their defense spending if they felt threatened. However, internal balancing is not a mechanical process. According to John Mearsheimer, leaders of states facing security competition are likely to use nationalism to garner support from their populations for the necessary regeneration of military capabilities.87

Writing at the end of the Cold War, Mearsheimer suggested that Europe would revert to a pattern of recurrent warfare. The absence of the United States and the Soviet Union would leave Europe, once again, an anarchic multipolar system. The structure of the system would force the states to compete with one another, as they had prior to the Cold War. Mearsheimer argued that pre-1945 “hypernationalism” was a product of “security competition among the European states, which compelled elites to mobilize public support for national defense efforts.”88

American retrenchment could similarly lead to an anarchic, multipolar Europe—thus increasing the chances of war on the continent. Such a system could engender nationalist sentiments among the populations of Europe, heightening animosities between national groups. These heightened animosities could help erode norms against military aggression that have facilitated the decline in interstate war. Nationalist groups within a country can seize on these sentiments to pursue confrontational and expansionist policies.89 Encouraging support for increased military capabilities through nationalism might lead populations to see war as once again a means to national glory or maintaining national honor. Matters of national prestige and honor can lead to the initiation of wars when bound up in territorial claims, while at the same time increasing the intensity and duration of a conflict.90

Nationalism and security competition might also erode the pacifying effects of economic openness. Realism suggests states are concerned about relative gains.91 States in security competition might be wary of trading with one another due to concerns about how a potential rival’s economic gains might provide it with an advantage if translated into military power. They may also adopt autarkic policies for fear of undermining their economic and military self-sufficiency.92 Territorial conquest has become increasing anachronistic in international politics. However, the proliferation of protectionist policies might once again make aggression and preventive war seem like strategically sensible ways for states to secure the resources necessary to reduce the ability of potential rivals to cut them off economically.

If the risk of territorial aggression increases, the possession of nuclear weapons would become an attractive option for some states whose security was previously guaranteed by the United States. Nuclear weapons are most useful for deterring major territorial aggression, meaning their potential utility increases as the potential for war does.93 A number of U.S. allies have either previously pursued nuclear weapons or have the capability to do so. They might choose to obtain a nuclear arsenal once responsible for their own security.

#### Pursuit is inevitable

Wright 20 [(Thomas, director of the Center on the United States and Europe and a senior fellow in the Project on International Order and Strategy at the Brookings Institution, former lecturer at the University of Chicago's Harris School for Public Policy, PhD from Georgetown University and M.Phil. from Cambridge University) “The Folly of Retrenchment:Why America Can’t Withdraw From the World,” Foreign Affairs, 4/2020] JL

A fifth problem with retrenchment is that it lacks domestic support. The American people may favor greater burden sharing, but there is no evidence that they are onboard with a withdrawal from Europe and Asia. As a survey conducted in 2019 by the Chicago Council on Global Affairs found, seven out of ten Americans believe that maintaining military superiority makes the United States safer, and almost three-quarters think that alliances contribute to U.S. security. A 2019 Eurasia Group Foundation poll found that over 60 percent of Americans want to maintain or increase defense spending. As it became apparent that China and Russia would benefit from this shift toward retrenchment, and as the United States’ democratic allies objected to its withdrawal, the domestic political backlash would grow. One result could be a prolonged foreign policy debate that would cause the United States to oscillate between retrenchment and reengagement, creating uncertainty about its commitments and thus raising the risk of miscalculation by Washington, its allies, or its rivals.

#### **Heg is sustainable – America has strong bones**

Ikenberry 18 [(John, Professor of Politics and International Affairs in the Woodrow Wilson School of Public and International Affairs at Princeton University) reviewing book by Beckley (Michael, Fellow in the International Security Program at Harvard Kennedy School's Belfer Center for Science and International Affairs) “Unrivaled: Why America Will Remain the World’s Sole Superpower,” Foreign Affairs, November/December 2018]

It has become conventional wisdom that the United States is in decline, the uni-polar era is ending, and China is on the rise. In this smart and sophisticated book, Beckley tackles this thesis head-on. He does not dispute that the United States has its problems or that misguided leaders often squander its advantages. But he points out that the United States’ deep geographic, demographic, and institutional reserves give the country unique resilience. The United States is the only great power without regional rivals. Its companies and universities dominate the world. And most important, Beckley argues that it has by far the best fundamentals for future economic growth, thanks to its abundant natural resources, favorable demographics, secure property rights, and lasting political institutions. China’s growth prospects, in contrast, are “dismal.” Beckley also thinks the declinists use the wrong measures of power. GDP, for example, exaggerates the influence of populous but poor countries, such as China, while overlooking problems that drain those countries’ economic and military resources. He does not argue that the United States can—or should—try to preserve the unipolar era, but he does think that it will long remain the world’s leading power.

#### Nuclear war causes extinction – famine and climate change

Starr 15 [(Steven, Director of the University of Missouri’s Clinical Laboratory Science Program and a senior scientist at the Physicians for Social Responsibility) “Nuclear War, Nuclear Winter, and Human Extinction,” Federation of American Scientists, 10/14/2015] DD

While it is impossible to precisely predict all the human impacts that would result from a nuclear winter, it is relatively simple to predict those which would be most profound. That is, a nuclear winter would cause most humans and large animals to die from nuclear famine in a mass extinction event similar to the one that wiped out the dinosaurs.

Following the detonation (in conflict) of US and/or Russian launch-ready strategic nuclear weapons, nuclear firestorms would burn simultaneously over a total land surface area of many thousands or tens of thousands of square miles. These mass fires, many of which would rage over large cities and industrial areas, would release many tens of millions of tons of black carbon soot and smoke (up to 180 million tons, according to peer-reviewed studies), which would rise rapidly above cloud level and into the stratosphere. [For an explanation of the calculation of smoke emissions, see Atmospheric effects & societal consequences of regional scale nuclear conflicts.]

The scientists who completed the most recent peer-reviewed studies on nuclear winter discovered that the sunlight would heat the smoke, producing a self-lofting effect that would not only aid the rise of the smoke into the stratosphere (above cloud level, where it could not be rained out), but act to keep the smoke in the stratosphere for 10 years or more. The longevity of the smoke layer would act to greatly increase the severity of its effects upon the biosphere.

Once in the stratosphere, the smoke (predicted to be produced by a range of strategic nuclear wars) would rapidly engulf the Earth and form a dense stratospheric smoke layer. The smoke from a war fought with strategic nuclear weapons would quickly prevent up to 70% of sunlight from reaching the surface of the Northern Hemisphere and 35% of sunlight from reaching the surface of the Southern Hemisphere. Such an enormous loss of warming sunlight would produce Ice Age weather conditions on Earth in a matter of weeks. For a period of 1-3 years following the war, temperatures would fall below freezing every day in the central agricultural zones of North America and Eurasia. [For an explanation of nuclear winter, see Nuclear winter revisited with a modern climate model and current nuclear arsenals: Still catastrophic consequences.]

Nuclear winter would cause average global surface temperatures to become colder than they were at the height of the last Ice Age. Such extreme cold would eliminate growing seasons for many years, probably for a decade or longer. Can you imagine a winter that lasts for ten years?

The results of such a scenario are obvious. Temperatures would be much too cold to grow food, and they would remain this way long enough to cause most humans and animals to starve to death.

Global nuclear famine would ensue in a setting in which the infrastructure of the combatant nations has been totally destroyed, resulting in massive amounts of chemical and radioactive toxins being released into the biosphere. We don’t need a sophisticated study to tell us that no food and Ice Age temperatures for a decade would kill most people and animals on the planet.  Would the few remaining survivors be able to survive in a radioactive, toxic environment?

### Solvency

#### PLAN: Member nations of the World Trade Organization should reduce intellectual property protections for anti-malarial medicines.

Todd 19 [(Matthew, Professor of Drug Discovery, Pharma & Biochemistry at the UCL School of Pharmacy. He founded and currently leads the Open Source Malaria (OSM) and Open Source Mycetoma (MycetOS) consortia and is a founder of a broader Open Source Pharma movement. He is on the Editorial Boards of PLoS One, ChemistryOpen and Nature Scientific Reports.) “Open Source Malaria” Global Innovation Exchange, 5/24/2019. https://www.globalinnovationexchange.org/innovation/open-source-malaria] BC

Open Source Malaria is already in progress and delivering for sustainable development. The project aims to take candidate molecules through from discovery to patients. Given the IP-free (Creative Commons) licencing applied throughout, the resulting medicine would be widely and sustainably available to patients at the lowest possible price via the generics industry. This would have significant impact on the 3.2 billion people at risk of the disease, and on the current scale of the disease’s terrible human cost: malaria takes the lives of 1200 people each day, mostly young children. The occurrence of resistance to the current front line drugs used worldwide (the artemisinins, used in combination therapies) means new, inexpensive medicines are urgently needed. Since beginning operations in 2011, Open Source Malaria has examined four series of molecules with the potential to become new antimalarials. The first three series were derived from molecules identified by GlaxoSmithKline which were placed in the public domain in 2010. The compounds in Series 1 possessed a molecular problem that could not be engineered out, and this series is described in a major publication submitted to the peer-reviewed literature. A second series was abandoned when it became clear that another, closed, research group was pursuing the same structures. Series 3 was stopped when it was discovered that even the slightest alterations to the molecule’s structure eliminated all potency against the parasite. The current series, Series 4, originated from the pharmaceutical company Pfizer. The series includes molecules with remarkable potency, and, crucially, with the ability to cure mice infected with a model of malaria. This “in vivo” activity is a major strength of these compounds and mean they need to be pursued further. OSM is now working to solve two remaining liabilities of these molecules: they are metabolized too quickly and they do not dissolve sufficiently well in water. The consortium is also seeking to understand the molecular details of how these simple compounds are killing the parasite. If the molecular liabilities can be overcome, it is likely that Series 4 could progress to the clinical trial phase of drug development. This would be the first time a “born open” compound has progressed from discovery through the clinical phase and finally to market, and raises the possibility that an IP-free, potent new antimalarial might be able to reach people in this way. Should this occur, the structure of how we research and develop medicines will be irreversibly changed.

#### It ends the outbreak and overcome past challenges in combating the illness

Willman 4/29 [(Marnie, Virology, University of Manitoba Bannatyne and National Microbiology Laboratory) “Researchers create an effective RNA vaccine for malaria” MassiveSci, 4/29/2021. https://massivesci.com/articles/malaria-mrna-vaccine-covid-biotech-patents/] BC

Malaria remains a significant problem facing Africa. Of the 409,000 worldwide malaria deaths estimated by the WHO in 2019, 94 percent of all cases occurred in Africa.

Malaria is caused by a parasite, carried and transmitted to humans by female Anopheles mosquitoes (there are more than 400 species of this particular type of mosquito, and 30 of them can carry malaria). The battle between malaria and science remains because of a handy trick this parasite plays on the immune system.

Our immune system has a component called “MIF” which stands for “cytokine macrophage migration inhibitory factor.” The job of MIF is to regulate the movement of immune cells to the site of an infection (either attracting them to the site, or stopping them from continuing to arrive once the invader or injury is gone). Plasmodium, the one-celled parasite that causes malaria, can produce a nonfunctional “decoy” of MIF, causing our confused immune system to then fail to make the T cells that would normally be stimulated as a result of regular MIF activity during infection. The ultimate result is no production of T cells, which would normally make memory B cells that would generate long-lasting immunity against the malaria.

Now you might be able to see why designing a vaccine is challenging for malaria. In a typical vaccine, a bit of protein or a deactivated virus or bacteria is used to stimulate the immune system. Your immune system then pumps out antibodies against that invader, and you’re left with memory B cells that remember that infection; the body is then primed and ready to fight a future infection. The Plasmodium parasite interferes with the process of T cells leading to those long-lived memory B cells that would fight off future infections faster and more efficiently. So, your next encounter with this parasite would be the same as your first, with no built-up immunity from previous infections.

Thankfully, there is hope. Yale researchers recently filed a patent for a malaria vaccine using a RNA platform. mRNA vaccines are a relatively new technology that uses non-infectious and non-integrating (this means it won’t accidentally become part of your healthy cells) piece of genetic material from the pathogen of interest (in our case, malaria).

mRNA is kind of like instructions for generating a protein. By delivering the mRNA as a vaccine, your body takes the genetic material up into cellular cytoplasm (the liquid inside of your cells), and begin to make the protein by following instructions within the mRNA. This new protein is then released, spotted by your vigilant immune system, and flagged. As your body becomes aware of the threat, your T cells and immune system are activated, and memory B cells are formed against the pathogen. Just like that — you’re immune!

This new vaccine, generated by Richard Bucala and Andrew Geall is an saRNA (similar to mRNA, but more efficient) vaccine that encodes the PMIF that Plasmodium normally uses to disarm our immune system. As Bucala and Geall discovered, immunizing patients with saRNA that encodes PMIF uses the parasite’s own gene against it, and confers protection. These results were also seen in a study from 2018, in which MIF was tested successfully used as a treatment for malaria infection in a mouse model.

Malaria and COVID-19 have two thin in common. Both are serious problems continuing to cause high caseloads and fatality rates globally. Both have had mRNA-based vaccines suggested as their solution (malaria is an experimental vaccine, COVID-19 mRNA vaccines have now been approved and are in use). Researchers continue to test mRNA vaccine candidates for a variety of diseases in the hopes that more solutions to deadly pathogens will be found.

Bucala and Geall’s new malaria vaccine candidate is a great example of a new technology being applied to a previously unsolvable problem. This is what science is all about. mRNA vaccines have been applied to a number of problematic pathogens including COVID-19, rabies, Zika virus. Perhaps the most famous mRNA vaccines are the ones developed in the last year to target the SARS-CoV-2 virus that causes COVID-19. The Pfizer Inc and BioNTech vaccine (almost 94 million doses have been administered in the US alone in recent months) is an mRNA vaccine, as is the Moderna vaccine, which is ramping up production and distribution. Researchers and doctors alike continue to hope that this technology will help us see the end of the most significant global outbreak in recent history.

#### Only the vaccine can eradicate the disease

Piper 4/28 [(Kelsey is a Staff Writer for Vox's new vertical with a focus on the global poor, animal welfare, and risks affecting a stable future for our world. She previously worked as the head of the writing team at Triplebyte, and ran Stanford Effective Altruism during college.) “The new malaria vaccine is a total game changer” Vox, 4/28/2021. https://www.vox.com/future-perfect/22399386/malaria-vaccine-r21mm-public-health-global-child-mortality] BC

The big picture

Malaria isn’t just one of the world’s biggest killers of children. It’s also one of the biggest barriers to good childhood health and development in affected areas. Malaria infection causes long-term problems including cognitive impairment, and likely has long-term developmental impacts on children even when they survive it.

The world has done a lot over the past few decades to fight malaria. Interventions like insecticide-treated bed nets and seasonal preventive treatment in the form of medications have driven death rates down from around 1 million every year as recently as the 1990s to around 400,000 today. But without an effective vaccine that can be distributed everywhere, it’s going to be incredibly difficult to eradicate the disease.

Researchers know that, and malaria vaccine research is one of the most active areas of vaccine research, with human challenge trials in the UK (meaning clinical trials where volunteers are deliberately infected with the disease), phase 1 and phase 2 clinical trials throughout areas with high malaria prevalence, and other promising ideas being pursued based on encouraging results in mice.

Now, all that effort is starting to pay off. In general, writing about malaria vaccines means emphasizing that everything is still early-stage, that there’s lots of reason to expect a new innovation or development to fall through, and that while every avenue is worth pursuing, the public should know that most of them won’t pay off.

That’s not true this time. This is a late-stage result, and there’s every reason to expect it to hold up. “This is excellent work,” Lowe told me. “This is the best news in the malaria vaccine world ever.”

This is the first vaccine to meet the World Health Organization’s threshold of 75 percent effectiveness for a malaria vaccine. With many other vaccine candidates making their way through trials, it almost definitely won’t be the last. The more we know about malaria — and about vaccination — the better we can design vaccines that are cheap, simple to store and administer, that don’t require too many booster doses, and that provoke a strong and enduring immune response.

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### 1AR – Framing

**The standard is maximizing expected wellbeing**

**First, pleasure and pain are intrinsically valuable. People consistently regard pleasure and pain as good reasons for action, despite the fact that pleasure doesn’t seem to be instrumentally valuable for anything.**

**Moen 16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] SJDI

Let us start by observing, empirically, that a widely shared judgment about intrinsic value and disvalue is that pleasure is intrinsically valuable and pain is intrinsically disvaluable. On virtually any proposed list of intrinsic values and disvalues (we will look at some of them below), pleasure is included among the intrinsic values and pain among the intrinsic disvalues**.** This inclusion makes intuitive sense, moreover, for there is something undeniably good about the way pleasure feels and something undeniably bad about the way pain feels, and neither the goodness of pleasure nor the badness of pain seems to be exhausted by the further effects that these experiences might have. “Pleasure” and “pain” are here understood inclusively, as encompassing anything hedonically positive and anything hedonically negative.2 The special value statuses of pleasure and pain are manifested in how we treat these experiences in our everyday reasoning about values**.** If you tell me that you are heading for the convenience store, I might ask: “What for?” This is a reasonable question, for when you go to the convenience store you usually do so, not merely for the sake of going to the convenience store, but for the sake of achieving something further that you deem to be valuable**.** You might answer, for example: “To buy soda.” This answer makes sense, for soda is a nice thing and you can get it at the convenience store. I might further inquire, however: “What is buying the soda good for?” This further question can also be a reasonable one, for it need not be obvious why you want the soda. You might answer: “Well, I want it for the pleasure of drinking it.” If I then proceed by asking “But what is the pleasure of drinking the soda good for?” the discussion is likely to reach an awkward end. The reason is that the pleasure is not good for anything further; it is simply that for which going to the convenience store and buying the soda is good.3 As Aristotle observes**:** “We never ask [a man] what his end is in being pleased, because we assume that pleasure is choice worthy in itself.”4 Presumably, a similar story can be told in the case of pains, for if someone says “This is painful!” we never respond by asking: “And why is that a problem?” We take for granted that if something is painful, we have a sufficient explanation of why it is bad. If we are onto something in our everyday reasoning about values, it seems that pleasure and pain are both places where we reach the end of the line in matters of value.

**Moreover, *only* pleasure and pain are intrinsically valuable. All other values can be explained with reference to pleasure; Occam’s razor requires us to treat these as instrumentally valuable.**

**Moen 16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] SJDI

I think several things should be said in response to Moore’s challenge to hedonists. First, **I do not think the burden of proof lies on hedonists to explain why the additional values are not intrinsic values. If someone claims that X is intrinsically valuable, this is a substantive, positive claim, and it lies on him or her to explain why we should believe that X is in fact intrinsically valuable.** Possibly, this could be done through thought experiments analogous to those employed in the previous section. Second, **there is something peculiar about the list of additional intrinsic values** that counts in hedonism’s favor**: the listed values have a strong tendency to be well explained as things that help promote pleasure and avert pain.** To go through Frankena’s list, life and consciousness are necessary presuppositions for pleasure; activity, health, and strength bring about pleasure; and happiness, beatitude, and contentment are regarded by Frankena himself as “pleasures and satisfactions.” The same is arguably true of beauty, harmony, and “proportion in objects contemplated,” and also of affection, friendship, harmony, and proportion in life, experiences of achievement, adventure and novelty, self-expression, good reputation, honor and esteem. Other things on Frankena’s list, such as understanding, **wisdom, freedom, peace, and security, although they are perhaps not themselves pleasurable, are important means to achieve a happy life, and as such, they are things that hedonists would value highly.** **Morally good dispositions and virtues, cooperation, and just distribution of goods and evils, moreover, are things that, on a collective level, contribute a happy society, and thus the traits that would be promoted and cultivated if this were something sought after.** To a very large extent, the intrinsic values suggested by pluralists tend to be hedonic instrumental values. Indeed, pluralists’ suggested intrinsic values all point toward pleasure, for while the other values are reasonably explainable as a means toward pleasure, pleasure itself is not reasonably explainable as a means toward the other values. Some have noticed this. Moore himself, for example, writes that though his pluralistic theory of intrinsic value is opposed to hedonism, its application would, in practice, look very much like hedonism’s: “Hedonists,” he writes “do, in general, recommend a course of conduct which is very similar to that which I should recommend.”24 Ross writes that “[i]t is quite certain that by promoting virtue and knowledge we shall inevitably produce much more pleasant consciousness. These are, by general agreement, among the surest sources of happiness for their possessors.”25 Roger Crisp observes that “those goods cited by non-hedonists are goods we often, indeed usually, enjoy.”26 What Moore and Ross do not seem to notice is that their observations give rise to two reasons to reject pluralism and endorse hedonism. The first reason is that if **the suggested non-hedonic intrinsic values are potentially explainable by appeal to just pleasure and pain** (which, following my argument in the previous chapter, we should accept as intrinsically valuable and disvaluable), **then—by appeal to Occam’s razor—we have at least a pro tanto reason to resist the introduction of any further intrinsic values and disvalues. It is ontologically more costly to posit a plurality of intrinsic values and disvalues, so in case all values admit of explanation by reference to a single intrinsic value and a single intrinsic disvalue, we have reason to reject more complicated accounts.** **The fact that suggested non-hedonic intrinsic values tend to be hedonistic instrumental values does not, however, count in favor of hedonism solely in virtue of being most elegantly explained by hedonism; it also does so in virtue of creating an explanatory challenge for pluralists.** The challenge can be phrased as the following question: **If the non-hedonic values suggested by pluralists are truly intrinsic values in their own right, then why do they tend to point toward pleasure and away from pain?**27

**Moral uncertainty means preventing extinction should be our highest priority.  
Bostrom 12** [Nick Bostrom. Faculty of Philosophy & Oxford Martin School University of Oxford. “Existential Risk Prevention as Global Priority.” Global Policy (2012)]  
These reflections on **moral uncertainty suggest** an alternative, complementary way of looking at existential risk; they also suggest a new way of thinking about the ideal of sustainability. Let me elaborate.¶ **Our present understanding of axiology might** well **be confused. We may not** nowknow — at least not in concrete detail — what outcomes would count as a big win for humanity; we might not even yet **be able to imagine the best ends** of our journey. **If we are** indeedprofoundly **uncertain** about our ultimate aims,then we should recognize that **there is a great** option **value in preserving** — and ideally improving — **our ability to recognize value and** to **steer the future accordingly. Ensuring** that **there will be a future** version of **humanity** with great powers and a propensity to use them wisely **is** plausibly **the best way** available to us **to increase the probability that the future will contain** a lot of **value.** To do this, we must prevent any existential catastrophe.

**Reducing the risk of extinction is always priority number one.   
Bostrom 12** [Faculty of Philosophy and Oxford Martin School, University of Oxford.], Existential Risk Prevention as Global Priority.  Forthcoming book (Global Policy). MP. http://www.existenti...org/concept.pdfEven if we use the most conservative of these estimates, which entirely ignores the   possibility of space colonization and software minds, **we find that the expected loss of an existential   catastrophe is greater than the value of 10^16 human lives**.  **This implies that the expected value of   reducing existential risk by a mere one millionth of one percentage point is at least a hundred times the   value of a million human lives.**  The more technologically comprehensive estimate of 10  54 humanbrain-emulation subjective life-years (or 10  52  lives of ordinary length) makes the same point even   more starkly.  Even if we give this allegedly lower bound on the cumulative output potential of a   technologically mature civilization a mere 1% chance of being correct, we find that the expected   value of reducing existential risk by a mere one billionth of one billionth of one percentage point is worth   a hundred billion times as much as a billion human lives. **One might consequently argue that even the tiniest reduction of existential risk has an   expected value greater than that of the definite provision of any ordinary good, such as the direct   benefit of saving 1 billion lives.**  And, further, that the absolute value of the indirect effect of saving 1  billion lives on the total cumulative amount of existential riskâ€”positive or negativeâ€”is almost   certainly larger than the positive value of the direct benefit of such an action.