UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

UNITED STATES OF AMERICA *ex rel.* SHOLTO DAVID, Plaintiff-Relator, v. DANA-FARBER CANCER INSTITUTE, INC., Defendant	Civil Action No. _____ FILED UNDER SEAL PURSUANT TO 31 U.S.C. § 3730(b)(2) JURY TRIAL DEMANDED

FALSE CLAIMS ACT COMPLAINT

I. INTRODUCTION

1. Relator Sholto David ("Relator"), a PhD biologist with expertise in detecting medical image fraud, alleges that defendant Dana-Farber Cancer Institute, Inc. ("Dana-Farber"), a cancer center in Boston, Massachusetts, has violated the False Claims Act, 31 U.S.C. § 3729(a)(1) and (2), by using fraudulent medical images in grant applications and research articles to induce the National Institutes of Health ("NIH") to pay millions of dollars to support research at Dana-Farber.

2. Dana-Farber researchers, including Principal Investigators ("PIs") or project leaders on numerous NIH grants, used fraudulent medical image data in scores of research articles that they have published since the turn of the century. NIH necessarily would have relied on this body of research in assessing both the track records of the Dana-Farber researchers and the promise and results of the particular programs of research that Dana-Farber proposed for NIH grant funding.

3. The Dana-Farber researchers' fraudulent publications described preclinical research purportedly supporting a variety of hypotheses about biological mechanisms related to treatment of cancer, including multiple myeloma and Waldenström macroglobulinemia.

4. These publications reflect at least the following types of research fraud:

a. repurposing of microscope images of tissue derived from one patient to depict tissue derived from an entirely different patient, while cropping, rotating or magnifying the images in order to disguise their origin;

b. splicing together portions of medical images acquired in distinct experiments so as to fabricate the appearance of having obtained images fully consistent with the researchers' hypotheses;

c. cloning (*i.e.*, cutting out and duplicating) regions of empty background space into portions of a medical image so as to hide unwanted features in the image;

d. cloning portions of a medical image into another portion of an image so as to falsely represent a feature at that location consistent with the hypothesis being tested;

e. mirroring medical images, *i.e.*, horizontally flipping them in photo processing software, so as to be able to repurpose them as the apparent results of independent experiments;

f. duplicating images of mice used for an experiment to represent that more mice exhibited a desired experimental result than was in fact the case; and

g. inflating the number of patients or the number of mice in which researchers achieved certain experimental outcomes consistent with their hypotheses.

5. This fraud enabled Dana-Farber to misrepresent to NIH the progress of its researchers in developing the ability to target the precise biological mechanisms that are uniquely important in cancer cell growth and survival while limiting harm to other cells.

6. Relator is an original source of the Complaint allegations.

7. Prior to the filing of this Complaint, Relator made substantive disclosures to the government.

8. This action is filed in camera and under seal pursuant to the requirements of the False Claims Act, 31 U.S.C. § 3730(b)(2).

II. PARTIES, JURISDICTION AND VENUE

9. The Relator, Sholto David, is a resident of Wales in the United Kingdom who has a PhD in cell and molecular biology from Newcastle University in the United Kingdom.

10. The United States is the real party in interest in this action pursuant to 31 U.S.C. § 3730.

11. Dana-Farber is a Massachusetts nonprofit corporation headquartered in Boston. It operates cancer research and treatment facilities in and around Boston.

12. This Court has jurisdiction of this action under 28 U.S.C. §§ 1331 and 1345 because Relator brings this action on behalf of the United States pursuant to 31 U.S.C. § 3730.

13. Venue lies in this Court under 28 U.S. Code § 1391 because Dana-Farber is located in this District, and because its researchers engaged in the misconduct at issue in this District.

III. BACKGROUND

A. Legal Framework

14. The False Claims Act imposes civil penalties and liability of up to three times the amount of the harm suffered by the government on defendants who make or cause a false or fraudulent claim for payment to a United States government agency, 31 U.S.C. 3729(a)(1)(A), or who create a material false record or statement to get a false claim paid by a United States government agency, 31 U.S.C. 3729(a)(1)(B).

15. NIH makes payments to grantee research institutions, including Dana-Farber, in reliance on the content of grant applications and progress reports prepared by PIs at the institutions.

16. An authorized representative of each grantee institution must certify, using forms PHS-398 or SF-424, the veracity of information provided to NIH in support of a grant application.

17. An authorized representative also must make an annual certification as to the veracity of the content of progress reports.

18. In addition to certifying to the veracity of the content of grant applications and progress reports, the authorized representative must assure NIH of compliance with 42 CFR Part 93, which prohibits research misconduct in NIH-sponsored research.

19. "Research misconduct" includes, *inter alia,* "fabrication," which is "making up data or results and recording or reporting them," and "falsification," which is "manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record." 42 CFR § 93.103.

20. NIH has warned that, in cases of confirmed research misconduct, NIH not only may terminate grant awards associated with the confirmed case, but, if it is not satisfied with corrective actions taken, may bar its awardee from receiving NIH funding in the future. *See* NIH Grants Policy Statement at 8.5.

21. NIH requires that medical image data be published and presented either in unmanipulated form or, if the researcher wants certain features to stand out more clearly, in manipulated form, but only so long as there are disclosures about the manipulation. 42 CFR § 93.103.

B. Medical Image Data In Scientific Reporting

22. Physicians, medical researchers, NIH grant reviewers, and the peer reviewers for academic journals assess biological research by relying on medical images of the results of laboratory experiments or patient tissue samples.

23. Medical image data may include (1) micrographs of slides of extracted tissue that has been stained to highlight the presence or absence of certain proteins,

nucleic acids, or other features, and (2) images of so-called "Western blots" or other related techniques.[1]

24. Western blots are the outcome of gel electrophoresis experiments in which proteins from a sample migrate through a gel, with smaller proteins migrating further, and larger proteins less far.

25. In a Western blot experiment, researchers transfer the proteins from the gel to a membrane, and stain them with antibodies to highlight the presence or absence of specific proteins in the sample, resulting in a sequence of dark smudges, called bands.

26. Researchers may capture an image of the bands using either light-sensitive films or digital imaging devices.

27. In a Western blot, the intensity of the band indicates the level of the measured protein in the sample; the darker the band, the more protein was present. When the gel is imaged, the location of the band in one direction (*e.g.*, horizontally) reflects the sample and testing conditions, while the location in the other direction (*e.g.*, vertically) corresponds to the protein's size.

28. There is scientific meaning for a specialist reader in the horizontal and vertical locations of each band and their intensity, relative to other bands.

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[1] On occasion, Dana-Farber researchers reported Northern or Southern blot experiments, which produce visually similar results to Western blot experiments but detect RNA or DNA sequences rather than proteins.

29. Similarly, in microscope images of tissue; there is scientific meaning conveyed by the brightness or darkness with which certain stained features in the tissue appear, relative to other features in the image.

30. Thus, specialist readers rely on features in medical images to assess how successful a given experiment has been in demonstrating a hypothesized biological mechanism.

31. The vast majority of specialist readers will never attempt to replicate an experiment described in a research article, but will rely on the authenticity of the images they see.

32. Cutting, pasting, and splicing Western blots or portions of images to duplicate or mix distinct experimental results, undermines the integrity of the scientific message that a researcher proffers, whether in a research article or a grant application.

C. NIH Reliance On Medical Images And Research Articles In Grantmaking

33. NIH identifies a given grantmaking mechanism using codes, including R01, P01, P30, P50, and U01.

34. NIH awards an R01 based on its assessment that an individual PI has the competencies necessary to execute a proposed research project, with NIH payments being limited to $500,000 per year for three to five years.

35. NIH relies on its assessment of PI competencies in awarding U01 cooperative agreements, which have no budgetary limit but over which NIH exercises more programmatic control.

36. NIH may award P50 grants to a group of PIs working together on related research that addresses a particular programmatic need.

37. NIH awards P01 grants to fund a number of individual research projects on a common theme, each led by an established PI.

38. In making any of the above grants, NIH and its grant reviewers rely on biosketches, a formalized style of curriculum vitae within grant applications, to assess the credentials, competencies, and established track records of the PIs.

39. NIH and its grant reviewers also rely on technical descriptions of the proposed research. Such a description must contain references to peer-reviewed and published research articles as evidence that the proposed research has a sound scientific foundation and is likely to be fruitful.

40. A grant award does not cause NIH to transfer the amount of the grant to the grantee immediately. Rather, it authorizes the grantee to invoice NIH for costs incurred during its research subject to NIH approval of annual progress reports.

41. NIH requires that annual progress reports identify research articles arising from the grant payments to date. NIH relies on the integrity of the published research articles in deciding whether to continue to make progress payments or to terminate a grant early for lack of progress.

IV. THE DANA-FARBER RESEARCHERS' PUBLICATION OF FRAUDULENT MEDICAL IMAGES IN SCORES OF RESEARCH ARTICLES

42. Dana-Farber researchers William Hahn, Irene Ghobrial, Kenneth Anderson, Nikhil Munshi, Teru Hideshima, Constantine Mitsiades, and Dharminder Chauhan have published scores of articles in which they included fraudulent medical

image data. Exhibit 1 lists articles reflecting a pattern of fraud, and also collects links to relevant posts on PubPeer, an online community post-publication review platform. Exhibit 2 provides Relator's additional descriptions of fraud in articles listed in Exhibit 1 that are not discussed on PubPeer.

43. Hahn, Ghobrial, Anderson, Munshi, Hideshima, Mitsiades, and Chauhan, are also the PIs or project leaders of grants that NIH has awarded to Dana-Farber for research closely related to the subject matter of the research articles listed in Exhibit 1.

V. THE DANA-FARBER RESEARCHERS' USE OF FRAUDULENT ARTICLES TO INDUCE NIH TO MAKE GRANT PAYMENTS TO DANA-FARBER

A. NIH's Renewal Of Award Number P50CA100707

44. For more than two decades, NIH has funded Dana-Farber's research on multiple myeloma through a P50 grant with, titled "SPORE in Multiple Myeloma." (SPORE is an acronym for "Specialized Program of Research Excellence.")

45. In 2017, the P50CA100707 grant was scheduled to terminate after passing through several renewals.

46. In 2018 or 2019, Dana-Farber researchers submitted a grant application to NIH that was a competitive renewal application for P50CA100707, meaning that it contained all the necessary elements of a fresh grant application, including biosketches for the named PIs and descriptions of the scientific foundation of the proposed research, including references to previously published research articles and preliminary data.

47. On information and belief, this competitive renewal application responded to a publicly-posted funding opportunity announcement that also prompted

applications from PIs across the academic community to be in direct competition with Dana-Farber for funding of SPOREs at their research institutions.

48. In 2019, in reliance on the Dana-Farber researchers' competitive renewal application, NIH awarded Dana-Farber a five-year grant starting to continue work under the award number P50CA100707.

49. On information and belief, NIH denied other qualified biomedical researchers with sound programs of research funding in favor of Dana-Farber's proposal based on the Dana-Farber researchers' competitive renewal application and the biosketches and scientific foundation that they provided.

50. For each year from 2019 to 2023, NIH made payments to Dana-Farber in reliance on both the competitive renewal application and in reliance on annual progress reports.

51. On information and belief, in the Dana-Farber researchers' annual progress reports, they described research articles published in the immediately preceding budget period using the grant funds so as to induce NIH to continue making payments.

52. The table below lists NIH expenditures on the renewal award for P50CA100707.

Project Title	Project Number	Principal Investigators	Fiscal Year	Total Cost
SPORE in Multiple Myeloma	5P50CA100707-20	ANDERSON, KENNETH; MUNSHI, NIKHIL	2023	$2,257,199
SPORE in Multiple Myeloma	5P50CA100707-19	ANDERSON, KENNETH; MUNSHI, NIKHIL	2022	$2,257,199

SPORE in Multiple Myeloma	5P50CA100707 -18	ANDERSON, KENNETH; MUNSHI, NIKHIL	2021	$2,257,199
SPORE in Multiple Myeloma	5P50CA100707 -17	ANDERSON, KENNETH; MUNSHI, NIKHIL	2020	$2,349,611
SPORE in Multiple Myeloma	2P50CA100707 -16A1	ANDERSON, KENNETH; MUNSHI, NIKHIL	2019	$2,276,698

53. On information and belief, Dana-Farber's competitive renewal application for 2P50CA100707 and its subsequent annual progress reports relied on the following research articles on multiple myeloma that contained fraudulent medical images and related preliminary data.

Date	Article Citation
2018	Bae, J., Hideshima, T., Tai, Y. T., Song, Y., Richardson, P., Raje, N., Munshi, N. C., & Anderson, K. C. (2018). Histone deacetylase (HDAC) inhibitor ACY241 enhances anti-tumor activities of antigen-specific central memory cytotoxic T lymphocytes against multiple myeloma and solid tumors. *Leukemia*, 32(9), 1932–1947. Correction at https://doi.org/10.1038/s41375-024-02185-y.
2017	Das, D. S., Das, A., Ray, A., Song, Y., Samur, M. K., Munshi, N. C., Chauhan, D., & Anderson, K. C. (2017). Blockade of Deubiquitylating Enzyme USP1 Inhibits DNA Repair and Triggers Apoptosis in Multiple Myeloma Cells. *Clinical Cancer Research*, 23(15), 4280–4289.
2017	Bar-Natan, M., Stroopinsky, D., Luptakova, K., Coll, M. D., Apel, A., Rajabi, H., Pyzer, A. R., Palmer, K., Reagan, M. R., Nahas, M. R., Karp Leaf, R., Jain, S., Arnason, J., Ghobrial, I. M., Anderson, K. C., Kufe, D., Rosenblatt, J., & Avigan, D. (2017). Bone marrow stroma protects myeloma cells from cytotoxic damage via induction of the oncoprotein MUC1. *British Journal of Haematology*, 176(6), 929–938.
2016	Cea, M., Cagnetta, A., Acharya, C., Acharya, P., Tai, Y. T., Yang, C., Lovera, D., Soncini, D., Miglino, M., Fraternali-Orcioni, G., Mastracci, L., Nencioni, A., Montecucco, F., Monacelli, F., Ballestrero, A., Hideshima, T., Chauhan, D., Gobbi, M., Lemoli, R. M., Munshi, N., Treon, S. P., Anderson, K. C. (2016). Dual NAMPT and BTK Targeting Leads to Synergistic Killing of Waldenström Macroglobulinemia Cells Regardless of MYD88 and CXCR4 Somatic Mutation Status. *Clinical Cancer Research*, 22(24), 6099–6109.
2016	Hideshima, T., Qi, J., Paranal, R. M., Tang, W., Greenberg, E., West, N., Colling, M. E., Estiu, G., Mazitschek, R., Perry, J. A., Ohguchi, H., Cottini, F.,

	Mimura, N., Görgün, G., Tai, Y. T., Richardson, P. G., Carrasco, R. D., Wiest, O., Schreiber, S. L., Anderson, K. C., Bradner, J. E. (2016). Discovery of selective small-molecule HDAC6 inhibitor for overcoming proteasome inhibitor resistance in multiple myeloma. *Proceedings of the National Academy of Sciences of the United States of America*, 113(46), 13162–13167. Correction at https://www.pnas.org/doi/10.1073/pnas.2402806121.
2015	Zhu, D., Wang, Z., Zhao, J. J., Calimeri, T., Meng, J., Hideshima, T., Fulciniti, M., Kang, Y., Ficarro, S. B., Tai, Y. T., Hunter, Z., McMilin, D., Tong, H., Mitsiades, C. S., Wu, C. J., Treon, S. P., Dorfman, D. M., Pinkus, G., Munshi, N. C., Tassone, P., Marton, J.A., Anderson, K.C., Carrasco, R. D. (2015). The Cyclophilin A-CD147 complex promotes the proliferation and homing of multiple myeloma cells. *Nature Medicine*, 21(6), 572–580. Correction at https://www.nature.com/articles/s41591-024-02820-2.
2013	Yang, G., Zhou, Y., Liu, X., Xu, L., Cao, Y., Manning, R. J., Patterson, C. J., Buhrlage, S. J., Gray, N., Tai, Y. T., Anderson, K. C., Hunter, Z. R., & Treon, S. P. (2013). A mutation in MYD88 (L265P) supports the survival of lymphoplasmacytic cells by activation of Bruton tyrosine kinase in Waldenström macroglobulinemia. Blood, 122(7), 1222–1232.
2009	Chauhan, D., Singh, A. V., Brahmandam, M., Carrasco, R., Bandi, M., Hideshima, T., Bianchi, G., Podar, K., Tai, Y. T., Mitsiades, C., Raje, N., Jaye, D. L., Kumar, S. K., Richardson, P., Munshi, N., & Anderson, K. C. (2009). Functional interaction of plasmacytoid dendritic cells with multiple myeloma cells: a therapeutic target. *Cancer Cell*, 16(4), 309–323.
2008	Chauhan, D., Singh, A., Brahmandam, M., Podar, K., Hideshima, T., Richardson, P., Munshi, N., Palladino, M. A., & Anderson, K. C. (2008). Combination of proteasome inhibitors bortezomib and NPI-0052 trigger in vivo synergistic cytotoxicity in multiple myeloma. *Blood*, 111(3), 1654–1664.
2000	Tai, Y. T., Teoh, G., Lin, B., Davies, F. E., Chauhan, D., Treon, S. P., Raje, N., Hideshima, T., Shima, Y., Podar, K., & Anderson, K. C. (2000). Ku86 variant expression and function in multiple myeloma cells is associated with increased sensitivity to DNA damage. *Journal of Immunology* 165(11), 6347–6355. Retraction Notice at https://journals.aai.org/jimmunol/article/212/8/1392/266725/Retraction-Ku86-Variant-Expression-and-Function-in.

54. The above table contains links to where the authors have retracted one of the articles and corrected three more.

B. NIH Award Number P01CA203655

55. In 2016 or 2017, Dana-Farber submitted a grant application to NIH for a new award, number P01CA203655, which would support multiple research projects led by multiple PIs.

56. On information and belief, the grant application for P01CA203655 compromised distinct projects, each led by a different established PI and each with separately justified budgets and technical content.

57. On information and belief, and notwithstanding the separately justified budgeting, the Dana-Farber researchers also made arguments as to the synergistic nature of the separate projects and the commonality between them, so as to justify the P01CA203655 award in its entirety to Dana-Farber, consistent with NIH's conception of a P01 grant as requiring the separate PIs to be pursuing projects on a common theme.

58. Among the proposed projects, Dana-Farber included a project titled "Project 4: Interrogating PP2A Signaling in Human Cancers" with Hahn as the proposed PI. Dana-Farber's application for NIH funding for this project proposed further study by Hahn on protein phosphatase 2A ("PP2A") subunits that are recurrently mutated or deleted in human cancers. A grant abstract by Hahn touted Dana-Farber's purported research identifying a particular form of PP2A that promoted cancer-like cellular transformations.

59. On information and belief, Dana-Farber's application for the P01CA203655 award included Hahn's biosketch and described the scientific foundation

of his proposed research, including references to his previously published research articles and preliminary data, so as to justify the funding of his project.

60. For each year from 2017 to 2021, NIH made payments in reliance on both the original grant application and annual progress reports in which Dana-Farber described research articles published in the immediately preceding budget period using the grant funds.

61. The table below lists NIH expenditures for award number P01CA203655:

Project Title	Project Number	Principal Investigator	Fiscal Year	Total Cost (Subproject)
PROJECT 4: Interrogating PP2A Signaling in Human Cancers	5P01CA203655-05	HAHN, WILLIAM	2021	$326,362
PROJECT 4: Interrogating PP2A Signaling in Human Cancers	5P01CA203655-04	HAHN, WILLIAM	2020	$326,362
PROJECT 4: Interrogating PP2A Signaling in Human Cancers	5P01CA203655-03	HAHN, WILLIAM	2019	$316,571
PROJECT 4: Interrogating PP2A Signaling in Human Cancers	5P01CA203655-02	HAHN, WILLIAM	2018	$326,362
PROJECT 4: Interrogating PP2A Signaling in Human Cancers	1P01CA203655-01A1	HAHN, WILLIAM	2017	$328,830

62. On information and belief, Dana-Farber's grant application and annual progress reports for the P01CA203655 award relied on the following research articles on PP2A signaling or other research discussed in the grant application abstract. Hahn was a co-author of each of these articles, and each contained fraudulent medical images.

Date	Article Citation
2009	Cheng, H., Liu, P., Wang, Z. C., Zou, L., Santiago, S., Garbitt, V., Gjoerup, O. V., Iglehart, J. D., Miron, A., Richardson, A. L., Hahn, W. C., & Zhao, J. J. (2009). SIK1 couples LKB1 to p53-dependent anoikis and suppresses metastasis. *Science Signaling*, 2(80):ra35.
2007	Sablina, A. A., Chen, W., Arroyo, J. D., Corral, L., Hector, M., Bulmer, S. E., DeCaprio, J. A., & Hahn, W. C. (2007). The tumor suppressor PP2A Abeta regulates the RalA GTPase. *Cell*, 129(5), 969–982.

2005	Chen, W., Arroyo, J. D., Timmons, J. C., Possemato, R., & Hahn, W. C. (2005). Cancer-associated PP2A Aalpha subunits induce functional haploinsufficiency and tumorigenicity. *Cancer Research*, *65*(18), 8183–8192. Retraction Notice at https://aacrjournals.org/cancerres/article/84/6/935/735008/Retraction-Cancer-Associated-PP2A-A-Subunits.
2004	Berger, R., Febbo, P. G., Majumder, P. K., Zhao, J. J., Mukherjee, S., Signoretti, S., Campbell, K. T., Sellers, W. R., Roberts, T. M., Loda, M., Golub, T. R., & Hahn, W. C. (2004). Androgen-induced differentiation and tumorigenicity of human prostate epithelial cells. *Cancer Research*, 64(24), 8867–8875.
2004	Chen, W., Possemato, R., Campbell, K. T., Plattner, C. A., Pallas, D. C., & Hahn, W. C. (2004). Identification of specific PP2A complexes involved in human cell transformation. *Cancer Cell*, 5(2), 127–136.

63. The table above contains a link to where the authors have retracted one article.

C. NIH Award Number R01CA207237

64. In 2015 or 2016, Dana-Farber submitted a grant application to NIH titled "Therapeutically Targeting Plasmacytoid Dendritic Cells in Multiple Myeloma" with award number R01CA207237. The PIs for R01CA207237 were Anderson and Chauhan. Dana-Farber's application proposed further research on their hypothesis that targeting plasmacytoid dendritic cells, found in bone marrow, could treat multiple myeloma.

65. On information and belief, Dana-Farber's R01CA207237 application included biosketches for Chauhan and Anderson and arguments as to the scientific foundation for the proposed research. On information and belief, these materials cited research articles by Chauhan and Anderson.

66. Furthermore, between 2016 and 2020, Anderson and Chauhan submitted annual progress reports to NIH that referenced or included preliminary data from research articles produced in the immediately preceding grant periods.

67. The table below lists NIH expenditures for award number 5R01CA207237.

Project Title	Project Number	Principal Investigators	Fiscal Year	Total Cost
Therapeutically Targeting Plasmacytoid Dendritic Cells in Multiple Myeloma	5R01CA207237-05	ANDERSON, KENNETH; CHAUHAN, DHARMINDER	2020	$395,166
Therapeutically Targeting Plasmacytoid Dendritic Cells in Multiple Myeloma	5R01CA207237-04	ANDERSON, KENNETH; CHAUHAN, DHARMINDER	2019	$383,310
Therapeutically Targeting Plasmacytoid Dendritic Cells in Multiple Myeloma	5R01CA207237-03	ANDERSON, KENNETH; CHAUHAN, DHARMINDER	2018	$395,166
Therapeutically Targeting Plasmacytoid Dendritic Cells in Multiple Myeloma	5R01CA207237-02	ANDERSON, KENNETH; CHAUHAN, DHARMINDER	2017	$395,166
Therapeutically Targeting Plasmacytoid Dendritic Cells in Multiple Myeloma	1R01CA207237-01	ANDERSON, KENNETH; CHAUHAN, DHARMINDER	2016	$395,166

68. On information and belief, NIH made the R01CA207237 award and the progress payments pursuant to the award in reliance on the following research articles with related subject matter containing fraudulent medical images.

Date	Article Citation
2017	Bar-Natan, M., Stroopinsky, D., Luptakova, K., Coll, M. D., Apel, A., Rajabi, H., Pyzer, A. R., Palmer, K., Reagan, M. R., Nahas, M. R., Karp Leaf, R., Jain, S., Arnason, J., Ghobrial, I. M., Anderson, K. C., Kufe, D., Rosenblatt, J., & Avigan, D. (2017). Bone marrow stroma protects

	myeloma cells from cytotoxic damage via induction of the oncoprotein MUC1. *British Journal of Haematology*, 176(6), 929–938.
2017	Das, D. S., Das, A., Ray, A., Song, Y., Samur, M. K., Munshi, N. C., Chauhan, D., & Anderson, K. C. (2017). Blockade of Deubiquitylating Enzyme USP1 Inhibits DNA Repair and Triggers Apoptosis in Multiple Myeloma Cells. *Clinical Cancer Research*, 23(15), 4280–4289.
2015	Bae, J., Keskin, D. B., Cowens, K., Lee, A. H., Dranoff, G., Munshi, N. C., & Anderson, K. C. (2015). Lenalidomide Polarizes Th1-specific Anti-tumor Immune Response and Expands XBP1 Antigen-Specific Central Memory $CD3^{+}CD8^{+}$ T cells against Various Solid Tumors. *Journal of Leukemia*, 3(2), 178.
2012	Tai, Y. T., Chang, B. Y., Kong, S. Y., Fulciniti, M., Yang, G., Calle, Y., Hu, Y., Lin, J., Zhao, J. J., Cagnetta, A., Cea, M., Sellitto, M. A., Zhong, M. Y., Wang, Q., Acharya, C., Carrasco, D. R., Buggy, J. J., Elias, L., Treon, S. P., Matsui, W., Anderson, K. C. (2012). Bruton tyrosine kinase inhibition is a novel therapeutic strategy targeting tumor in the bone marrow microenvironment in multiple myeloma. *Blood*, 120(9), 1877–1887.
2009	Azab, A. K., Runnels, J. M., Pitsillides, C., Moreau, A. S., Azab, F., Leleu, X., Jia, X., Wright, R., Ospina, B., Carlson, A. L., Alt, C., Burwick, N., Roccaro, A. M., Ngo, H. T., Farag, M., Melhem, M. R., Sacco, A., Munshi, N. C., Hideshima, T., Rollins, B. J., Anderson, K.C., Kung, A.L., Lin, C.P., Ghobrial, I. M. (2009). CXCR4 inhibitor AMD3100 disrupts the interaction of multiple myeloma cells with the bone marrow microenvironment and enhances their sensitivity to therapy. *Blood*, 113(18), 4341–4351.
2009	Chauhan, D., Singh, A. V., Brahmandam, M., Carrasco, R., Bandi, M., Hideshima, T., Bianchi, G., Podar, K., Tai, Y. T., Mitsiades, C., Raje, N., Jaye, D. L., Kumar, S. K., Richardson, P., Munshi, N., & Anderson, K. C. (2009). Functional interaction of plasmacytoid dendritic cells with multiple myeloma cells: a therapeutic target. *Cancer Cell*, 16(4), 309–323.
2008	Chauhan, D., Singh, A., Brahmandam, M., Podar, K., Hideshima, T., Richardson, P., Munshi, N., Palladino, M. A., & Anderson, K. C. (2008). Combination of proteasome inhibitors bortezomib and NPI-0052 trigger in vivo synergistic cytotoxicity in multiple myeloma. *Blood*, 111(3), 1654–1664.
2004	Hideshima, T., Podar, K., Chauhan, D., Ishitsuka, K., Mitsiades, C., Tai, Y. T., Hamasaki, M., Raje, N., Hideshima, H., Schreiner, G., Nguyen, A. N., Navas, T., Munshi, N. C., Richardson, P. G., Higgins, L. S., & Anderson, K. C. (2004). P38 MAPK inhibition enhances PS-341 (bortezomib)-induced cytotoxicity against multiple myeloma cells. *Oncogene*, 23(54), 8766–8776.

D. **NIH Award Numbers R01CA181683, R01CA178264, And R01CA050947**

69. In 2013 or 2014, Dana-Farber submitted grant applications for three R01 grants – R01CA181683, R01CA178264, and R01CA050947 – to conduct research into potential therapies for multiple myeloma.

70. Award number R01CA181683 was entitled "Stroma-Mediated Clonal Evolution in Multiple Myeloma." Dana-Farber listed Ghobrial as the PI for this grant.

71. Award number R01CA178264 was entitled "Functional and Biologic Significance of Deacetylase3 Inhibition in Myeloma." Dana-Farber listed Hideshima and Anderson as the PIs for this grant.

72. Award number R01CA050947 was entitled "Molecular Sequelae of Myeloma-Bone Marrow Interactions: Therapeutic Applications." Dana-Farber listed Anderson and Mitsiades as the PIs for this grant.

73. The tables below list NIH expenditures for award numbers R01CA181683, R01CA178264, and R01CA050947.

Project Title	Project Number	Principal Investigators	Fiscal Year	Total Cost
Stroma-Mediated Clonal Evolution in Multiple Myeloma	5R01CA181683-05	GHOBRIAL, IRENE	2018	$353,770
Stroma-Mediated Clonal Evolution in Multiple Myeloma	5R01CA181683-04	GHOBRIAL, IRENE	2017	$353,770
Stroma-Mediated Clonal Evolution in Multiple Myeloma	5R01CA181683-03	GHOBRIAL, IRENE	2016	$353,773
Stroma-Mediated Clonal Evolution in Multiple Myeloma	5R01CA181683-02	GHOBRIAL, IRENE	2015	$353,786
Stroma-Mediated Clonal Evolution in Multiple Myeloma	1R01CA181683-01A1	GHOBRIAL, IRENE	2014	$353,798

Project Title	Project Number	Principal Investigators	Fiscal Year	Total Cost
Functional and Biologic Significance of Deacetylase3 Inhibition in Myeloma	5R01CA178264-05	HIDESHIMA, TERU; ANDERSON, KENNETH	2018	$353,291
Functional and Biologic Significance of Deacetylase3 Inhibition in Myeloma	5R01CA178264-04	HIDESHIMA, TERU; ANDERSON, KENNETH	2017	$353,291
Functional and Biologic Significance of Deacetylase3 Inhibition in Myeloma	5R01CA18264-03	HIDESHIMA, TERU; ANDERSON, KENNETH	2016	$353,291
Functional and Biologic Significance of Deacetylase3 Inhibition in Myeloma	5R01CA178264-02	HIDESHIMA, TERU; ANDERSON, KENNETH	2015	$353,291
Functional and Biologic Significance of Deacetylase3 Inhibition in Myeloma	1R01CA178264-01A1	HIDESHIMA, TERU; ANDERSON, KENNETH	2014	$353,291

Project Title	Project Number	Principal Investigators	Fiscal Year	Total Cost
Molecular Sequelae of Myeloma-Bone Marrow Interactions: Therapeutic Applications	5R01CA050947-26	ANDERSON, KENNETH, MITSIADES, CONSTANTINE	2018	$301,545
Molecular Sequelae of Myeloma-Bone Marrow Interactions: Therapeutic Applications	5R01CA050947-25	ANDERSON, KENNETH, MITSIADES, CONSTANTINE	2017	$301,545
Molecular Sequelae of Myeloma-Bone Marrow Interactions: Therapeutic Applications	5R01CA050947-24	ANDERSON, KENNETH, MITSIADES, CONSTANTINE	2016	$301,545
Molecular Sequelae of Myeloma-Bone Marrow Interactions: Therapeutic Applications	5R01CA050947-23	ANDERSON, KENNETH, MITSIADES, CONSTANTINE	2015	$301,545

Molecular Sequelae of Myeloma-Bone Marrow Interactions: Therapeutic Applications	2R01CA050947-22A1	ANDERSON, KENNETH, MITSIADES, CONSTANTINE	2014	$301,545

74. Between 2015 and 2018, NIH's payments pursuant to the above awards relied on Dana-Farber's annual progress reports, which cited its researchers' publications in the immediately preceding budget periods on their myeloma research.

75. On information and belief, Dana-Farber referenced the following research article in a progress report for R01CA181683 so as to induce continued funding from NIH in the subsequent budget periods.

Date	Article Citation
2017	Bar-Natan, M., Stroopinsky, D., Luptakova, K., Coll, M. D., Apel, A., Rajabi, H., Pyzer, A. R., Palmer, K., Reagan, M. R., Nahas, Ml. R., Karp Leaf, R., Jain, S., Arnason, J., Ghobrial, I. M., Anderson, K. C., Kufe, D., Rosenblatt, J., & Avigan, D. (2017). Bone marrow stroma protects myeloma cells from cytotoxic damage via induction of the oncoprotein MUC1. *British Journal of Haematology*, 176(6), 929–938.

76. On information and belief, Dana-Farber referenced the following research articles in progress reports for R01CA050947 so as to induce continued funding from NIH in the subsequent budget periods.

Date	Article Citation
2017	Bar-Natan, M., Stroopinsky, D., Luptakova, K., Coll, M. D., Apel, A., Rajabi, H., Pyzer, A. R., Palmer, K., Reagan, M. R., Nahas, M. R., Karp Leaf, R., Jain, S., Arnason, J., Ghobrial, I. M., Anderson, K. C., Kufe, D., Rosenblatt, J., & Avigan, D. (2017). Bone marrow stroma protects myeloma cells from cytotoxic damage via induction of the oncoprotein MUC1. *British Journal of Haematology*, 176(6), 929–938.
2017	Das, D. S., Das, A., Ray, A., Song, Y., Samur, M. K., Munshi, N. C., Chauhan, D., & Anderson, K. C. (2017). Blockade of Deubiquitylating Enzyme USP1 Inhibits DNA Repair and Triggers Apoptosis in Multiple Myeloma Cells. *Clinical Cancer Research*, 23(15), 4280–4289.

2016	An, G., Acharya, C., Feng, X., Wen, K., Zhong, M., Zhang, L., Munshi, N. C., Qiu, L., Tai, Y. T., & Anderson, K. C. (2016). Osteoclasts promote immune suppressive microenvironment in multiple myeloma: therapeutic implication. *Blood, 128*(12), 1590–1603.
2016	Cea, M., Cagnetta, A., Acharya, C., Acharya, P., Tai, Y. T., Yang, C., Lovera, D., Soncini, D., Miglino, M., Fraternali-Orcioni, G., Mastracci, L., Nencioni, A., Montecucco, F., Monacelli, F., Ballestrero, A., Hideshima, T., Chauhan, D., Gobbi, M., Lemoli, R. M., Munshi, N., Treon, S. P., Anderson, K. C. (2016). Dual NAMPT and BTK Targeting Leads to Synergistic Killing of Waldenström Macroglobulinemia Cells Regardless of MYD88 and CXCR4 Somatic Mutation Status. *Clinical Cancer Research*, 22(24), 6099–6109.

77. On information and belief, Dana-Farber referenced the following research articles in progress reports for R01CA178264 so as to induce continued funding from NIH in the subsequent budget periods.

Date	Article Citation
2017	Bar-Natan, M., Stroopinsky, D., Luptakova, K., Coll, M. D., Apel, A., Rajabi, H., Pyzer, A. R., Palmer, K., Reagan, M. R., Nahas, Ml. R., Karp Leaf, R., Jain, S., Arnason, J., Ghobrial, I. M., Anderson, K. C., Kufe, D., Rosenblatt, J., & Avigan, D. (2017). Bone marrow stroma protects myeloma cells from cytotoxic damage via induction of the oncoprotein MUC1. *British Journal of Haematology*, 176(6), 929–938.
2017	Das, D. S., Das, A., Ray, A., Song, Y., Samur, M. K., Munshi, N. C., Chauhan, D., & Anderson, K. C. (2017). Blockade of Deubiquitylating Enzyme USP1 Inhibits DNA Repair and Triggers Apoptosis in Multiple Myeloma Cells. *Clinical Cancer Research*, 23(15), 4280–4289.
2016	Cea, M., Cagnetta, A., Acharya, C., Acharya, P., Tai, Y. T., Yang, C., Lovera, D., Soncini, D., Miglino, M., Fraternali-Orcioni, G., Mastracci, L., Nencioni, A., Montecucco, F., Monacelli, F., Ballestrero, A., Hideshima, T., Chauhan, D., Gobbi, M., Lemoli, R. M., Munshi, N., Treon, S. P., Anderson, K. C. (2016). Dual NAMPT and BTK targeting leads to synergistic killing of Waldenström Macroglobulinemia cells regardless of MYD88 and CXCR4 somatic mutation status. *Clinical Cancer Research*, 22(24), 6099–6109.
2016	Hideshima, T., Qi, J., Paranal, R. M., Tang, W., Greenberg, E., West, N., Colling, M. E., Estiu, G., Mazitschek, R., Perry, J. A., Ohguchi, H., Cottini, F., Mimura, N., Görgün, G., Tai, Y. T., Richardson, P. G., Carrasco, R. D., Wiest, O., Schreiber, S. L., Anderson, K. C., Bradner, J. E. (2016). Discovery of selective small-molecule HDAC6 inhibitor for overcoming

	proteasome inhibitor resistance in multiple myeloma. *Proceedings of the National Academy of Sciences of the United States of America*, 113(46), 13162–13167. Correction at https://doi.org/10.1073/pnas.2402806121.

78. The above table contains a link to where the authors have corrected one article.

VI. Representative Examples Of The Dana-Farber Researchers' Medical Image Fraud

A. Image Copying And Manipulation In The *Clinical Cancer Research* Article

79. In the 2016 article, "Dual NAMPT and BTK targeting leads to synergistic killing of Waldenström Macroglobulinemia cells regardless of MYD88 and CXCR4 somatic mutation status," that Anderson, Munshi, and other Dana-Farber researchers published in *Clinical Cancer Research*, they claimed to show that the protein nicotinamide phosphoribosyltransferase ("Nampt") was a viable therapeutic target for treating Waldenstrom's macroglobulinemia, whether or not MYD88, a protein already known to be involved in the cancer, was active.

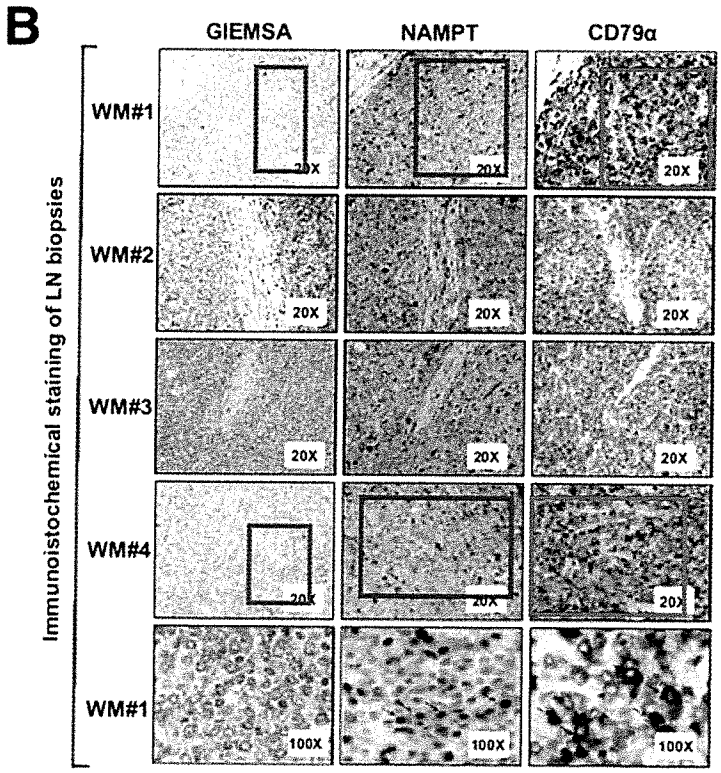
80. On information and belief, the 2016 *Clinical Cancer Research* article served to demonstrate to NIH that Dana-Farber researchers were competent to clarify biological mechanisms that could involve MYD88 during the competitive renewal of the P50CA100707 grant for the SPORE in 2019.

81. Studies of MYD88 were one of four subprojects that together comprised this SPORE.

82. Figure 1B of the *Clinical Cancer Research* 2016 article purportedly demonstrated detectable levels of Nampt in lymph node samples taken from four Waldenstrom's macroglobulinemia patients.

83. The figure also showed two other stains, Giemsa and CD79α, which are other stains routinely used in haematology research.

84. As shown below, Dana-Farber researchers repurposed images of a sample from the first patient (WM#1) to represent purportedly similar results that they had obtained in treating a sample from the fourth patient (WM#4).



85. The repurposed images are not simple duplicates – which might indicate a series of sloppy but unintentional clerical errors. Rather, the Dana-Farber researchers

rotated and magnified the repurposed images (despite claiming the same level of magnification in the corner of the images), with the effect of disguising their true origin.

86. On information and belief, the Dana-Farber researchers felt the need to re-use the images from the patient WM#1 sample in their claimed depictions of the patient WM#4 sample because they did not obtain sufficiently consistent results in more than three patients.

87. The image re-use fraudulently inflated the strength of the evidence the researchers claimed to be presenting in the 2016 *Clinical Cancer Research* article.

88. The fraud serving to inflate the number of patients showing consistent results materially undermines the level of confidence a specialist reader would have in the conclusions of the article, given the already small number of patients that the researchers claimed to have studied.

89. On information and belief, NIH would not have considered the 2016 *Clinical Cancer Research* article to be valid evidence of either the Dana-Farber researchers' competencies or the scientific foundation for the SPORE had NIH and its grant reviewers known of the Dana-Farber researcher's use of image copying and manipulation within the article.

B. Image Copying And Manipulation In The *Nature Medicine* Article

90. In the 2015 article, "The Cyclophilin A–CD147 complex promotes the proliferation and homing of multiple myeloma cells," that Anderson, Munshi, Hideshima, and other Dana-Farber researchers published in *Nature Medicine*, they

rotated and magnified the repurposed images (despite claiming the same level of magnification in the corner of the images), with the effect of disguising their true origin.

86. On information and belief, the Dana-Farber researchers felt the need to re-use the images from the patient WM#1 sample in their claimed depictions of the patient WM#4 sample because they did not obtain sufficiently consistent results in more than three patients.

87. The image re-use fraudulently inflated the strength of the evidence the researchers claimed to be presenting in the 2016 *Clinical Cancer Research* article.

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89. On information and belief, NIH would not have considered the 2016 *Clinical Cancer Research* article to be valid evidence of either the Dana-Farber researchers' competencies or the scientific foundation for the SPORE had NIH and its grant reviewers known of the Dana-Farber researcher's use of image copying and manipulation within the article.

B. Image Copying And Manipulation In The *Nature Medicine* Article

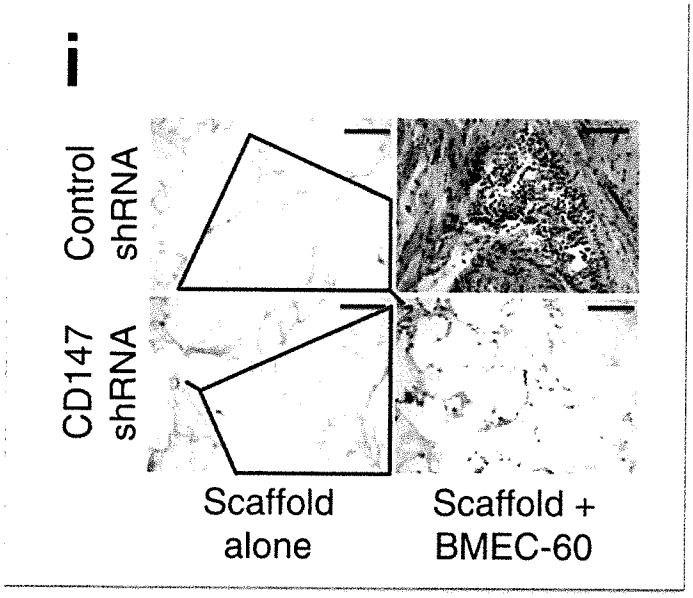
90. In the 2015 article, "The Cyclophilin A–CD147 complex promotes the proliferation and homing of multiple myeloma cells," that Anderson, Munshi, Hideshima, and other Dana-Farber researchers published in *Nature Medicine*, they

claimed to show that the protein CyPA, secreted by bone marrow endothelial cells ("BMECs"), contributed to the growth of cancer when it binds to the CD147 protein.

91. On information and belief, the 2015 *Nature Medicine* article served to demonstrate to NIH that Dana-Farber researchers were skilled at targeting biological mechanisms involved in cancer therapies during the competitive renewal of the P50CA100707 grant for the SPORE in 2019.

92. The 2015 *Nature Medicine* article contains multiple instances of scientific research fraud.

93. *First*, as shown below, in Figure 5i of the article, the Dana-Farber researchers repurposed an image showing that cancer cells were scarce in the absence of both BMECs and CD147 (top row left) to represent the results of a different experiment in which CD147 was present, but BMECs were not (bottom row left).



94. Notably, the Dana-Farber researchers did not make a straightforward copy, but instead used a rotational transformation that had the effect of disguising their copying.

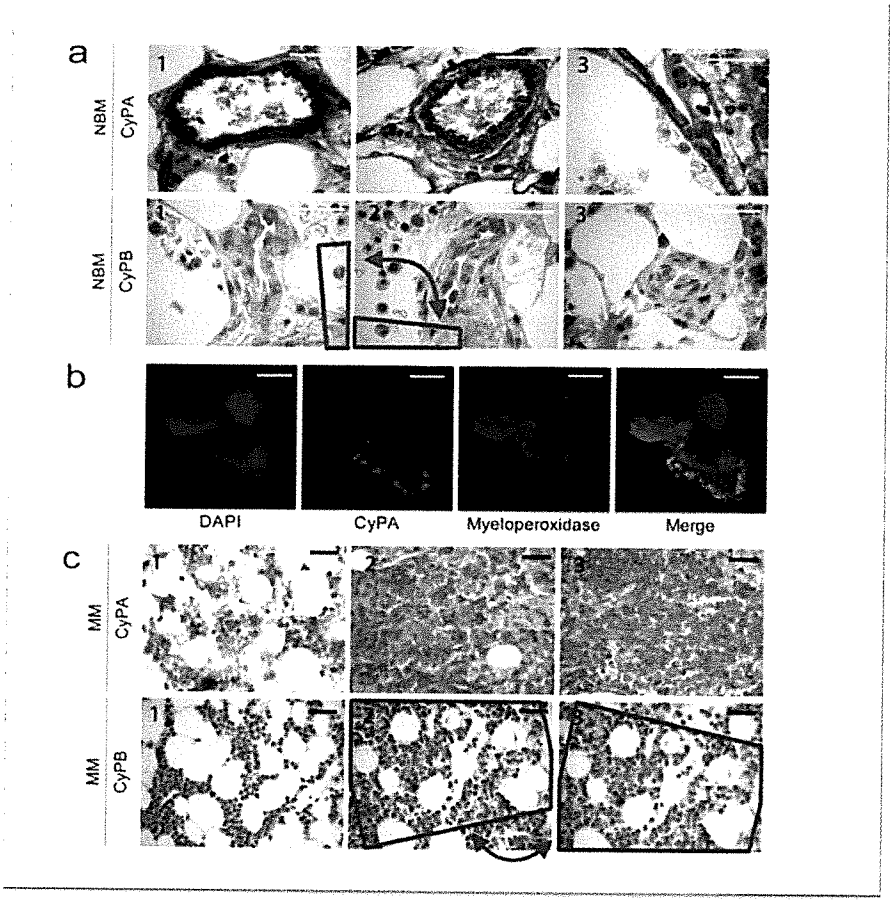
95. This fraud helped to provide apparent support for the Dana-Farber researchers' hypothesis of a linkage between CyPA and CD147.

96. On information and belief, if the Dana-Farber researchers' experiments truly had shown that BMECs played a role in cancer growth by binding to CD147, they easily could have shown an image in which CD147 was present, but cancer cell growth was scarce, without repurposing and manipulating another image.

97. On information and belief, the Dana-Farber researchers did not disclose their publication of a fraudulent image in the 2015 *Nature Medicine* article when relying on it in their competitive renewal for P50CA100707.

98. On information and belief, had NIH known of the Dana-Farber researchers' fraudulent image copying and manipulation in the 2015 *Nature Medicine* article, NIH neither would have believed that its prior funding for Dana-Farber under the P50CA100707 award had borne fruit prior to the competitive renewal, nor believed that the Dana-Farber researchers had demonstrated a track record of competency in research as of the time of the competitive renewal, because the fraudulent image copying and manipulation gives cause to doubt that the Dana-Farber researchers ever obtained authentic medical image data to show their purported discovery of novel therapeutic potential in targeting the linkage of CD147 and CyPA.

99. *Second*, as shown below, in Figure S03 of the supplement for the 2015 *Nature Medicine* article, the Dana-Farber researchers repurposed and rotated images of patient tissue to show that the secretion of CyPA by BMECs also occurred in other patients, who they claimed to be representative of some 60 patients they had recruited.



100. If the Dana-Farber researchers had achieved consistent findings in as many as 60 patients, as they claimed, they would not have needed to repurpose images from one patient – who may have shown the effect they wanted by chance – to another confirmatory example.

101. The misrepresentation in Figure S03 substantially undermines the Dana-Farber researchers' claim, in their competitive renewal grant abstract for P50CA100707, that they had shed light on the biological mechanisms involved in multiple myeloma using clinically-derived samples.

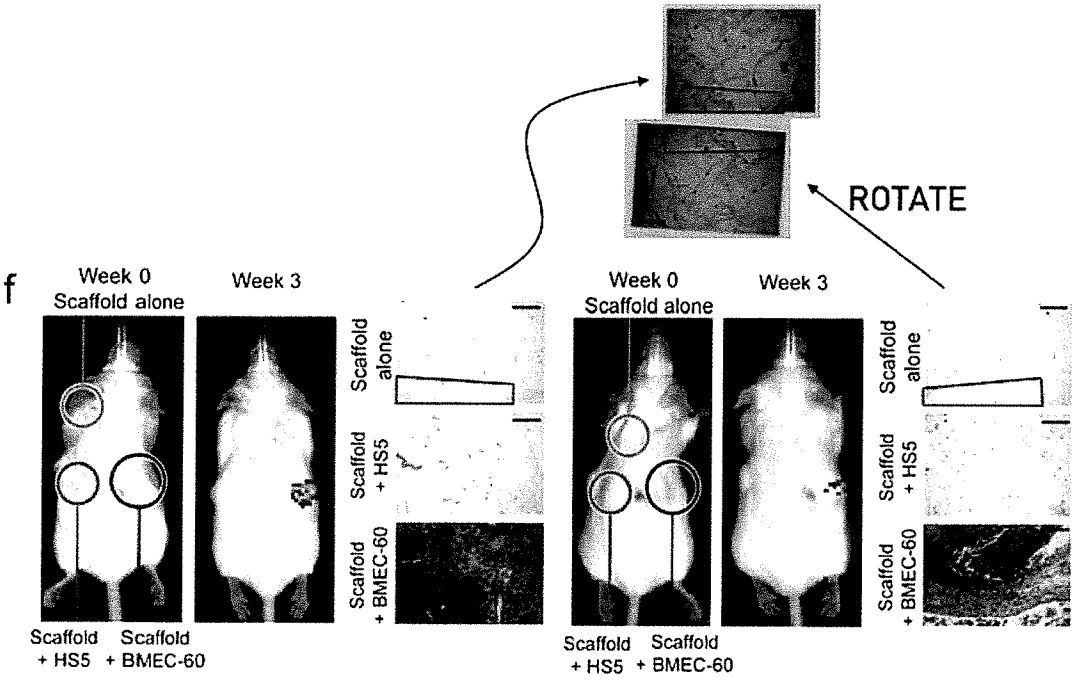
102. On January 25, 2024, shortly after Relator contacted Dana-Farber to challenge the integrity of these two figures from the 2015 *Nature Medicine* article, the Dana-Farber researchers issued a correction that replaced the repurposed images from the two figures with other images.

103. In the correction, the researchers asserted that the original figures "inadvertently contained overlapping areas," but they did not explain the rotation of the repurposed data that was seemingly intentional and had made their copying hard to detect.

104. *Third*, after the Dana-Farber researchers published their correction, Relator found further copying in Figure S1f of the supplement to the 2015 *Nature Medicine* article.

105. In Figure S1f, the colored circles appeared in the original article, while in the image below Relator added red trapezoids to show where the Dana-Farber researchers repurposed their image data.

"(f) Left and right, results of two independent experiments..."



106. The duplication and repurposing within Figure S1f undermines the Dana-Farber researchers' claim, in the 2015 *Nature Medicine* article, to have obtained consistent results in "two independent experiments" supporting their hypothesis. In fact, the Dana-Farber researchers just copied and rotated the findings from one experiment and claimed that the copied and rotated image was the product of a separate experiment. Due to natural variability in living systems, a failure to conduct independent experiments that give rise to consistent results materially undermines the degree of confidence that a specialist reader of a study will have in its stated conclusions.

C. Image Copying And Manipulation In The 2017 *Clinical Cancer Research* Article

107. In the 2017 article, "Blockade of deubiquitylating enzyme USP1 inhibits DNA repair and triggers apoptosis in Multiple Myeloma cells," that Anderson, Munshi,

Chauhan, and other Dana-Farber researchers published in *Clinical Cancer Research*, they claimed to show that inhibiting the activity of the enzyme ubiquitin-specific peptidase 1 (USP1) with the USP1 inhibitor SJB3-019A decreases the viability of multiple myeloma cells.

108. If valid, the 2017 *Clinical Cancer Research* article would demonstrate Dana-Farber's track record understanding the role ubiquitination could play in cancer therapies, and thus help to demonstrate the institution's competency to execute the ubiquitin-related project in the P50CA100707 competitive renewal in 2019.

109. The *Clinical Cancer Research* 2017 also article acknowledges support from three other grants, including R01CA207237 and R01CA050947.

110. On information and belief, the Dana-Farber researchers cited the 2017 *Clinical Cancer Research* article in the progress reports for these grants in or around 2017.

111. On information and belief, in their competitive renewal application and progress reports, the Dana-Farber researchers did not disclose that Figures 5A and 6C of the 2017 *Clinical Cancer Research* article reflect fraudulent copying, as shown below.

112. In Figure 5A, the Dana-Farber researchers claimed to depict an image resulting from a Western blot experiment to compare the amounts of two proteins – p21, which plays a role in suppressing tumor growth, and ß-actin, a control that is generally present – in cancer cells treated with increasing concentrations of the SJB3-019A.

113. As the concentration of SJB3-019A increased, according to the finding that the researchers purported to show in Figure 5A, so did the intensity of the p21 band, while the ß-actin control bands remained more or less consistent. Thus, the figure suggested that SJB3-019A correlates with tumor suppression.

114. In Figure 6C, the Dana-Farber researchers purported to show the results of a similar, but separate, experiment with three proteins – SOX-4, SOX-2, and NOTCH-1 – that are associated with the renewal or survival of multiple myeloma cells.

115. Because Figure 6C showed fainter bands with greater strengths of SJB3-019A, this figure, too, tended to show the potential utility of SJB3-019A to target multiple myeloma cells.

116. As Relator shows above, however, the SOX-2 Western blots in Figure 6C were identical to the p21 Western blots in Figure 5A, save for a mirror transformation that served to obscure the repurposing.

117. Given that either Figure 5A or Figure 6C must be bogus, it is impossible to know whether higher concentrations of SJB3-019A actually increase the presence of p21, the protein associated with the suppression of tumor growth, or decrease the presence of SOX-2, the cancer-promoting protein.

118. Likewise, it would have been impossible for NIH to know whether Dana-Farber's progress reports for R01CA207237 or R01CA050947 or its competitive renewal application for P50100707 described true progress concerning the effect of SJB3-019A on these proteins.

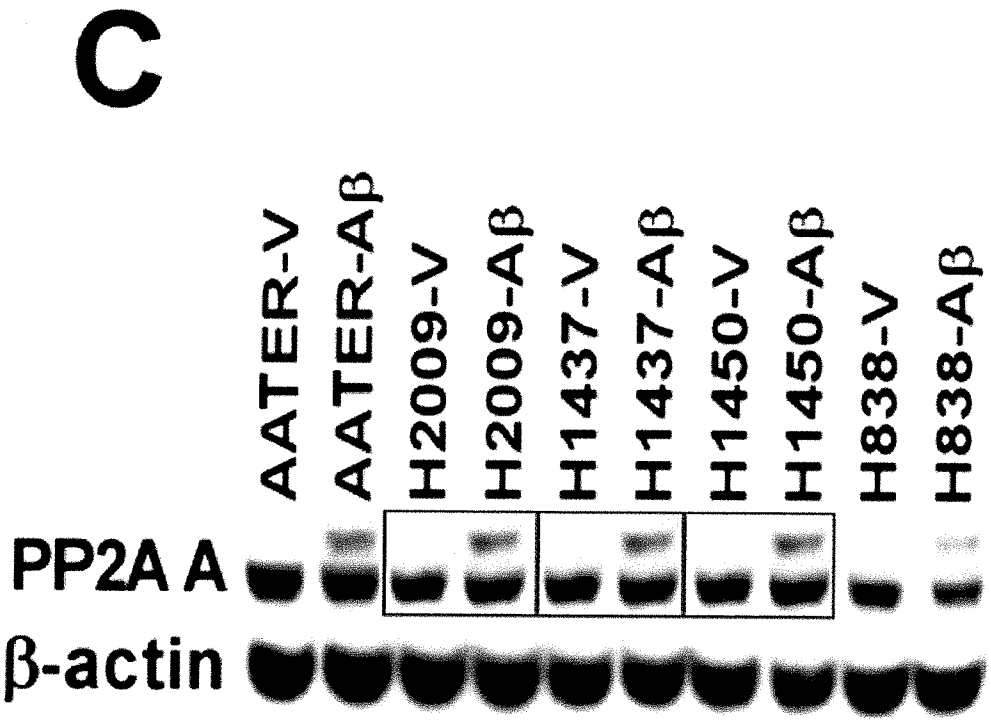
D. Image Copying In The 2007 *Cell* Article

119. In the 2007 article, "The tumor suppressor PP2A Aß regulates the RalA GTPase," that Hahn and other Dana-Farber researchers published in *Cell*, they claimed to elucidate the mode of action of a form of the tumor suppressor PP2A.

120. On information and belief, NIH relied on this research in awarding Dana-Farber the P01CA203655 Subproject on PP2A Signaling.

121. Figure 2C of the 2007 *Cell* article contained a fraudulent depiction of the results of a Western blot experiment that purportedly showed expression of two different forms of PP2A across a number of different tumor cell lines (including H2009, H1437 and H1450).

122. As shown below, the "PP2A A" row of the figure purported to show two horizontal bands: in the bottom band, a form of PP2A was always present (dark smudges in every vertical lane); in the top band, the PP2A was only sometimes present (empty lane or a dark smudge).



123. But, as indicated by the blue rectangles, the top band of the PP2A A row actually showed three sets of identical results.

124. Because the Dana-Farber researchers used this figure to prove that they had generated consistent results in three different cell lines, their use of copied results undermines that claim and thereby undermines the confidence that a specialist reader would have in their stated conclusions.

125. The fraudulent copying of results purportedly showing the Dana-Farber researchers' success in distinguishing the biological action of two different forms of PP2A undermines the premise of the grant application for the P01 subproject to fund Dana-Farber's further research on PP2A signaling, because the P01 subproject was premised on Hahn's assertion that, while more than 80 forms of PP2A exist, Dana-Farber had made unique progress in studies of a particular form expected to have significant therapeutic potential across human cancers.

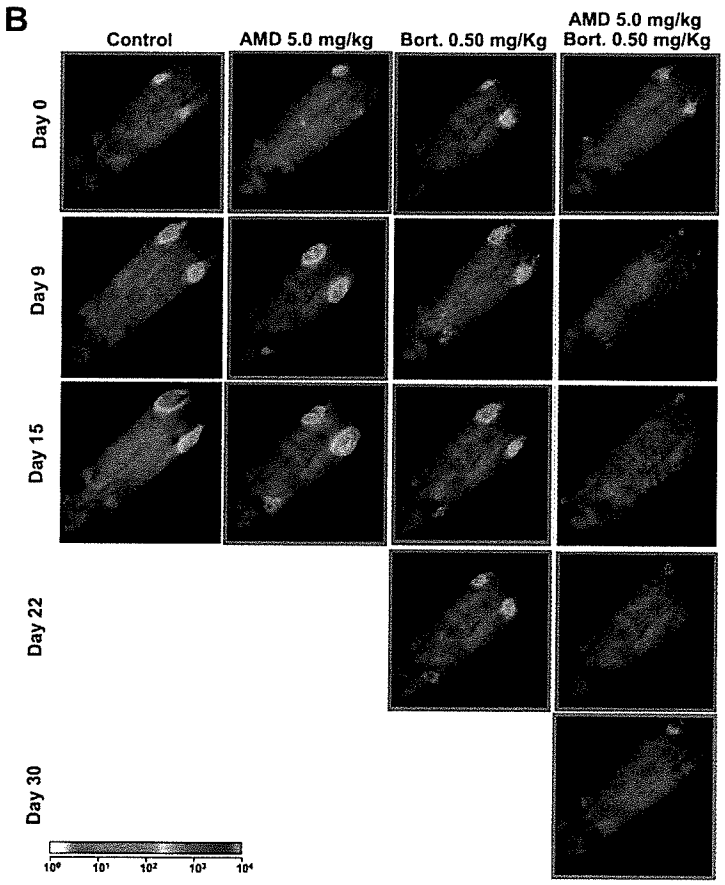
E. Image Copying In The 2009 *Blood* Article

126. In the 2009 article, "CXCR4 inhibitor AMD3100 disrupts the interaction of multiple myeloma cells with the bone marrow microenvironment and enhances their sensitivity to therapy," that Ghobrial, Anderson, Munshi, Hideshima, and other Dana-Farber researchers published in *Blood*, they described experiments in mice in which treatment with the small molecule AMD3100 supposedly increased the sensitivity of multiple myeloma cells to certain chemotherapies, including bortezomib.

127. The Dana-Farber researchers asserted that AMD3100 disrupted adhesion of multiple myeloma cells to bone marrow and thus inhibited cancer growth.

128. On information and belief, the 2009 *Blood* article, which was supported by an earlier NIH grant, provided support for Dana-Farber's subsequent application for the R01CA207237 grant that NIH awarded in 2016.

129. On information and belief, in the R01CA207237 grant application, Dana-Farber did not disclose that Figure 4B of the 2009 *Blood* article contained extensive data copying and fraud, as shown below.



130. This figure purported to depict four different mice (each in a separate column) on five different days over a thirty-day period, with the cancer cells in each mouse illuminated according to their strength.

131. The control mouse in the left column supposedly was untreated, had severe cancer on day 15, and died before day 22.

132. The mouse in the second column purportedly was treated only with AMD3100, had severe cancer on day 15, and died before day 22.

133. The mouse in the third column purportedly was treated only with bortezomib, had some cancer on day 22, and died before day 30.

134. The mouse in the fourth column purportedly was treated with AMD3100 and bortezomib and was largely-cancer free and alive on day 30.

135. Figure 4B on its face provided evidence that the bortezomib-only mouse lived longer than the control or AMD3100-only mice, and that the mouse treated with both AMD3100 and bortezomib lived longest of all.

136. As Relator has determined, however, the Dana-Farber researchers used images of the same mice to represent other mice. Their duplications included the following:

a. As shown by the green boxes, the same mouse appeared as the control on day 0 and as the AMD3100-bortezomib mouse on day 30. (While this sameness is difficult to see with the naked eye from the figure, it is clear that both images show a mouse with the same dark spots on the rear of the body.)

b. As shown by the blue boxes, the same mouse appeared as the AMD3100-only mouse on day 0 and as the AMD3100-bortezomib mouse on day 0. (While this sameness is difficult to see with the naked eye from the figure, it is clear that both images showed a mouse with the same black line extending from between the eyes to about midway down the body.)

c. As shown by the red boxes, the same mouse appeared as the AMD3100-only mouse on days 9 and 15, as the bortezomib-only mouse on days 0, 15, and 22, and as the AMD3100-bortezomib mouse on day 22. (While this sameness is difficult to see with the naked eye from the figure, it is clear that all six of these images showed a mouse with two short black lines appearing at angles on the body, one near the front and the other near the rear.)

137. The Dana-Farber researchers' extensive copying undercuts any claim that their experiment showed bortezomib, or bortezomib with AMD3100, to be an effective treatment for multiple myeloma.

138. In December 2023, Relator posted on PubPeer to describe his findings of copying in Figure 4B of the 2009 *Blood* article

139. Following Relator's post, a comment signed by Ghobrial appeared on PubPeer stating that "[w]e will look into it, thanks." As of April 12, 2024, however, Ghobrial still had not followed up on PubPeer or published any correction to her article.

140. Dana-Farber's R01CA207237 abstract stated: "In our prior studies supported by NIH funding we identified the role of the bone marrow (BM) microenvironment in conferring growth, survival, and drug resistance in multiple

myeloma (MM) cells. Importantly, we have successfully translated multiple novels agents (bortezomib, carfilzomib, lenalidomide, and pomalidomide) targeting these interactions from the bench to the bedside and FDA approval for treatment of MM."

141. The fabrication of the results of the Dana-Farber researchers' prior experiment on the effectiveness of bortezomib, as shown in Figure 4B of the 2009 *Blood* article, undermines the basis for the R01CA207237 grant that NIH awarded to Dana-Farber in 2016.

F. Fraudulent Image Copying Between Two Supposedly Distinct Studies In *Cancer Cell* in 2009 And *Blood* in 2008

142. In 2008, Chauhan, Hideshima, Anderson, and other Dana-Farber researchers published an article in *Blood* titled "Combination of proteasome inhibitors bortezomib and NPI-0052 trigger in vivo synergistic cytotoxicity in Multiple Myeloma." This article claimed to show that bortezomib in combination with the molecule NPI-0052 triggered the death of myeloma cells from both cell lines but also from tissue taken from patients whose cancers were resistant to conventional therapy.

143. In 2009, Chauhan, Hideshima, Munshi, Anderson, and other Dana-Farber researchers published an article in *Cancer Cell* titled "Functional interaction of plasmacytoid dendritic cells with Multiple Myeloma cells: a therapeutic target." This article claimed to show that plasma dendritic cells ("pDCs") from bone marrow promote the survival and drug resistance of myeloma cells.

144. On information and belief, the Dana-Farber researchers' competitive renewal application for P50CA100707 and their application for R01CA207237 relied on the articles in *Blood* in 2008 and *Cancer Cell* in 2009 as evidence that Dana-Farber had the

necessary competencies to carry out successful research into potential therapies for myeloma and that the programs of research they proposed in these applications would be fruitful.

145. Both articles contained fraudulent copying of image data, as shown below.

Figure 3A from 2008 Blood

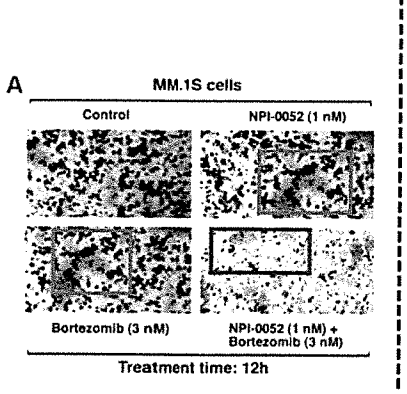
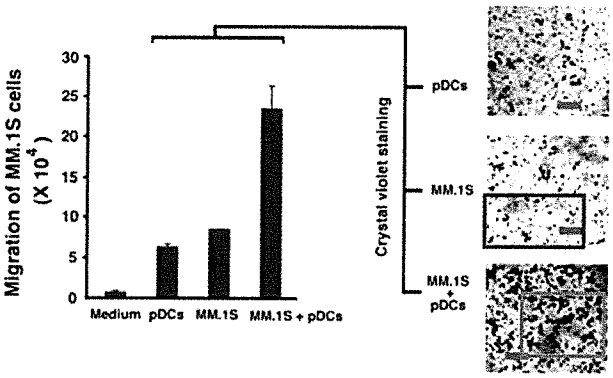


Figure 5B from 2009 Cancer Cell



146. In Figure 3A of the 2008 *Blood* article, the Dana-Farber researchers used four microscope images of myeloma cells (stained purple) to show that fewer cells remained alive 12 hours after treatment with both bortezomib and NPI-0052 than after treatment with either bortezomib or NPI-0052 alone.

147. Within Figure 3A of the 2008 *Blood* article, the microscope images of cells purportedly treated with bortezomib alone, or with NPI-0052 alone, contain cloned sections, indicated by green rectangles.

148. The cloned sections show that the Dana-Farber researchers created both images by cropping smaller regions from the same large field image in two different ways, so as to disguise their repurposing of the same data into distinct experimental contexts.

149. The Dana-Farber researchers also stretched or compressed one image relative to the other so as to further disguise their repurposing.

150. The repurposing suggests that the Dana-Farber researchers may never have run the experiments necessary to show that treatment with both bortezomib and NPI-0052 was synergistic when compared to treatment with only one or the other, hence creating ambiguity as to whether perhaps only one of the two agents was efficacious.

151. Then, in the 2009 *Cancer Cell* article, the Dana-Farber researchers repurposed the duplicated image data from the 2008 *Blood* article to represent a sample of myeloma cells exposed to pDCs, with the scientific message that such cells survived better than cells not undergoing such exposure, as shown by the green rectangle.

152. Furthermore, as shown by the red rectangles, in the 2009 *Cancer Cell* article, the Dana-Farber researchers additionally repurposed image data purportedly representing myeloma cells treated with bortezomib and NPI-0052 to represent a control sample of tissue that was not treated with pDCs.

153. Again, the Dana-Farber researchers cropped a single wide field image in different ways in the two articles, while also changing the aspect ratio of the resulting images, so as to disguise their repurposing.

154. The conflation of images across the two articles undermines the Dana-Farber researchers' representation that they conducted an experiment to compare survival of myeloma cells treated with pDCs with an authentic control as they claimed in the 2009 *Cancer Cell* article. If they had in fact conducted the experiment they

described in the article, they would not have needed to repurpose images from an earlier article about a different experiment.

155. On information and belief, NIH awarded the Dana-Farber researchers the R01CA207237 grant and approved the competitive renewal of the P50CA100707 grant in part because of Dana-Farber's representation that its researchers had successfully triangulated therapies that could overcome drug resistance and prevent myeloma cell survival.

G. Dana-Farber's Leadership's Historic Association With Image Fraud

156. In 2006, Dana-Farber's current CEO, Laurie Glimcher, was the "corresponding author" of an article in the journal *Science* entitled "Proapoptotic BAX and BAK modulate the unfolded protein response by a direct interaction with IRE1α."

157. Glimcher has gained scientific acclaim for this and other work claiming to shed light on the "unfolded protein response," which is an important cellular process implicated in human disease.

158. Author affiliations on the *Science* article showed Glimcher as associated with Harvard School of Public Health, while the lead author, Claudio Hetz, was jointly associated with Harvard School of Public Health and Dana-Farber.

159. In November 2014, and again in May and July 2020, anonymous commenters on PubPeer identified multiple examples of image repurposing and splicing in the supplementary figures to the *Science* article.

160. In or around August 2020, Hetz, by then at the University of Chile, posted a defense of the image processing practices in the *Science* article and other articles he

published while he was working at Harvard School of Public Health and Dana-Farber. Hetz acknowledged repurposing and splicing some Western blot bands, but insisted this did not affect the scientific message of the articles. He wrote: "Most gels indicated were indeed spliced to improve clarity or simplify the results. In this process some times we were not accurate unintentionally, but these errors did not alter the conclusion of the experiments …. Folders with original films were stored at HSPH and then transferred to Cornel [*sic*] University when the lab moved to New York. Data was stored for 7 years (NIH policy) and then all boxes were eliminated. We contacted the lab to scan all primary data as backup, however this was no longer possible."

161. Between her employment ending at Harvard School of Public Health in 2011, and becoming Dana-Farber's CEO in 2016, Glimcher was Dean of the Medical College at Weill Cornell Medicine.

162. In 2016, in her capacity as Dana-Farber's CEO, Glimcher submitted a competitive renewal application for NIH award number P30CA006516, entitled "Dana-Farber/Harvard Cancer Center." Dana-Farber had received NIH funding under this award since at least 1985, successfully going through several competitive renewals.

163. The P30CA006516 competitive renewal in 2016 sought funding for clinical research infrastructure at Dana-Farber, Harvard School of Public Health, Beth Israel Deaconess Medical Center, Harvard Medical School, and Massachusetts General Hospital.

164. On information and belief, NIH relied in part on the integrity of the 2006 *Science* article when assessing the scientific credentials of Glimcher and evaluating

Dana-Farber's qualifications to lead the P30CA006516 competitive renewal. That article was among Glimcher's most high-profile articles. The grant abstract for the renewal stated: "The progress presented in this proposal has required DF/HCC leadership, its combined resources, and, most importantly, its consortium structure."

165. On January 3, 2024, Relator emailed Dana-Farber's research integrity office and other researchers a list of links to journal articles and associated PubPeer posts describing image fraud in those articles. The list included links to the 2006 *Science* article, as well as to two other articles that Glimcher had published.

166. On April 18, 2024, *Science* retracted the 2006 article that Glimcher and Hetz had published.

167. The Retraction Notice stated: "An internal analysis that began in February 2021 has revealed discrepancies in the controls shown in several of the study's figures. As a result the authors are no longer confident that these figures support the conclusions. As a result the authors are retracting the paper."

168. The Retraction Notice also stated that Hetz had not agreed to the retraction, that one author was deceased, that four other authors (not including Glimcher) could not be reached, and that all other authors (thereby implicitly including Glimcher) had agreed with the retraction.

COUNT I: FALSE OR FRAUDLENT CLAIMS
(31 U.S.C. § 3729(A)(1))

169. Relator repeats and realleges each allegation in each of the preceding paragraphs as if fully set forth herein.

170. During the period from at least as early as 2014 through the present, Dana-Farber knowingly presented, or caused the presentation of, false or fraudulent claims for payment or approval, in violation of the False Claims Act, 31 U.S.C. § 3729(a)(1)(A), specifically, fraudulent grant applications and progress reports seeking payment from NIH.

171. By virtue of the false or fraudulent claims Dana-Farber knowingly presented, or caused to be presented, the United States has suffered actual damages and is entitled to recover treble damages plus a civil monetary penalty for each false claim.

COUNT II: FALSE RECORDS AND STATEENTS
(31 U.S.C. § 3729(A)(1)(B))

172. Relator repeats and realleges each allegation in each of the preceding paragraphs as if fully set forth herein.

173. During the period from at as early as 2014 through the present, Dana-Farber knowingly made, used, or caused to be made or used false records or statements, including copied, transposed, and altered medical images, material to false or fraudulent claims to NIH, in violation of the False Claims Act, 31 U.S.C. § 3729(a)(1)(B).

174. By virtue of the false records or statements Defendants made, used, or caused to be made or used, the United States has suffered actual damages and is entitled to recover treble damages plus a civil monetary penalty for each false claim.

PRAYER FOR RELIEF

WHEREFORE, Relator demands and prays for the following relief:

1. That judgment be entered in favor of the United States for the amount of its damages, trebled as required by law, and such civil penalties as are required by law, together with all such further relief as may be just and proper;

2. An award to Relator of a percentage of the proceeds of the action in accordance with 31 U.S.C. § 3730(d);

3. An award to Relator of its costs and reasonable attorney fees for prosecuting this action; and

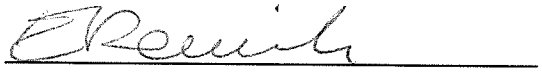
4. All other relief as may be required or authorized by law and in the interests of justice.

DEMAND FOR JURY TRIAL

Relator hereby demands a trial by jury.

Dated: April 22, 2024

Respectfully submitted,



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