Moonshot

Inside Pfizer's Nine-Month
Race to Make the
Impossible
Possible

DR. ALBERT BOURLA



мооnsнот. Copyright © 2022 by Pfizer Inc. All rights reserved. Printed in the United States of America. No part of this book may be used or reproduced in any manner whatsoever without written permission except in the case of brief quotations embodied in critical articles and reviews. For information, address HarperCollins Publishers, 195 Broadway, New York, NY 10007.

HarperCollins books may be purchased for educational, business, or sales promotional use. For information, please email the Special Markets Department at SPsales@harpercollins.com.

FIRST EDITION

Designed by Bonni Leon-Berman

Library of Congress Cataloging-in-Publication Data has been applied for.

ISBN 978-0-06-321079-0

22 23 24 25 26 LSC 10 9 8 7 6 5 4 3 2 1

Acknowledgments

I NEVER IMAGINED I'D WRITE a book. Leading Pfizer's effort to bring forward our COVID-19 vaccine created many unexpected opportunities—and responsibilities. One of those was to record our journey for future leaders and to document the triumph achieved by the nearly ninety thousand colleagues whose stories of perseverance, creativity, and sacrifice are told in these pages. It is for their legacy that I've authored *Moonshot*.

First and foremost, I offer my heartfelt congratulations to the Project Lightspeed members. In this bold endeavor to make the impossible possible, you managed to both aim high *and* hit.

To our COVID-19 vaccine partners at BioNTech, in particular Ugur Şahin and Özlem Türeci. I thank you, and consider it an honor to have traveled this road together.

To the Pfizer executive leadership team, who contributed to the vaccine while also delivering every day around the world on our purpose: *Breakthroughs that change patients' lives*. I can imagine no better team and am grateful for your partnership.

To the Pfizer board of directors, who provided wisdom and support throughout the pandemic and consistently over time. Thank you for being so resolutely behind our vision.

To the Pfizer team who contributed their time to this book: Eric Aaronson, Frank Briamonte, Andrea Christensen, Dana Gandsman, Ed Harnaga, Doug Lankler, Debra Mangone, Anneka Norgren,

Sally Susman, and Tiffany Trunko. Special thanks to Sally, my partner and prodder throughout this project.

To the dedicated team of professionals who move mountains every day in support of the office of the CEO, including in the support of the development of this book: Michele Bander, Dana Dotti, Steve Fascianella, Lily Hakim, Sonia Heidel, Yolanda Lyle, and Dorothy O'Mara.

My sincere thanks to all those who were interviewed to help account for posterity: Yasmeen Agosti, Tanya Alcorn, Payal Becher Sahni, Kim Bencker, Mois Bourla, Selise Bourla, Donna Boyce, Frank D'Amelio, Lindsay Dietschi, Mikael Dolsten, Phil Dormitzer, Lidia Fonseca, Bill Gruber, Ed Harnaga, Susan Hockfield, Angela Hwang, Kathrin Jansen, Luis Jodar, John Ludwig, Rod MacKenzie, Mike McDermott, Kevin Nepveux, Dara Richardson-Heron, Caroline Roan, Martina Ryall, Susan Schuman, Jon Selib, and John Young.

To my external advisors, who gave generously of their expertise: Greg Shaw at Clyde Hill Publishing, Hollis Heimbouch and the team at HarperCollins, Mollie Glick and the team at CAA, and Alan Fleischmann and his colleagues at Laurel Strategies.

To all my readers, please know that this work represents my memory of events during an incredibly pressured period. I've endeavored to make this work as accurate as possible. Any mistake in that regard is my own.

Bibliography

Preface

- Centers for Disease Control and Prevention. "Polio Vaccination." Vaccines and Preventable Diseases. Updated May 4, 2018. https://www.cdc.gov/vaccines/vpd/polio/index.html.
- Dun & Bradstreet. "Array Biopharma Inc." D&B Business Directory. Updated January 1, 2019. https://www.dnb.com/business-directory/company-profiles.array _biopharma_inc.4784383beada038eadb66c2232df9ddd.html.
- Hopkins, Jared S. "Mylan Deal Furthers Pfizer CEO's Bet on Patent-Protected Drugs." *The Wall Street Journal.* Updated July 29, 2019. https://www.wsj.com/articles/pfizer-to-merge-off-patent-drug-business-with-mylan-11564398516.
- Kennedy, John F. "John F. Kennedy Moon Speech-Rice Stadium." Johnson Space Center. September 12, 1962. https://er.jsc.nasa.gov/seh/ricetalk.htm.
- Kuchar, E., M. Karlikowska-Skwarnik, S. Han, and A. Nitsch-Osuch. "Pertussis: History of the Disease and Current Prevention Failure." In *Pulmonary Dysfunction and Disease*, edited by Mieczyslaw Pokorski, 77–82. Advances in Experimental Medicine and Biology. Cham, Switzerland: Springer International Publishing, 2016.
- Mazzucato, Mariana. Mission Economy: A Moonshot Guide to Changing Capitalism. New York: Harper Business, 2021.
- Merriam-Webster. "Moon shot." https://www.merriam-webster.com/dictionary/moon %20shot.
- Murray, Jessica. "Covid vaccine: UK woman becomes first in world to receive Pfizer jab." *The Guardian*. December 8, 2020. https://www.theguardian.com/world/2020/dec/08/coventry-woman-90-first-patient-to-receive-covid-vaccine-in-nhs-campaign.
- Pfizer. "Pfizer Reports Second-Quarter 2020 Results." Press release. Business Wire. July 28, 2020. https://www.businesswire.com/news/home/20200728005358/en/Pfizer-Reports-Second-Quarter-2020-Results.
- World Health Organization. *Novel Coronavirus (2019-nCoV) Situation Report-1*. January 21, 2020. https://apps.who.int/iris/bitstream/handle/10665/330760/nCoV sitrep21Jan2020-eng.pdf?sequence=3&isAllowed=y.
- World Health Organization. *Origin of SARS-CoV-2*. March 26, 2020. https://apps.who.int/iris/bitstream/handle/10665/332197/WHO-2019-nCoV-FAQ-Virus_origin-2020.1-eng.pdf.

- Acevedo, Nicole, and Minyvonne Burke. "Washington state man becomes first U.S. death from coronavirus." NBC News. February 29, 2020. https://www.nbcnews.com/news/us-news/1st-coronavirus-death-u-s-officials-say-n1145931.
- Centers for Disease Control and Prevention. "In the Absence of SARS-CoV Transmission Worldwide: Guidance for Surveillance, Clinical and Laboratory Evaluation, and Reporting." SARS Home. Updated May 3, 2005. https://www.cdc.gov/sars/surveillance/absence.html.
- C-SPAN. "President Trump Meeting with Pharmaceutical Executives on Coronavirus." March 2, 2020. https://www.c-span.org/video/?469926-1/president-trump-meeting-pharmaceutical-executives-coronavirus.
- Greenwood, Brian. "The contribution of vaccination to global health: past, present and future." *Philosophical Transactions of the Royal Society B* 369, no. 1645 (June 2014). https://doi.org/10.1098/rstb.2013.0433.
- Herper, Matthew. "In the race for a Covid-19 vaccine, Pfizer turns to a scientist with a history of defying skeptics—and getting results." *Stat.* August 24, 2020. https://www.statnews.com/2020/08/24/pfizer-edge-in-the-race-for-a-covid-19-vaccine-could-be-a-scientist-with-two-best-sellers-to-her-credit/.
- *Kathimerini*. "Delphi Economic Forum postponed because of coronavirus fears." February 29, 2020. https://www.ekathimerini.com/news/250087/delphi-economic-forum-postponed-because-of-coronavirus-fears/.
- LeDuc, James W., and M. Anita Barry. "SARS, the First Pandemic of the 21st Century." *Emerging Infectious Diseases* 10, no. 26 (November 2004). https://doi.org/10.3201/eid1011.040797_02.
- Li, Shan, and Joyu Wang. "Wuhan Coronavirus Hospitals Turn Away All but Most Severe Cases." *The Wall Street Journal*. Updated February 5, 2020. https://www.wsj.com/articles/united-american-airlines-suspend-hong-kong-service-as-coronavirus-saps-demand-11580897463.
- Office of Disease Prevention and Health Promotion. "Immunization and Infectious Diseases." Healthy People 2020. Updated June 23, 2021. https://www.healthypeople.gov/node/3527/data-details.%C2%A0Accessed.
- Okwo-Bele, Jean-Marie. "Together we can close the immunization gap." World Health Organization Media Centre. April 22, 2015. https://apps.who.int/mediacentre/commentaries/vaccine-preventable-diseases/en/index.html.
- Pfizer. "Kathrin U. Jansen, Ph.D." https://www.pfizer.com/people/medical-experts/vaccinations/kathrin_jansen-phd.
- Pfizer. "Mikael Dolsten, M.D./Ph.D." https://www.pfizer.com/people/leadership/executives/mikael_dolsten-md-phd.

- UNICEF. "UNICEF reaches almost half of the world's children with life-saving vaccines." Press release. April 26, 2017. https://www.unicef.org/press-releases/unicef-reaches-almost-half-worlds-children-life-saving-vaccines.
- Vaccines Europe. *Improving Access and Convenience to Vaccination*. June 2018. https://www.vaccineseurope.eu/wp-content/uploads/2018/06/VE-Flu-Vaccination-Access-Pharmacies-0506018-FIN-FIN.pdf.
- World Health Organization. "Middle East respiratory syndrome coronavirus (MERS-CoV)." Newsroom. March 11, 2019. https://www.who.int/news-room/fact-sheets/detail/middle-east-respiratory-syndrome-coronavirus-(mers-cov).
- World Health Organization. "Vaccines and immunization." https://www.who.int/health-topics/vaccines-and-immunization.

- BioNTech. "BioNTech Signs Collaboration Agreement with Pfizer to Develop mRNA-based Vaccines for Prevention of Influenza." News release. August 16, 2018. https://investors.biontech.de/news-releases/news-release-details/biontech-signs-collaboration-agreement-pfizer-develop-mrna-based.
- BioNTech. "Our Vision." https://biontech.de/our-dna/vision.
- Cohen, Jon. "Chinese researchers reveal draft genome of virus implicated in Wuhan pneumonia outbreak." *Science*. Updated January 11, 2020. https://www.sciencemag.org/news/2020/01/chinese-researchers-reveal-draft-genome-virus-implicated-wuhan-pneumonia-outbreak.
- Dormitzer, Philip. "Rapid production of synthetic influenza vaccines." *Current Topics in Microbiology and Immunology* 386 (2015): 237–73. https://doi.org/10.1007/82_2014_399.
- Geall, Andrew, Ayush Verma, Gillis R. Otten, Christine A. Shaw, Armin Hekele, Kaustuv Banerjee, Yen Cu, et al. "Nonviral Delivery of Self-Amplifying RNA Vaccines." *Proceedings of the National Academy of Sciences* 109, no. 36 (September 4, 2012): 14604–9. https://doi.org/10.1073/pnas.1209367109.
- Marshall, Heather D., and Vito Iacoviello. "mRNA Vaccines for COVID-19—How Do They Work?" *EBSCO Health Notes*. Updated March 16, 2021. https://www.ebsco.com/blogs/health-notes/mrna-vaccines-covid-19-how-do-they-work.
- Pardi, Norbert, Michael J. Hogan, Frederick W. Porter, and Drew Weissman. "mRNA Vaccines—A New Era in Vaccinology." *Nature Reviews Drug Discovery* 17 (2018): 261–79. https://doi.org/10.1038/nrd.2017.243.
- Pfizer. "Pfizer and BioNTech Announce Further Details on Collaboration to Accelerate Global COVID-19 Vaccine Development." Press release. April 9, 2020. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-announce-further-details-collaboration.

Pfizer. "Pfizer and BioNTech Reach Agreement with Covax for Advance Purchase of Vaccine to Help Combat COVID-19." Press release. January 22, 2021. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-reach-agreement-covax-advance-purchase.

Pfizer. "William C. Gruber, M.D., FAAP, FIDSA." https://www.pfizer.com/people/medical-experts/vaccinations/william_gruber-md-faap-fidsa-0.

Chapter 3

- Centers for Disease Control and Prevention. "1918 Pandemic Influenza: Three Waves." Updated May 11, 2018. https://www.cdc.gov/flu/pandemic-resources/1918 -commemoration/three-waves.htm.
- The College of Physicians of Philadelphia. "Vaccine Development, Testing, and Regulation." The History of Vaccines. Updated January 17, 2018. https://ftp.history ofvaccines.org/content/articles/vaccine-development-testing-and-regulation.
- David, Sharoon, and Paras B. Khandhar. "Double-Blind Study." In *StatPearls*. Treasure Island (FL): StatPearls Publishing, 2021. https://www.ncbi.nlm.nih.gov/books/NBK546641/.
- US Department of Health and Human Services, Food and Drug Administration, Center for Biologics Evaluation and Research. *Development and Licensure of Vaccines to Prevent COVID-19: Guidance for Industry*. June 2020. https://www.fda.gov/media/139638/download.
- US Department of Health and Human Services, Food and Drug Administration, Center for Biologics Evaluation and Research. *Emergency Use Authorization for Vaccines to Prevent COVID-19: Guidance for Industry.* May 25, 2021. https://www.fda.gov/media/142749/download.
- US Food and Drug Administration. "Coronavirus (COVID-19) Update: FDA Takes Action to Help Facilitate Timely Development of Safe, Effective COVID-19 Vaccines." Press release. June 30, 2020. https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-takes-action-help-facilitate-timely-development-safe-effective-covid.

- Hopkins, Jared S. "How Pfizer Delivered a Covid Vaccine in Record Time: Crazy Deadlines, a Pushy CEO." *The Wall Street Journal*. December 11, 2020. https://www.wsj.com/articles/how-pfizer-delivered-a-covid-vaccine-in-record-time-crazy-deadlines-a-pushy-ceo-11607740483.
- Johnson, Carolyn Y. "Large U.S. covid-19 vaccine trials are halfway enrolled, but lag on participant diversity." *The Washington Post*. August 27, 2020. https://www.washingtonpost.com/health/2020/08/27/large-us-covid-19-vaccine-trials-are-halfway-enrolled-lag-participant-diversity/.

- Pfizer. "About our Landmark Trial." 2021. https://www.pfizer.com/science/coronavirus/vaccine/about-our-landmark-trial.
- Pfizer. "BioNTech and Pfizer announce regulatory approval from German authority Paul-Ehrlich-Institut to commence first clinical trial of COVID-19 vaccine candidates." Press release. April 22, 2020. https://www.pfizer.com/news/press-release/press-release-detail/biontech_and_pfizer_announce_regulatory_approval_from_german_authority_paul_ehrlich_institut_to_commence_first_clinical_trial_of_covid_19_vaccine_candidates.
- Pfizer. "Commitment to Diversity." Coronavirus COVID-19 Vaccine Updates. 2021. https://www.pfizer.com/science/coronavirus/vaccine/rapid-progress.
- Pfizer. "Our Values and Culture." 2019. https://www.pfizer.com/sites/default/files /investors/financial_reports/annual_reports/2019/our-purpose/our-values-and -culture/index.html.
- Pfizer. 2016 Annual Review. February 2017. https://www.pfizer.com/sites/default/files/investors/financial_reports/annual_reports/2016/assets/pdfs/pfi2016ar-full-report.pdf.
- Redd, Nola Taylor. "How Fast Does Light Travel? | The Speed of Light." Space.com. March 6, 2018. https://www.space.com/15830-light-speed.html.
- Rottas, Melinda, Peter Thadeio, Rachel Simons, Raven Houck, David Gruben, David Keller, David Scholfield, et al. "Demographic diversity of participants in Pfizer sponsored clinical trials in the United States." *Contemporary Clinical Trials* 106 (July 2021): 106421. https://doi.org/10.1016/j.cct.2021.106421.
- Treisman, Rachel. "Outpacing The U.S., Hard-Hit Navajo Nation Has Vaccinated More Than Half Of Adults." NPR. April 26, 2021. https://www.npr.org/sections/coronavirus-live-updates/2021/04/26/990884991/outpacing-the-u-s-hard-hit-navajo-nation-has-vaccinated-more-than-half-of-adults.
- US Census Bureau. "QuickFacts." 2019. https://www.census.gov/quickfacts/fact/table/US/RHI725219.

- Bosman, Julie, Audra D. S. Burch, and Sarah Mervosh. "One Day in America: More Than 121,000 Coronavirus Cases." *The New York Times*. November 5, 2020. https://www.nytimes.com/2020/11/05/us/covid-one-day-in-america.html.
- Dreisbach, Tom. "Pfizer CEO Sold Millions In Stock After Coronavirus Vaccine News, Raising Questions." NPR. November 11, 2020. https://www.npr.org/2020/11/11/933957580/pfizer-ceo-sold-millions-in-stock-after-coronavirus-vaccine-news-raising-questio.
- Mueller, Benjamin. "U.K. Approves Pfizer Coronavirus Vaccine, a First in the West." *The New York Times.* December 2, 2020. https://www.nytimes.com/2020/12/02/world/europe/pfizer-coronavirus-vaccine-approved-uk.html.

- Pfizer. "Pfizer and BioNTech Announce Vaccine Candidate Against COVID-19 Achieved Success in First Interim Analysis from Phase 3 Study." Press release. November 9, 2020. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-announce-vaccine-candidate-against.
- Pfizer. "Pfizer and BioNTech Receive Authorization in the European Union for COVID-19 Vaccine." Press release. December 21, 2020. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-receive-authorization-european-union.
- Rosen, Bruce, Ruth Waitzberg, and Avi Israeli. "Israel's rapid rollout of vaccinations for COVID-19." *Israel Journal of Health Policy Research* 10, no. 6 (January 6, 2021). https://doi.org/10.1186/s13584-021-00440-6.
- Sweet, Jesse, dir. "Mission Possible: The Race for a Vaccine." National Geographic CreativeWorks: Washington, DC, 2021. Aired March 11, 2021, on National Geographic. https://www.youtube.com/watch?v=jbZUZ9JYNBE.
- US Food and Drug Administration. "Pfizer-BioNTech COVID-19 Vaccine." https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease -2019-covid-19/pfizer-biontech-covid-19-vaccine.
- World Health Organization. COVID-19 Weekly Epidemiological Update. November 17, 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/weekly-epi-update-14.pdf.
- World Health Organization. "WHO issues its first emergency use validation for a COVID-19 vaccine and emphasizes need for equitable global access." Press release. December 31, 2020. https://www.who.int/news/item/31-12-2020-who-issues-its-first-emergency-use-validation-for-a-covid-19-vaccine-and-emphasizes-need-for-equitable-global-access.

- BBC News. "Covid-19: First man to get jab William Shakespeare dies of unrelated illness." May 25, 2021. https://www.bbc.com/news/uk-england-coventry-warwickshire -57234741.
- Boucher, Dave, Kristen Jordan Shamus, and Todd Spangler. "Biden postpones visit to Pfizer facility in Portage until Friday." *Detroit Free Press.* February 17, 2021. https://www.freep.com/story/news/politics/2021/02/17/joe-biden-pfizer-facility-portage/6785063002/.
- Burger, Ludwig. "BioNTech-Pfizer raise 2021 vaccine output goal to 2.5 billion doses." Reuters. March 30, 2021. https://www.reuters.com/article/us-health-coronavirus-biontech-target/biontech-pfizer-raise-2021-vaccine-output-goal-to-2–5-billion-doses-idUSKBN2BM1BW.
- Bush, Evan, and Sandi Doughton. "Front-line medical workers get first doses of

- coronavirus vaccine in Seattle." *The Seattle Times*. Updated December 16, 2020. https://www.seattletimes.com/seattle-news/health/front-line-medical-workers-get-first-doses-of-coronavirus-vaccine-in-seattle/.
- Cha, Ariana Eunjung, Brittany Shammas, Ben Guarino, and Jacqueline Dupree. "Record numbers of covid-19 patients push hospitals and staffs to the limit." *The Seattle Times*. December 16, 2020. https://www.seattletimes.com/nation-world/nation/record-numbers-of-covid-19-patients-push-hospitals-and-staffs-to-the-limit/.
- Choi, Candace, and Michelle R. Smith. "States ramp up for biggest vaccination effort in US history." *The Seattle Times*. Updated November 13, 2020. https://www.seattletimes.com/seattle-news/health/states-ramp-up-for-biggest-vaccination-effort-in-us-history/.
- Cott, Emma, Elliot deBruyn, and Jonathan Corum. "How Pfizer Makes Its Covid-19 Vaccine." *The New York Times.* April 28, 2021. https://www.nytimes.com/interactive/2021/health/pfizer-coronavirus-vaccine.html.
- CVS. "CVS Health surpasses 10 million COVID-19 vaccine doses administered." Press release. April 1, 2021. https://cvshealth.com/news-and-insights/press-releases/cvs-health-surpasses-10-million-covid-19-vaccine-doses.
- Griffin, Riley. "Pfizer to Deliver U.S. Vaccine Doses Faster Than Expected." *Bloomberg*. January 26, 2021. https://news.bloomberglaw.com/health-law-and-business/pfizer-to-deliver-u-s-vaccine-doses-faster-than-expected-ceo.
- Hess, Corrinne. "Pfizer's Pleasant Prairie Facility Could Supply Western US With Coronavirus Vaccine." Wisconsin Public Radio. December 9, 2020. https://www.wpr.org/pfizers-pleasant-prairie-facility-could-supply-western-us-coronavirus-vaccine.
- Johnson, Carolyn Y. "A vial, a vaccine and hopes for slowing a pandemic—how a shot comes to be." *The Washington Post.* November 17, 2020. https://www.washington.post.com/health/2020/11/17/coronavirus-vaccine-manufacturing/.
- Lowe, Derek. "RNA Vaccines And Their Lipids." *In the Pipeline* (blog). *Science Translational Medicine*. January 11, 2021. https://blogs.sciencemag.org/pipeline/archives/2021/01/11/rna-vaccines-and-their-lipids.
- Lupkin, Sydney. "Pfizer's Coronavirus Vaccine Supply Contract Excludes Many Taxpayer Protections." NPR. November 24, 2020. https://www.npr.org/sections/health-shots/2020/11/24/938591815/pfizers-coronavirus-vaccine-supply-contract-excludes-many-taxpayer-protections.
- Madani, Doha. "First trucks with Covid-19 vaccine roll out of Pfizer plant in Michigan." NBC News. December 13, 2020. https://www.nbcnews.com/news/us-news/first-trucks-covid-19-vaccine-roll-out-pfizer-plant-michigan-n1251037.
- Mahase, Elisabeth. "Vaccinating the UK: How the Covid Vaccine Was Approved, and Other Questions Answered." *BMJ* 371 (December 9, 2020): m4759. https://doi.org/10.1136/bmj.m4759.

- Mehta, Chavi. "Lyft, CVS Health partner to increase access to COVID-19 vaccines." Reuters. February 19, 2021. https://www.reuters.com/business/healthcare-pharmaceuticals/lyft-cvs-health-partner-increase-access-covid-19-vaccines-2021-02-19/.
- Moutinho, Sofia. "Syringe size and supply issues continue to waste COVID-19 vaccine doses in United States." *Science*. March 26, 2021. https://www.sciencemag.org/news/2021/03/syringe-size-and-supply-issues-continue-waste-covid-19-vaccine-doses-united-states.
- O'Donnell, Carl. "Why Pfizer's ultra-cold COVID-19 vaccine will not be at the local pharmacy any time soon." Reuters. November 9, 2020. https://www.reuters.com/article/health-coronavirus-vaccines-distribution/why-pfizers-ultra-cold-covid-19-vaccine-will-not-be-at-the-local-pharmacy-any-time-soon-idUSKBN27P2VP.
- Park, Alice. "The First Authorized COVID-19 Vaccine in the U.S. Has Arrived." Time. December 11, 2020. https://time.com/5920134/first-authorized-covid-19-vaccine-us/.
- Pfizer. "COVID-19 Vaccine U.S. Distribution Fact Sheet." November 2020. https://www.pfizer.com/news/hot-topics/covid_19_vaccine_u_s_distribution_fact_sheet.
- Pfizer. "Pfizer and BioNTech to Supply the U.S. with 100 Million Additional Doses of COVID-19 Vaccine." Press release. December 3, 2020. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-supply-us-100-million-additional-doses.
- Pfizer. "Pfizer Announces Agreement with Gilead to Manufacture Remdesivir for Treatment of COVID-19." Press release. August 7, 2020. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-announces-agreement-gilead-manufacture-remdesivir.
- Romo, Vanessa. "Some Vials Of COVID-19 Vaccine Contain Extra Doses, Expanding Supply, FDA Says." NPR. December 16, 2020. https://www.npr.org/sections/coronavirus-live-updates/2020/12/16/947386411/some-vials-of-covid-19-vaccine-contain-extra-doses-expanding-supply.
- Routledge. "John D Ludwig." https://www.routledge.com/authors/i3183-john-ludwig#.
- Rowland, Christopher. "Biden wants to squeeze an extra shot of vaccine out of every Pfizer vial. It won't be easy." *The Washington Post.* January 22, 2021. https://www.washingtonpost.com/business/2021/01/22/pfizer-vaccine-doses-syringes/.
- Rowland, Christopher. "Inside Pfizer's race to produce the world's biggest supply of covid vaccine." *The Washington Post.* June 16, 2021. https://www.washingtonpost.com/business/2021/06/16/pfizer-vaccine-engineers-supply/.
- Rowland, Christopher. "Pfizer spent months working to extract sixth dose from vials as vaccine production shortfalls loomed." *The Washington Post*. February 3, 2021. https://www.washingtonpost.com/business/2021/02/03/pfizer-vaccine-syringes-doses/.

- Rubicon Science. "Knauer develops Impingement Jet Mixing Technology for the production of mRNA-filled nanoparticles." April 20, 2021. https://rubiconscience.com.au/2021/04/20/knauer-develops-impingement-jets-mixing-technology-for-the-production-of-mrna-filled-nanoparticles/.
- Shadburne, Sarah. "UPS ships out first round of Covid-19 vaccines from Louis-ville." *Louisville Business First*. December 14, 2020. https://www.bizjournals.com/louisville/news/2020/12/14/ups-ships-out-first-round-of-covid-vaccines-from.html.
- Stares, Justin. "The beer and beauty fame of the Belgian town that is about to save the world." *Daily Mail*. November 14, 2020. https://www.dailymail.co.uk/news/article-8950061/The-beer-beauty-fame-Belgian-town-save-world.html.
- Taliaferro, Lanning. "Rockland Coronavirus: Restrictions Imposed In 4 New Hot Spots." *Patch.* November 19, 2020. https://patch.com/new-york/pearlriver/rockland-coronavirus-restrictions-imposed-4-new-hot-spots.
- Thomas, Katie, Sharon LaFraniere, Noah Weiland, Abby Goodnough, and Maggie Haberman. "F.D.A. Clears Pfizer Vaccine, and Millions of Doses Will Be Shipped Right Away." *The New York Times*. December 11, 2020. https://www.nytimes.com/2020/12/11/health/pfizer-vaccine-authorized.html. Excerpt from *The New York Times*. © 2020 The New York Times Company. All rights reserved. Used under license.
- Weintraub, Karen, and Elizabeth Weise. "The sprint to create a COVID-19 vaccine started in January. The finish line awaits." *USA Today*. Updated September 12, 2020. https://www.usatoday.com/in-depth/news/health/2020/09/11/covid-vaccine-trials-update-timeline-companies-progress-phases/3399557001/.
- World Health Organization. "Tozinameran COVID-19 mRNA Vaccine (nucleoside modified)—COMIRNATY® (Pfizer–BioNTech) Training." January 27, 2021. https://cdn.who.int/media/docs/default-source/immunization/covid-19/pfizer-specific-training_full-deck_27-january-final.pdf.

- Bourla, Albert. "An Open Letter from Pfizer Chairman and CEO to Colleagues." Pfizer. May 7, 2021. https://www.pfizer.com/news/hot-topics/why_pfizer_opposes_the_trips_intellectual_property_waiver_for_covid_19_vaccines.
- Britannica. "Ursula von der Leyen." https://www.britannica.com/biography/Ursula -von-der-Leyen.
- Centers for Disease Control and Prevention. "CDC Vaccine Price List." Updated July 1, 2021. https://www.cdc.gov/vaccines/programs/vfc/awardees/vaccine-management/price-list/index.html#adult.
- Centers for Disease Control and Prevention. "Vaccine Effectiveness: How Well Do the Flu Vaccines Work?" Updated May 6, 2021. https://www.cdc.gov/flu/vaccines-work/vaccineeffect.htm.

- Cooper, Ryan. "Trump's jaw-dropping vaccine screwup." *The Week*. December 9, 2020. https://theweek.com/articles/953941/trumps-jawdropping-vaccine-screwup.
- Das, Krishna. "India delays big exports of AstraZeneca shot, as infections surge." Reuters. March 24, 2021. https://www.reuters.com/article/health-coronavirus-india-vaccine-exclusi-idINKBN2BG27D.
- *The Economist.* "India's Covid-19 Crisis Has Spiralled out of Control." May 3, 2021. https://www.economist.com/graphic-detail/2021/05/03/indias-covid-19-crisis-has-spiralled-out-of-control.
- Gaurav, Kunal. "Covid-19 travel ban: These countries have restricted flights to and from India." *Hindustan Times*. May 4, 2021. https://www.hindustantimes.com/world-news/covid19-travel-ban-these-countries-have-restricted-flights-to-and-from-india-101620125693859.html.
- LaFraniere, Sharon, and Zach Montague. "Pfizer Seals Deal With U.S. for 100 Million More Vaccine Doses." *The New York Times.* December 23, 2020. https://www.nytimes.com/2020/12/23/us/politics/pfizer-vaccine-doses-virus.html.
- Lupkin, Sydney. "Defense Production Act Speeds Up Vaccine Production." NPR. March 13, 2020. https://www.npr.org/sections/health-shots/2021/03/13/976531488/defense-production-act-speeds-up-vaccine-production.
- Lupkin, Sydney. "U.S. Government May Find It Hard To Get More Doses Of Pfizer's COVID-19 Vaccine." NPR. December 10, 2020. https://www.npr.org/sections/health-shots/2020/12/10/944857395/us-government-may-find-it-hard-to-get-more-doses-of-pfizers-covid-19-vaccine.
- Office of the United States Trade Representative. "Statement from Ambassador Katherine Tai on the Covid-19 Trips Waiver." Press release. May 5, 2021. https://ustr.gov/about-us/policy-offices/press-office/press-releases/2021/may/statement-ambassador-katherine-tai-covid-19-trips-waiver.
- Pfizer. "Angela Hwang." https://www.pfizer.com/people/leadership/executives/angela _hwang.
- Pfizer. "Pfizer and BioNTech Celebrate Historic First Authorization in the US of Vaccine to Prevent Covid-19." Press release. December 11, 2020. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-celebrate-historic-first-authorization.
- Pfizer. "Pfizer and BioNTech Reach Agreement With Covax For Advance Purchase of Vaccine to Help Combat COVID-19." Press release. January 22, 2021. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-reach-agreement-covax-advance-purchase.
- Phartiyal, Sankalp, and Alasdair Pal "India's daily COVID-19 cases pass 400,000 for first time as second wave worsens." Reuters. Updated April 30, 2021. https://www.reuters.com/world/asia-pacific/india-posts-record-daily-rise-covid-19-cases-401993-2021-05-01/.

- Reuters. "African Union drops AstraZeneca vaccine, which COVAX will supply." April 8, 2020. https://www.reuters.com/article/uk-health-coronavirus-africa/african-union-drops-astrazeneca-vaccine-which-covax-will-supply-idUSKBN2BV19H.
- Reuters. "Pfizer-BioNTech to provide 1 bln vaccines to poorer nations this year." May 21, 2021. https://www.reuters.com/article/health-coronavirus-pfizer-vaccine/rpt-pfizer-biontech-to-provide-1-bln-vaccines-to-poorer-nations-this-year-idUSL5N2N83AQ.
- Shear, Michael D., and David E Sanger. "Biden Aims to Bolster U.S. Alliances in Europe, but Challenges Loom." *The New York Times*. Updated June 11, 2021. https://www.nytimes.com/2021/06/09/us/politics/biden-europe-g7.html. Excerpt from *The New York Times*. © 2020 The New York Times Company. All rights reserved. Used under license.
- Stacey, Kiran. "Jeff Zients: the 'Mr Fix It' in charge of tackling the US Covid crisis." Financial Times, January 20, 2021. https://www.ft.com/content/b52ca23e-d244 -498b-8199-5f7bd3f64177.
- Stearns, Jonathan, Alberto Nardelli, and Nikos Chrysoloras. "Faced With Vaccine Shortages, EU Set to Impose Export Controls." Bloomberg. January 28, 2021. https://www.bloomberg.com/news/articles/2021-01-28/europe-opens-door-to-vaccine-export-ban-risking-global-backlash.
- US Department of Health and Human Services. "Fact Sheet: Explaining Operation Warp Speed." December 21, 2020. https://public3.pagefreezer.com/content/HHS.gov/31-12-2020T08:51/https://www.hhs.gov/about/news/2020/06/16/fact-sheet-explaining-operation-warp-speed.html.
- US Embassy & Consulates in the United Kingdom. "COVID-19 Information." https://uk.usembassy.gov/covid-19-coronavirus-information/.
- Twohey, Megan, Ketin Collins, and Katie Thomas. "With First Dibs on Vaccines, Rich Countries Have 'Cleared the Shelves." *The New York Times*. Updated December 18, 2020. https://www.nytimes.com/2020/12/15/us/coronavirus-vaccine-doses-reserved.html.
- The Week. "Tregenna Castle: inside the Cornwall resort hosting G7 summit leaders." June 10, 2021. https://www.theweek.co.uk/news/uk-news/953111/inside-tregenna-castle-resort-where-world-leaders-will-stay-for-g7.
- Weixel, Nathaniel. "US comes under pressure to share vaccines with rest of world." *The Hill.* March 14, 2021. https://thehill.com/policy/healthcare/543004-us-comes-under-pressure-to-share-vaccines-with-rest-of-world.
- World Bank. "The World Bank Atlas method—detailed methodology." https://datahelpdesk.worldbank.org/knowledgebase/articles/378832-what-is-the-world-bank-atlas-method.
- World Bank. "The World by Income and Region." World Development Indicators. 2020. https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html.

- World Health Organization. "Biography: Dr Tedros Adhanom Ghebreyesus." https://www.who.int/director-general/biography.
- World Health Organization. "Dr Tedros takes office as WHO Director-General." Press release. July 1, 2017. https://www.who.int/news/item/01-07-2017-dr-tedros-takes-office-as-who-director-general.
- World Health Organization. "What is the ACT-Accelerator." https://www.who.int/initiatives/act-accelerator/about.
- World Health Summit. "Albert Bourla." https://www.worldhealthsummit.org/speaker -view.html?tx_glossary2_glossary%5Bglossary%5D=497&tx_glossary2_glossary%5Baction%5D=show&tx_glossary2_glossary%5Bcontroller%5D=Glossary&cHash=4c5aa69f2ebf2b540822f6a2d525bfd8.
- World Trade Organization. "Export Controls and Export Bans over the Course of the Covid-19 Pandemic." Press release. April 29, 2020. https://www.wto.org/english/tratop_e/covid19_e/bdi_covid19_e.pdf.
- World Trade Organization. "Overview: the TRIPS Agreement." https://www.wto.org/english/tratop_e/trips_e/intel2_e.htm.

- Aljazeera. "As Olympics begin, Japan rolls out red carpet for Pfizer CEO." July 23, 2021. https://www.aljazeera.com/economy/2021/7/23/japan-rolls-out-red-carpet -for-pfizer-ceo-to-ensure-jab-delivery.
- Baron, John. "The Life of Edward Jenner, M.D., LL.D., F.R.S., Physician Extraordinary to His Majesty George IV., Foreign Associate of the National Institute of France, With Illustrations of His Doctrines, and Selections from His Correspondence." *Edinburgh Medical and Surgical Journal* 51, no. 139 (April 1, 1839): 500–527.
- Biden, Joseph R. "Inaugural Address by President Joseph R. Biden, Jr." Speech. Washington, DC. January 20, 2021. https://www.whitehouse.gov/briefing-room/speeches-remarks/2021/01/20/inaugural-address-by-president-joseph-r-biden-jr/.
- Department of Health and Social Care. "UK COVID-19 vaccines delivery plan." Gov.uk. Updated January 13, 2021. https://www.gov.uk/government/publications/uk-covid-19-vaccines-delivery-plan/uk-covid-19-vaccines-delivery-plan.
- Guarascio, Francesco. "EU to shortly sign world's largest vaccine deal with Pfizer." Reuters. April 23, 2021. https://www.reuters.com/business/healthcare -pharmaceuticals/eu-seals-deal-with-pfizer-biontech-up-18-bln-doses-vaccine -eu-official-2021-04-23/.
- International Olympic Committee. "Who was Pierre de Coubertin?" April 28, 2021. https://olympics.com/ioc/faq/history-and-origin-of-the-games/who-was-pierre-de-coubertin.
- Jenner Institute. "About Edward Jenner." https://www.jenner.ac.uk/about/edward -jenner.

- Johnson, Boris. "Excellent conversation with Albert Bourla yesterday." LinkedIn. January 14, 2021. https://www.linkedin.com/posts/boris-johnson_excellent -conversation-with-albert-bourla-activity-6755790234409021440-BfMU/.
- Lentz, Thierry. "Talking Point with Thierry Lentz: Vaccination: When Napoleon Declared War on Smallpox." Napoleon.org. https://www.napoleon.org/en/history-of-the-two-empires/articles/talking-point-with-thierry-lentz-vaccination-when-napoleon-declared-war-on-smallpox/.
- Maan, Anurag, Shaina Ahluwalia, and Kavya B. "Global coronavirus cases exceed 50 million after 30-day spike." Reuters. November 8, 2020. https://www.reuters.com/article/health-coronavirus-global-cases/global-coronavirus-cases-exceed -50-million-after-30-day-spike-idUSKBN27O0IO.
- Navajo Nation OPVP Communications. "Live Town Hall Meeting with Dr. Albert Bourla 12.24.20." YouTube. Streamed live December 24, 2020. https://www.youtube.com/watch?v=wjscKbMSuUk.
- Obrador, Andrés Manuel López. "Presidente afianza con Pfizer compromiso de entrega de vacunas." Press release. January 19, 2021. https://lopezobrador.org.mx/2021/01/19/presidente-afianza-con-pfizer-compromiso-de-entrega-de-vacunas/.
- Pfizer. "Pfizer and BioNTech to Provide COVID-19 Vaccine Doses for Olympic Athletes at the 2020 Tokyo Games." Press release. May 6, 2021. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-provide-covid-19-vaccine-doses-olympic.
- Rickert, Levi. "Navajo Nation President Spoke with Pfizer CEO about Vaccine on Wednesday." Native News Online. December 9, 2020. https://nativenewsonline.net/currents/navajo-nation-president-spoke-with-pfizer-ceo-about-vaccine-on-wednesday.
- Shea, Sandra L. "How Can Scientists Promote Peace?" *Temperature* 5, no. 1 (February 22, 2018): 7–8. https://doi.org/10.1080/23328940.2017.1397086.
- von der Leyen, Ursula. "Statement by President von der Leyen, Prime Minister of Belgium De Croo, CEO of Pfizer Bourla, and co-founder and Chief Medical Officer of BioNTech Türeci, following the visit to the Pfizer manufacturing plant in Puurs, Belgium." Speech. Puurs, Belgium. April 23, 2021. https://ec.europa.eu/commission/presscorner/detail/en/statement_21_1929.
- Zeidler, Maryse. "Canadians' hesitancy about COVID-19 vaccine dropping, new poll suggests." CBC News. March 8, 2021. https://www.cbc.ca/news/canada/british-columbia/vaccine-poll-hesitancy-dropping-1.5940400.

Arlosoroff, Meirav. "Israel's Population Is Growing at a Dizzying Rate. Is It Up for the Challenge?" *Haaretz*. January 4, 2021. https://www.haaretz.com/israel-news/.premium.MAGAZINE-israel-s-population-is-growing-at-a-dizzying-rate-is-it-up-for-the-challenge-1.9410043.

- Benmeleh, Yaacov. "World-Leading Vaccine Push Augurs Return to Normal in Israel." Bloomberg. February 16, 2021. https://www.bloomberg.com/news/articles/2021-02-16/world-s-fastest-vaccine-push-augurs-return-to-normal-in-israel.
- Bourla, Albert. "While Caution Should Be Used in Extrapolating to Other Countries, These Observational Findings Are Demonstrating the Impact We Have in Reducing Human Pain and Makes All of Us at Pfizer so Proud: https://Bit.Ly/3wcS6qx(2/2)."Twitter, May 17, 2021. https://twitter.com/AlbertBourla/status/1394281683009089544.
- Centers for Disease Control and Prevention. "Joint CDC and FDA Statement on Vaccine Boosters." Press statement. July 8, 2021. https://www.cdc.gov/media/releases/2021/s-07082021.html.
- Centers for Disease Control and Prevention. "Joint Statement from HHS Public Health and Medical Experts on COVID-19 Booster Shots." Press statement. August 18, 2021. https://www.cdc.gov/media/releases/2021/s0818-covid-19-booster-shots.html.
- Centers for Disease Control and Prevention. "Media Statement from CDC Director Rochelle P. Walensky, MD, MPH, on Signing the Advisory Committee on Immunization Practices' Recommendation for an Additional Dose of an mRNA COVID-19 Vaccine in Moderately to Severely Immunocompromised People." Press statement. August 13, 2021. https://www.cdc.gov/media/releases/2021/s0813-additional-mRNA-mrna-dose.html.
- Centers for Disease Control and Prevention. "Science Brief: Background Rationale and Evidence for Public Health Recommendations for Fully Vaccinated People." Updated April 2, 2021. https://stacks.cdc.gov/view/cdc/104739.
- Centers for Disease Control and Prevention. "Science Brief: COVID-19 Vaccines and Vaccination." Updated July 27, 2021. https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/fully-vaccinated-people.html.
- Dimolfetta, David. "Netanyahu visits grave of Yoni, killed during Operation Entebbe 43 years ago." *The Jerusalem Post.* July 10, 2019. https://www.jpost.com/israel-news/netanyahu-visits-grave-of-murdered-brother-commemorating-43-years-595197.
- Erman, Michael, and Maayan Lubell. "Pfizer/BioNTech say data suggests vaccine 94% effective in preventing asymptomatic infection." Reuters. March 11, 2021. https://www.reuters.com/article/us-health-coronavirus-pfizer-israel-idUSKBN2B31IJ.
- Friedman, Gabe. "Meet Mikael Dolsten, the Jewish immigrant leading Pfizer's vaccine charge." *Baltimore Jewish Times*. December 30, 2020. https://www.jewishtimes.com/meet-mikael-dolsten-the-jewish-immigrant-leading-pfizers-vaccine-charge/.
- Haas, Eric J., Frederick J. Angulo, John M. McLaughlin, Emilia Anis, Shepherd R. Singer, Farid Khan, Nati Brooks, et al. "Impact and Effectiveness of MRNA BNT162b2 Vaccine against SARS-CoV-2 Infections and COVID-19 Cases, Hospitalisations, and Deaths Following a Nationwide Vaccination Campaign in

- Israel: An Observational Study Using National Surveillance Data." *The Lancet* 397, no. 10287 (May 15, 2021): 1819–29. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00947-8/fulltext. Excerpt reprinted from *The Lancet*, copyright © 2021, with permission from Elsevier.
- Jaffe-Hoffman, Maayan. "Israel signs agreement with Pfizer, Moderna for millions more COVID-19 vaccines." *The Jerusalem Post*. April 20, 2021. https://www.jpost.com/health-science/israel-to-sign-agreement-for-millions-more-pfizer-vaccines-665621.
- Lardieri, Alexa. "All Israelis Over 16 Are Eligible for Coronavirus Vaccine." U.S. News & World Report. February 4, 2021. https://www.usnews.com/news/health-news/articles/2021-02-04/all-israelis-over-16-are-eligible-for-coronavirus-vaccine.
- Pfizer. "Pfizer and BioNTech Provide Update on Booster Program in Light of the Delta-Variant." Press release. July 8, 2021. https://cdn.pfizer.com/pfizer.com/2021-07/Delta_Variant_Study_Press_Statement_Final_7.8.21.pdf.
- Ritchie, Hannah, Esteban Ortiz-Ospina, Diana Beltekian, Edouard Mathieu, Joe Hasell, Bobbie MacDonald, Charlie Giattino, Cameron Appel, Lucas Rodes-Guirao, and Max Roser. "Coronavirus Pandemic (COVID-19)." OurWorldInData .org. 2020. https://ourworldindata.org/coronavirus. Licensed under CC BY 4.0.
- Srivastava, Mehul. "Israelis raise glass to Pfizer as lockdown ends." *Financial Times*. March 12, 2021. https://www.ft.com/content/4cf1b235-ed07-4ffe-bab4-95846a0ecf36.
- State of Israel Ministry of Health. "MoH Pfizer Collaboration Agreement." January 6, 2021. https://govextra.gov.il/media/30806/11221-moh-pfizer-collaboration-agreement-redacted.pdf.
- Tikkanen, Roosa, Robin Osborn, Elias Mossialos, Ana Djordjevic, and George A. Wharton. "Israel." The Commonwealth Fund: International Health Care System Profiles. June 5, 2020. https://www.commonwealthfund.org/international-health-policy-center/countries/israel.
- Times of Israel. "Pfizer CEO hails 'obsessive' Netanyahu for calling 30 times to seal vaccine deal." March 11, 2021. https://www.timesofisrael.com/pfizer-ceo-obsessive-netanyahu-called-30-times-in-effort-to-seal-vaccine-deal/.
- Times of Israel. "Pfizer CEO to Visit Israel in March—Report." February 21, 2021. https://www.timesofisrael.com/liveblog_entry/pfizer-ceo-to-visit-israel-in-march-report/.
- VOA News. "World Marks One-Year Anniversary of WHO's Official Declaration of COVID-19 Pandemic." March 11, 2021. https://www.voanews.com/covid-19-pandemic/world-marks-one-year-anniversary-whos-official-declaration-covid-19-pandemic.

Appeal of Conscience Foundation. "Dr. Albert Bourla acceptance remarks upon receiving the 2021 Appeal of Conscience Award." May 26, 2021. https://appeal

- of conscience.org/dr-albert-bourla-acceptance-remarks-upon-receiving-the-2021 appeal-of-conscience-award/.
- Bourla, Albert. "An Open Letter from Pfizer Chairman and CEO Albert Bourla." Pfizer. October 16, 2020. https://www.pfizer.com/news/hot-topics/an_open_letter_from_pfizer_chairman_and_ceo_albert_bourla.
- Doshi, Peter. "Covid-19 Vaccine Trial Protocols Released." *BMJ* 371 (October 21, 2020): m4058. https://doi.org/10.1136/bmj.m4058.
- Gottfried, Jeffrey, Mason Walker, and Amy Mitchell. "Americans' Views of the News Media During the COVID-19 Outbreak." Pew Research Center. May 8, 2020. https://www.journalism.org/2020/05/08/americans-views-of-the-news-media-during-the-covid-19-outbreak/.
- Lee, Bruce Y. "Trump Suggests 'Deep State' At FDA Is Delaying Covid-19 Coronavirus Vaccine Testing." *Forbes*. August 22, 2020. https://www.forbes.com/sites/brucelee/2020/08/22/trump-says-deep-state-or-whoever-at-fda-delaying-covid-19-coronavirus-vaccine-testing/?sh=632e53b0f48d.
- Merriam-Webster. "Trust." https://www.merriam-webster.com/dictionary/trust.
- Pfizer. "Biopharma Leaders Unite To Stand With Science." Press release. September 8, 2020. https://www.pfizer.com/news/press-release/press-release-detail/biopharma-leaders-unite-stand-science.
- Pfizer. "Let's Undo Underrepresented Diversity in Clinical Trials." https://www.pfizer.com/science/clinical-trials/diversity-clinical-trials.
- Pfizer. "No Stone Left Unturned In The Fight Against COVID-19." YouTube. September 2, 2020. https://www.youtube.com/watch?v=_PBLoSN7OUo.
- Pfizer. "Science Will Win-Ask Science." YouTube. April 15, 2020. https://www.youtube.com/watch?v=Xl0tEfLve1U.
- Robert Wood Johnson Foundation and the Harvard T.H. Chan School of Public Health. "The Public's Perspective on the United States Public Health System." May 13, 2021. https://www.rwjf.org/en/library/research/2021/05/the-publics-perspective-on-the-united-states-public-health-system.html.
- Snyder Bulik, Beth. "Pharma's reputation rehab: A whopping two-thirds of Americans now offer a thumbs-up, Harris Poll finds." *Fierce Pharma*. February 19, 2021. https://www.fiercepharma.com/marketing/pharma-reputation-hits-high-americans-two-thirds-now-give-positive-rating-harris-poll.
- Stacey, Kiran. "FDA head says he is willing to fast-track Covid-19 vaccine." *Financial Times*. August 30, 2020. https://www.ft.com/content/f8ecf7b5-f8d2-4726-ba3f-233b8497b91a.
- Sweet, Jesse, dir. "Mission Possible: The Race for a Vaccine." National Geographic CreativeWorks: Washington, DC, 2021. Aired March 11, 2021, on National Geographic. https://www.youtube.com/watch?v=jbZUZ9JYNBE.

- Vardi, Nathan. "The Race Is On: Why Pfizer May Be the Best Bet to Deliver a Vaccine by the Fall." *Forbes*. May 20, 2020. https://www.forbes.com/sites/nathan vardi/2020/05/20/the-man-betting-1-billion-that-pfizer-can-deliver-a-vaccine-by-this-fall/?sh=385a522382e9.
- VOA News. "Fauci 'Cautiously Optimistic' About Coronavirus Vaccine." July 31, 2020. https://www.voanews.com/covid-19-pandemic/fauci-cautiously-optimistic -about-coronavirus-vaccine.
- Wagner, Meg, and Melissa Macaya. "Fauci testifies on coronavirus response." CNN. July 31, 2020. https://www.cnn.com/politics/live-news/fauci-coronavirus-testimony-07-31-20/h_d880e3e2e3cedbfdce59805138f3477b.
- Westall, Mark. "Pfizer's Vaccine Branding Victory Delivers Lessons for Marketers Everywhere." *AdAge.* July 19, 2021. https://adage.com/article/opinion/pfizers-vaccine-branding-victory-delivers-lessons-marketers-everywhere-opinion/2351431.

- Cubanski, Juliette, Tricia Neuman, Kendal Orgera, and Anthony Damico. No Limit: Medicare Part D Enrollees Exposed to High Out-of-Pocket Drug Costs Without a Hard Cap on Spending. The Henry J. Kaiser Family Foundation. November 2017. https://files.kff.org/attachment/Issue-Brief-No-Limit-Medicare-Part-D-Enrollees-Exposed-to-High-Out-of-Pocket-Drug-Costs-Without-a-Hard-Cap-on-Spending.
- European Commission. "Health technology assessment." https://ec.europa.eu/health/technology_assessment/overview_en.
- Miao, Lei, Yu Zhang and Leaf Huang. "mRNA vaccine for cancer immunotherapy." *Molecular Cancer* 20, no. 41 (February 25, 2021). https://molecular-cancer.biomed central.com/articles/10.1186/s12943-021-01335-5.
- Pfizer. "Pfizer Reports Strong First-Quarter 2021 Results." Press release. May 4, 2021. https://investors.pfizer.com/investor-news/press-release-details/2021/PFIZER-REPORTS-STRONG-FIRST-QUARTER-2021-RESULTS/default.aspx.
- Pfizer. "Rod MacKenzie, PH.D." https://www.pfizer.com/people/leadership/executives/rod_mackenzie-phd.
- Smithsonian National Air and Space Museum. "The Journey Home." Apollo to the Moon. https://airandspace.si.edu/exhibitions/apollo-to-the-moon/online/apollo-11/journey-home.cfm.
- The White House. "Fact Sheet: President Biden Takes Executive Actions to Tackle the Climate Crisis at Home and Abroad, Create Jobs, and Restore Scientific Integrity Across Federal Government." Press release. January 7, 2021. https://www.whitehouse.gov/briefing-room/statements-releases/2021/01/27/fact-sheet-president-biden-takes-executive-actions-to-tackle-the-climate-crisis-at-home-and-abroad-create-jobs-and-restore-scientific-integrity-across-federal-government/.

World Health Organization. "Cancer." March 3, 2021. https://www.who.int/news-room/fact-sheets/detail/cancer.

Epilogue

The Carter Center. "Corporate, Government, and Foundation Giving." https://www.cartercenter.org/donate/corporate-government-foundation-partners/index.html.

The Carter Center. "Jimmy Carter (biography)." November 6, 2019. https://www.cartercenter.org/about/experts/jimmy_carter.html.

Pfizer. "Board Members." https://www.pfizer.com/people/leadership/board-of-directors.

Weiner, Stacy. "Applications to medical school are at an all-time high. What does this mean for applicants and schools?" American Association of Medical Colleges (AAMC). October 22, 2020. https://www.aamc.org/news-insights/applications-medical-school-are-all-time-high-what-does-mean-applicants-and-schools.