WILMER EYE INSTITUTE
THE JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE
THE JOHNS HOPKINS HOSPITAL

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October 4, 2023

Re: The 2025 Helen Keller Prize for Vision Research
Nomination of Professor David Abramson,
(The Memorial Sloan Kettering Cancer Center, New York City)

Via email to: lbeckwith@helenkellerfoundation.org

It is extremely unusual—and indeed unheard of--- in contemporary medicine for one person to almost single-handedly revolutionize therapy of lethal cancerous diseases so that they become routinely curable with safe and effective therapy throughout the world. Such is the effect that Professor David Abramson, M.D. has had in the case of retinoblastoma and, importantly, in other ophthalmic malignancies in children during the last 5 decades.

Beginning in the early 2000's, he was the first person to perceive, understand, and disseminate knowledge leading to the seemingly magical therapeutic revolution represented by intra-arterial chemotherapy for retinoblastoma. It was a "eureka moment" for him (an example, perhaps, of the Louis Pasteur dictum that "chance favors the prepared mind"). Specifically, he uniquely understood that intra-arterial chemotherapy could have worldwide implications for cancer chemotherapy. After discovering an obscure Japanese reference on this subject, he created, validated, and disseminated the therapeutically beneficial knowledge derived from his personal human research and from his international teaching of intra-arterial chemotherapy.

Dr. Abramson documented his extraordinary human results through his then unique therapeutic approach via hundreds of articles and oral presentations. In doing so, and by documenting, time and time again, and in all corners of the world, the seemingly miraculous therapy for one of the worst cancers known to medical science, he converted a disease (retinoblastoma) with a customary >95% enucleation rate in children to one with a >95 % salvage rate. Moreover, salvation of useful vision has become routine (and markedly improved) with this form of therapy (Intra-arterial chemotherapy). Prior approaches, including systemic chemotherapy, external irradiation, and others, have therefore been mostly abandoned.

With regularly reproducible results, children otherwise doomed to both blindness and death have been converted to cancer-free, normally sighted individuals. Dr. Abramson documented his successful results with major, important publications. His H-index is now an impressive 79, and his papers have been cited over 20,000 times. He has expanded his retinoblastoma research to other pediatric ophthalmic malignancies and to other diseases (see below), and his total publications now exceed 730. He and his team have cared for more retinoblastoma patients than anyone worldwide. His techniques of intra-arterial chemo-therapy are now routinely employed in over 50 countries, and include choice of catheters, choice of drugs, including Melphalan, their doses, and the indications for both initial and recurrent treatments.

In addition to his seminal research on treatment of retinoblastoma, Dr. Abramson has pioneered and introduced several beneficially "disruptive" therapies and innovations in several other vision-related arenas. Some examples follow:

a. Since 1972, he has worked on the issue of second cancers in retinoblastoma survivors. When he started, these cancers were all thought to be late metastases of retinoblastoma, itself, but in 1976 (with Lorenz Zimmerman, M.D.) his publication showed that they were actually independent cancers (this was before the Rb gene had been identified). Since then, Dr. Abramson has demonstrated the relevance of radiation and chemotherapy to second cancers in such patients.

b. In the 1970's, Dr. Abramson changed the way orbital rhabdomyosarcoma is treated worldwide. Standard therapy had been exenteration (surgical removal of the entire orbital contents, with, of course, permanent total blindness), but Dr. Abramson's non-surgical approach via combinations of radiation and chemotherapy has saved more lives with obvious functional (that is, preserved or improved vision) and cosmetic success.

c. Dr. Abramson also introduced pre-implantation genetic diagnosis (PGD) for <u>prevention</u> of retinoblastoma. As a result, families with the gene for retinoblastoma can now have children with all of their normal genes, but without developing retinoblastoma…and this extends to the subsequent offspring and later generations who are also free of the Rb gene.

d. Intra-arterial chemotherapy, as refined and popularized by Dr. Abramson in retinoblastoma management, has now been expanded to other orbital tumors, brain tumors, and other head and neck cancers.

Thus, it can be said with confidence that Dr. Abramson has amply fulfilled the criteria for the Helen Keller Prize; namely, "RESEARCH EXCELLENCE AS DEMONSTRATED BY A NUMBER OF SIGNIFICANT RESEARCH CONTRIBUTIONS TO VISION SCIENCE DURING THE COURSE OF A CAREER, OR FOR A SINGLE RESEARCH CONTRIBUTION OF EXCEPTIONAL IMPORTANCE TO VISION SCIENCE." Indeed, Dr. Abramson's contributions are in concordance with both components of this set of criteria.

Dr. Abramson's contributions have been recognized "at home" and elsewhere. For example, at Memorial Sloan Kettering Cancer Center, he is the only physician to have been appointed at the "Professor" level (called "Member" at MSK) in the departments of surgery, pediatrics, and also radiation oncology. He is one of the few clinicians granted tenure at MSK (ordinarily reserved there for basic scientists). Elsewhere, he has been awarded the Stallard Medal (Cambridge University), the Bjerrum Medal (Danish Ophthalmological Society), the Alcon Research Institute Award, The Heed Alumni Award, the Weisenfeld Award (ARVO), the award of the Manhattan League of Helen Keller Services for the

Blind, the Franceschetti Medal (Swiss Ophthalmological Society), and the National Retinoblastoma Foundation Medal of Honor (India). His scientific and clinical publications continue to this day, and several more are actively in submission and under editorial review.

Since his nomination a year ago Dr. Abramson has continued his enormous productivity. For example, in 2022 he published 17 papers and, to date 16 in 2023, that included the Robert M. Ellsworth Lecture (2022), and the Victor Curtin Lecture (2023). The most exciting development is his cell free DNA work-in both retinoblastoma and uveal melanoma, and so far (with Dr. Jasmine Francis), he is leading the world into this new and important way of looking at, monitoring, and predicting cancer results, patterns and diagnosis. The cfDNA test they helped develop has been approved by NY State for early diagnosis of cancer (not just retinoblastoma). It presently detects cfDNA from about 80% of all human cancers.

And finally, the world has independently validated Dr. Abramson's work on intraarterial chemotherapy for retinoblastoma. An independent meta-analysis of 614 papers showed that intraarterial chemotherapy is safer, more effective and results in cures in a shorter time than intravenous chemotherapy. Not only does it save more eyes and vision, but the meta-analysis showed that patients' survival was better than with intravenous chemotherapy.

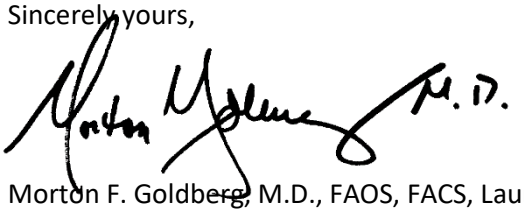
Moreover, in 2022 the results of a prospective randomized trial (from China) demonstrated that intraarterial chemotherapy was superior to intravenous chemotherapy, and that retaining and treating very advanced eyes did not compromise survival. So, for the first time in ophthalmic oncology, we have gold standard-level one evidence of a superior treatment for an eye cancer.

Presently, every retinoblastoma center in the US and now almost every center worldwide are using the technique, drugs, doses and schedule that Dr. Abramson introduced in 2006. At MSK he and his colleagues have gone from enucleating 95% of eyes to enucleating only 5% of eyes. And other centers are getting close to similar results. There is another surprising development worth mentioning. In developing nations throughout Latin America, Africa, Asia (including China and India), when families are offered enucleation, they often have preferred to not treat the child and allow the child to die with two eyes rather than survive with one eye. That is the main reason children die worldwide from retinoblastoma, whereas, retinoblastoma is now the most often cured pediatric cancer with survival over 99% at MSKCC. Worldwide, because families refuse removal of the eye (and systemic chemotherapy is not an option for financial, cultural and logistic reasons), patients' survival is just under 50%. But now, intrarterial chemotherapy has become available to these countries. In many cases their physicians have come to MSKCC to be trained by Dr. Abramson, and colleagues, and in others he has traveled to several countries to teach his techniques. Now, India, China, Argentina, Peru, Brazil, Columbia, Russia, Mexico, Vietnam, Egypt, Jordan, Morocco, Thailand, and three centers in Africa are using intraarterial chemotherapy for retinoblastoma. So, not only are babies in the US and Europe experiencing this major advance…but, children, worldwide, are as well.

It seems obvious to me that Dr. Abramson has created an inestimably valuable legacy in research related to vision. He has had the courage and perseverance to successfully tackle previously lethal and blinding disorders, especially in children, where initiating clinical research is always fraught with trepidation, emotion, and caution. It is not easy for a physician to champion new and initially unapproved therapeutic interventions, especially in children. It is even harder to attain success and actually revolutionize therapies for such dreadful diseases. Dr. Abramson deserves enormous credit and gratitude for having personally inserted himself into these extraordinarily difficult endeavors, and he has succeeded.

In my opinion his contributions clearly merit the 2025 Helen Keller Prize for Vision Research. Thank you very much for your consideration.

Sincerely yours,



Morton F. Goldberg, M.D., FAOS, FACS, Laureate of the American Academy of Ophthalmology, FRACO (hon.). M.D. (hon., Univ. Coimbra)

Memorial Sloan Kettering Cancer Center

Jan 11th 2025

Dear Helen Keller Foundation Prize Selection Committee,

Dear Hellen Keller Committee,

As requested, I am writing a second letter to support the application and reconsideration of David H. Abramson MD FACS for the Hellen Keller Prize in Vision research. While there is no need to repeat the reasons I have enthusiastically supported his nomination in the two prior years, I would like to mention additional reasons for my support.

1) His present **h-index** has increased to **85** with more than **27,000** citations of his work. Last year, 2024, he published **22** papers. Some of these recent papers have been cited as the most influential and popular papers by the Journals, including *Clinical Cancer Research* and *Ophthalmology.*
2) He has trained a generation of physicians, ophthalmologists and ophthalmic oncologists (I am one of them) and now collaborated and published with more than 325 scientists and clinicians.
3) His rigorous scientific and clinical work has significantly changed clinical management and outcomes for childhood retinoblastoma. As a recap:
    a. Dr. Abramson became a world's expert in radiation oncology and, rare for an Ophthalmologist, did additional training in Radiation Oncology receiving a license in Radiation Oncology. He co-authored (with Robert Sagerman MD) the teaching book on "Radiation and the Eye" used by all trainees in Radiation Oncology. Despite that he led the world in *abandoning* radiation for retinoblastoma because of its proclivity to induce second (fatal) cancers and introduced newer, safer and more effective treatments that did not use radiation.
    b. Dr. Abramson has performed more than 8,000 operations and lasers and trained more than 100 residents and fellows in Ophthalmic surgery and ophthalmic oncology. Despite his surgical experience and expertise, in the 1970's, he was the first to use radiation and chemotherapy for orbital rhabdomyosarcoma to eliminate surgery as primary treatment. That was 50 years ago and since then, 5 national randomized clinical trials have confirmed his work from the 1970's. Now surgery-sparing radiation/chemotherapy is the standard of care worldwide.
    c. Dr. Abramson has taught genetics for years and his clinic remains a "rotation" for genetic counseling students in New York. However, he didn't stop there - with collaborators, he introduced preimplantation genetic diagnosis (PGD) for retinoblastoma in 2004. This technique that allows families with germline retinoblastoma to have normal children without the retinoblastoma gene.
    d. In collaboration with researchers at MSK his **Nature** paper established the cell of origin of retinoblastoma, and also that retinoblastoma tumors all develop *in utero*. This is a profound discovery for the field and elucidated for the first time, the cell of origin for this pediatric cancer.
    e. His introduction of intraarterial chemotherapy for retinoblastoma in 2006 met significant criticism from colleagues. Now it is the first choice for all high-volume retinoblastoma centers worldwide and has decreased enucleation rates from 95% to

5%, retaining eyes-often with useful vision-without compromising survival. Two years ago, independent researchers demonstrated (in a randomized trial) that intraarterial chemotherapy is safer, has better outcomes with fewer side effects (and is cheaper) than intravenous chemotherapy. Not only are "developed nations´ using his technique but "developing nations" are too…in Africa, Asia, Latin America, Mexico and more. In those countries children were dying because families refused enucleation. Now, with intraarterial chemotherapy they are surviving (with the eye). At Memorial Sloan Kettering, intraarterial chemotherapy has surpassed over **2700** infusions in **800** eyes, speaking to his tremendous experience and the number of children he has helped.

Here are a few new examples:

f. With collaborators, Dr. Abramson has paved the field in understanding the utility of cell free DNA in retinoblastoma. He has demonstrated that cell free DNA is detectable in the blood of children (leaking from intraocular tumors a mere 5mm in size!); and that dynamics of cell free DNA may be related to recurrence of intraocular disease or systemic metastasis
g. The value of intravitreous injection for vitreous disease is well established, thanks in part to the work of Dr. Abramson. However, he is the first to pioneer the use of intravitreous injections of chemotherapy to treat Retinal or Subretinal tumors. Furthermore, he has escalated the chemotherapeutic agent of choice from melphalan to high-dose topotecan because of the recognition that melphalan, while effective, is potentially toxic to the retina. In doing so, he has refined the delivery of chemotherapy for retinoblastoma to a method that is less invasive and potentially more accessible to resource-limited countries.

It is not too dramatic to say that Dr. Abramson's scientific and clinical work in retinoblastoma has transformed the options, outlook and outcome for children (and their families) worldwide and it is a pleasure to-once again-endorse his application for this prestigious prize.

Jasmine H Francis MD, FACS
Member (Professor) Dept. of Surgery
Chief of Adult Clinic and Fellowship Director
Ophthalmic Oncology Service, Dept of Surgery
Memorial Sloan Kettering Cancer Center

BIOGRAPHICAL SKETCH

NAME: Abramson, David H.

eRA COMMONS USER NAME (credential, e.g., agency login): DABRAMSON

POSITION TITLE: Chief, Ophthalmic Oncology Service, Memorial Sloan Kettering Cancer Center (MSK)

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
Harvard College	BA	06/1965	Molecular Biology
Albert Einstein College of Medicine, Bronx, NY	MD	06/1969	Medicine
Albert Einstein College of Medicine; Medical Internship, Bronx, NY	Internship	06/1970	Internal Medicine
Armed Forces Institute of Pathology, Washington, DC	Fellowship	12/1972	Pathology
Columbia University/Harkness Eye Institute, New York, NY	Residency	06/1974	Ophthalmology
Columbia University/Harkness Eye Institute	Fellowship	06/1975	Ophthalmic Oncology

A. Personal Statement

Over my 50-year career as a clinician scientist focusing on ophthalmic oncology, I have contributed fundamental insights to the understanding of intra- and periocular tumors, particularly retinoblastoma, and led highly influential clinical research developing improved treatments. Highlights of my research include collaborating on the determination of the cell of origin of retinoblastoma (Nature 2014), identification of molecular alterations in choroidal and conjunctival tumors, and delineation of the pharmacokinetics of periocular, intraocular, intravenous, and intraarterial delivery of chemotherapy. The latter work has helped revolutionize the treatment of retinoblastoma, leading to a paradigm in which the vast majority of eyes can be preserved, often retaining visual function. Other therapeutic advances I have led include the replacement of exenteration by combined radiation and chemotherapy for recurrent embryonal rhabdomyosarcoma, orbital brachytherapy for recurrent rhabdomyosarcoma, antibiotics for periocular lymphomas, pre-implantation genetic diagnosis for retinoblastoma, and intravitreal chemotherapy for ocular malignancies. I also served as a PI on the NIH-sponsored 20-year Collaborative Ocular Melanoma Study (COMS) of uveal melanoma, which led to a standard approach to ^{125}I brachytherapy and contributed to clinical and epidemiologic knowledge of choroidal melanoma. For 50 years I have studied and published on second malignancies in retinoblastoma with the world's largest cohort of patients and the longest follow-up (some > 50 years). In collaboration with NIH researchers, Including Fred Li and Joe Fraumeni we have elucidated the role of the gene, environment and treatment in the genesis of second cancers. As a result of this work, we changed the management of retinoblastoma-abandoning effective treatment (radiation) because of long term side effects and introducing alternatives which are more effective, cheaper while with minimizing short and long term side effects of treatment.

Ongoing and recently completed projects that I would like to highlight include:
Gerber Foundation
Jan 2021-Dec 2024
Cell Free DNA in Retinoblastoma

Within 6 years we have taken a hypothesis-that plasma cfDNA from a child's intraocular retinoblastoma could be detected, quantified and reproduced-to a NY State approved clinical test. In this grant we are exploring the half-life of plasma cfDNA, its use in diagnosis of retinoblastoma, utility in predicting response to treatment and screening for second cancers.

Cycle for Survival
2013-present
Among the ongoing and published studies supported by this grant are:

1) Impact of intraarterial chemotherapy on hearing
2) Impact of intraarterial chemotherapy on menarche and hormones
3) Impact of intraarterial chemotherapy on growth (height and weight)
4) Impact of repeated anesthesia on cognitive development in children with retinoblastoma
5) High dose Rate Brachytherapy for uveal melanoma
6) Neurodevelopmental long-term study of impact of treatment of retinoblastoma on cognition and intellectual performance
7) Use of volumetric analysis (MRI) as a predictor tool and relationship to plasma cfDNA levels
8) Plasma cfDNA and uveal melanoma: detection of molecular alterations and consequence of brachytherapy
9) Impact of combined dilating drops and NSAIDS on anesthesia time for retinoblastoma
10) Long term study of second malignancies in retinoblastoma (study now ongoing for 40 years)
11) Impact of chemotherapy on children with 13q deletion syndrome in retinoblastoma
12) Pharmacokinetic studies of intraarterial chemotherapy (animals)
13) Pharmacokinetic studies of intravitreal chemotherapy (animals)

Fund for Ophthalmic Knowledge, Inc
2004-present

I received a US Patent (Patent 14/760,198) 5 years ago for a new bionic ocular prosthesis and have been working on creating a commercial prosthesis for use by children and adults. Standard prostheses look good but have limited motility and no pupillary response. This new prosthesis has normal motility, matches the color of the fellow eye perfectly and has a pupil that responds to light. It incorporates a screen (with battery and computer) in the prosthesis so that the image of the eye moves without need for the prosthesis to move.

Key citations (of >700, h-index 80, cited > 23,000 times):

a. **Abramson DH**, Ellsworth RM, Zimmerman LE. Nonocular cancer in retinoblastoma survivors. Trans Sect Ophthalmol Am Acad Ophthalmol Otolaryngol. 1976 May-Jun;81(3 Pt 1):454-7. PMID: 1066869.
b. **Abramson DH**, Dunkel IJ, Brodie SE, Kim JW, Gobin YP. A phase I/II study of direct intraarterial (ophthalmic artery) chemotherapy with melphalan for intraocular retinoblastoma initial results. Ophthalmology. 2008 Aug;115(8):1398-404, 1404.e1. PMID: 18342944.
c. **Abramson DH.** Cell free DNA (cfDNA) in the blood of retinoblastoma patients The Robert M. Ellsworth Lecture. Ophthalmic Genetics. 2022,Jan;43:731-735. PMCID:PMC9532458
d. **Abramson DH,** Mandelker DL, Brannon AR, Dunkel IJ, Benayed R, Berger MF, Arcila ME, Ladanyi M, Friedman DN, Jayakumaran G, Diosdado MS, Robbins MA, Haggag-Lindgren D, Shukla N, Walsh MF, Kothari P, Tsui DWY, Francis JH. Mutant-RB1 circulating tumor DNA in the blood of unilateral retinoblastoma patients: What happens during enucleation surgery: A pilot study. PLoS ONE. 2023,Feb;18:e0271505. PMCID:PMC9897525
e. Tonorezos ES, Friedman DN, Barnea D, Bosscha MI, Chantada G, Dommering CJ, de Graaf P, Dunkel IJ, Fabius AWM, Francis JH, Greer MLC, Kleinerman RA, Kors WA, Laughlin S, Moll AC, Morton LM, Temming P, Tucker MA, van Leeuwen FE, Walsh MF, Oeffinger KC, **Abramson DH.** Recommendations for long-term follow-up of adults with heritable retinoblastoma. Ophthalmology. 2020,Nov;127:1549-1557. PMCID:PMC7606265

2. Xu XL, Singh HP, Wang L, Qi DL, Poulos BK, **Abramson DH,** Jhanwar SC, Cobrinik D. Rb suppresses human cone-precursor-derived retinoblastoma tumours. Nature. 2014,Oct;514:385-388. PMCID:PMC4232224

3. Wong JR, Morton LM, Tucker MA, **Abramson DH,** Seddon JM, Sampson JN, Kleinerman RA . Risk of subsequent malignant neoplasms in long-term hereditary retinoblastoma survivors after chemotherapy and radiotherapy. J Clin Oncol. 2014 Oct 10;32(29):3284-90. doi: 10.1200/JCO.2013.54.7844. Epub 2014 Sep 2.PMID: 25185089

B. Positions, Scientific Appointments, and Honors

Positions and Employment

2006-	Professor of Ophthalmology, Weill Cornell Medical College, New York, NY
2004-	Chief, Ophthalmic Oncology Service, Department of Surgery, Memorial Sloan Kettering Cancer Center (MSK) Tenured (secondary appointments in Radiation Oncology and Pediatrics); Attending Surgeon, Memorial Hospital for Cancer and Allied Diseases
1999-2012	Associate Attending Surgeon, Department of Ophthalmology, New York Eye & Ear Infirmary, New York, NY
1993-1999	Associate Adjunct, Department of Ophthalmology, New York Eye & Ear Infirmary
1992-2004	Consultant in Ophthalmology, MSK
1992-1993	Consultant in Radiation Oncology, MSK
1991-2001	Attending, Long Island College Hospital, Brooklyn, NY
1984-	Attending Ophthalmologist, New York Hospital-Cornell University Medical Center
1984-2006	Clinical Professor of Ophthalmology, Cornell University Medical College (CUMC), New York, NY
1980-2004	Consultant in Ophthalmology, Department of Pediatrics, MSK
1980-1999	Associate Attending Surgeon, Manhattan Eye, Ear & Throat Hospital, New York, NY
1979-1984	Clinical Associate Professor of Ophthalmology, CUMC
1979-1984	Associate Attending Ophthalmologist, New York Hospital-Cornell University Medical Center
1979-1980	Assistant Attending Surgeon, Manhattan Eye, Ear & Throat Hospital
1978-1979	Instructor in Clinical Ophthalmology, CUMC
1977-1978	Assistant Instructor in Clinical Ophthalmology, CUMC
1974-1976	Assistant in Ophthalmology, CUMC
1974-1979	Assistant Ophthalmologist, Columbia Presbyterian Medical Center, New York, NY
1966	Head Teaching Fellow, Harvard University, Cambridge, MA

Honors

1961-65	**4 Time NCAA National Record (Swimming)**
1997	Franceschetti Medal, International Society for Genetic Eye Diseases and Retinoblastoma (ISGEDR)
1999	Charles May Lecture, Section on Ophthalmology, New York Academy of Medicine
1999	**Induction: Harvard University Athletic Hall of Fame**
2000	The Manhattan League of Helen Keller Services for the Blind Award
2001	Dorothy Rodbell Cohen Award for Sarcoma Research
2001	Hobie Award, New York State Ophthalmological Society
2002	Dunnington Lecture, Harkness Eye Institute, Columbia University
2003	Robert M. Ellsworth, MD, Memorial Lecture, ISGEDR
2004	**Mildred Weisenfeld Award for Excellence in Ophthalmology, Association for Research in Vision and Ophthalmology (ARVO)**
2008	**Lifetime Achievement Award, American Academy of Ophthalmology**
2009	**Stallard Medal, Cambridge University (International Society of Ocular Oncology)**
2009	Argentinian Society of Ophthalmology POEN award
2011	**Alcon Research Institute Award**
2012	**Heed-Gutman Award, Society of Heed Fellows**
2012	**Bjerrum Medal, Danish Ophthalmological Society**
2012	John Milton McClean Medal and Lecture, Weill Cornell Medical College
2012	**Dominick Purpura Award, Albert Einstein College of Medicine (Outstanding alumnus)**
2013	National Retinoblastoma Foundation Ovation, Center for Sight Medal of Honor, Hyderabad, India
2016	The Steven Podos Memorial Lecture, Mount Sinai School of Medicine

2019 **Induction, Retina Hall of Fame**
2019 **Induction, Brooklyn Tech Alumni Hall of Fame**

US Patent No. 16/949,528/ for bionic ocular prosthesis
First Class Marshal-Harvard Class President 1965-present
"Best Doctors in New York, Best Ophthalmologists in the US, Best Cancer Doctors in America" for 25 years

C. Contributions to Science

1. Introduction of ophthalmic artery chemosurgery for retinoblastoma. My work developing and demonstrating the safety and efficacy of highly selective delivery of chemotherapy to the eye, termed ophthalmic artery chemosurgery for its requirement of surgical planning and adjustment based on individual anatomy, has enabled saving 95% of the eyes that previously would have been enucleated or irradiated. This approach avoids the risk of secondary cancers associated with radiation, as well as the toxicity of systemic chemotherapy, and preserves vision in a substantial proportion of patients.
    a. **Abramson DH**, Dunkel IJ, Brodie SE, Kim JW, Gobin YP. A phase I/II study of direct intraarterial (ophthalmic artery) chemotherapy with melphalan for intraocular retinoblastoma initial results. Ophthalmology. 2008 Aug;115(8):1398-404, 1404.e1. PMID: 18342944.
    b. **Abramson DH**, Marr BP, Dunkel IJ, Brodie S, Zabor EC, Driscoll SJ, Gobin YP. Intra-arterial chemotherapy for retinoblastoma in eyes with vitreous and/or subretinal seeding: 2-year results. Br J Ophthalmol. 2012 Apr;96(4):499-502. PMID: 22053101.
    c. **Abramson DH**, Daniels AB, Marr BP, Francis JH, Brodie SE, Dunkel IJ, Gobin YP. Intra-arterial chemotherapy (ophthalmic artery chemosurgery) for group D retinoblastoma. PLoS One. 2016 Jan 12;11(1):e0146582. PMCID: PMC4710506.
    d. Francis JH, Levin AM, Zabor EC, Gobin YP, **Abramson DH**. Ten-year experience with ophthalmic artery chemosurgery: Ocular and recurrence-free survival. PLoS One. 2018 May 23;13(5):e0197081. PMCID: PMC5965845.
    e. Additional > 35 publications on this subject

2. Determination of the cell of origin of retinoblastoma. I contributed to a series of foundational studies demonstrating that retinoblastoma tumors are derived from cone photoreceptors in the retina. These studies showed that cone precursor cells are uniquely sensitive to transformation upon loss of *RB*, and helped explain more generally why certain initiating oncogenic mutations tend to be associated with specific cancer types. Knowledge of the cell of origin for retinoblastoma is essential for developing improved management approaches and may help to uncover Achilles heels in tumor cells.
    a. Cobrinik D, Francis RO, **Abramson DH**, Lee TC. Rb induces a proliferative arrest and curtails Brn-2 expression in retinoblastoma cells. Mol Cancer. 2006 Dec 12;5:72. PMCID: PMC1764425.
    b. Xu XL, Fang Y, Lee TC, Forrest D, Gregory-Evans C, Almeida D, Liu A, Jhanwar SC, **Abramson DH**, Cobrinik D. Retinoblastoma has properties of a cone precursor tumor and depends upon cone-specific MDM2 signaling. Cell. 2009 Jun 12;137(6):1018-31. PMCID: PMC5659855.
    c. Xu XL, Lee TC, Offor N, Cheng C, Liu A, Fang Y, Jhanwar SC, **Abramson DH**, Cobrinik D. Tumor-associated retinal astrocytes promote retinoblastoma cell proliferation through production of IGFBP-5. Am J Pathol. 2010 Jul;177(1):424-35. PMCID: PMC2893684.
    d. Xu XL, Singh HP, Wang L, Qi DL, Poulos BK, **Abramson DH**, Jhanwar SC, Cobrinik D. Rb suppresses human cone-precursor-derived retinoblastoma tumours. Nature. 2014 Oct 16;514(7522):385-8. PMCID: PMC4232224.

3. Understanding of the nature of second malignancies in familial and germline-mutant retinoblastoma. My early research helped reveal the high frequency of later cancers in retinoblastoma patients, as well as the contributions of inherited and sporadic germline mutations, radiation, and chemotherapy in influencing the pattern, timing, and location of these tumors. As a result of this and related work by others, retinoblastoma patients are now routinely screened for germline mutations and radiation is rarely used, reducing the incidence of secondary cancers and increasing the likelihood of early detection through routine surveillance in germline mutation carriers.

a. **Abramson DH**, Ellsworth RM, Zimmerman LE. Nonocular cancer in retinoblastoma survivors. Trans Sect Ophthalmol Am Acad Ophthalmol Otolaryngol. 1976 May-Jun;81(3 Pt 1):454-7. PMID: 1066869.
b. **Abramson DH**, Ronner HJ, Ellsworth RM. Second tumors in nonirradiated bilateral retinoblastoma. Am J Ophthalmol. 1979 May;87(5):624-7. PMID: 286550.
c. Habib LA, Francis JH, Fabius AW, Gobin PY, Dunkel IJ, **Abramson DH**. Second primary malignancies in retinoblastoma patients treated with intra-arterial chemotherapy: the first 10 years. Br J Ophthalmol. 2018 Feb;102(2):272-275. PMID: 28600304.
d. Kleinerman RA, Schonfeld SJ, Sigel BS, Wong-Siegel JR, Gilbert ES, **Abramson DH**, Seddon JM, Tucker MA, Morton LM. Bone and soft-tissue sarcoma risk in long-term survivors of hereditary retinoblastoma treated with radiation. J Clin Oncol. 2019 Dec 10;37(35):3436-3445. PMCID: PMC7001778.
e. Additional > 20 publications on this subject

In addition, I briefly mention:

1) Introduction/Demonstration that systemic chemotherapy and radiation should replace exenteration for orbital retinoblastoma
2) First use of Pre implantation genetic diagnosis for retinoblastoma.
3) Introduction of plasma cfDNA for retinoblastoma.
4) Use of combined exenteration/high dose brachytherapy for *recurrent* orbital rhabdomyosarcoma
5) Introduction of combined ICG/ 810nm Laser for retinoblastoma
6) Elucidation of mechanism of action of Pilocarpine
7) Pharmacokinetics of intravitreal and intraarterial delivery of chemotherapy for retinoblastoma

Complete List of Published Work:
https://pubmed.ncbi.nlm.nih.gov/?term=abramson+dh&sort=date&size=20