# Exhibit 515

# Expert Report of Richard F. Ambinder, M.D., Ph.D. Estate of Ronald Carter v. United States 7:23-cv-01565

# U.S. District Court for the Eastern District of North Carolina

Prepared By:

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# **Table of Contents**

Expert Report of Richard F. Ambinder, MD, PhD	3
Qualifications	3
Preparations & Methodology	4
Compensation	4
Lymphoma Background Information	4
Incidence	5
Pathogenesis	5
Staging	5
Performance Status.	6
Causation	6
Mantle Cell Lymphoma (MCL)	8
Ronald Carter's Pertinent Medical History	10
Opinion	11
References	14
Attachment A – Curriculum Vitae	17

# Expert Report of Richard F. Ambinder, MD, PhD

I have prepared this report in response to the United States' request for my opinion as a medical oncologist specializing in lymphoma and hematologic cell transplantation as to the cause of Ronald Carter's mantle cell lymphoma. Based on my review of the record and Mr. Carter's case history, I conclude that it is unlikely that intermittent exposure to contamination in water at Camp Lejeune, where Mr. Carter worked from 1972 to 2007, caused Mr. Carter to develop mantle cell lymphoma in 2011. In my opinion, the origin of Mr. Carter's mantle cell lymphoma is idiopathic. I further conclude that there is insufficient evidence to conclude that Mr. Carter's life-ending stroke or strokes were caused by rare intravascular lymphoma because no biopsy or autopsy was performed demonstrating intravascular lymphoma, and Mr. Carter had comorbidities that are more likely causes.

# **Qualifications**

I am a board-certified medical oncologist specializing in lymphoma and hematologic cell transplantation. I lead the Hematologic Malignancies and Bone Marrow Transplant Program at the Johns Hopkins Oncology Center, and the Lymphoma Clinical Service at the Johns Hopkins Hospital. I am a full professor with an endowed chair: the James B. Murphy Professor of Oncology. I graduated from Harvard College with a Bachelor of Arts degree with honors and the Johns Hopkins School of Medicine with an M.D. degree, again with honors. I earned a Ph.D. in Pharmacology at the Johns Hopkins School of Medicine, and I trained in Internal Medicine and Medical Oncology at the Johns Hopkins Hospital. I am board-certified in Internal Medicine and in Medical Oncology. I have received many honors including the Leukemia Lymphoma Society Scholar Award and the Stohlman Scholar Award. In addition, I am a member of two honorary societies: the American Society for Clinical Investigation, and the American Association for the Advancement of Science. While each of these awards and honors are somewhat different, they all attest to the quality of the research that I have done in the field of lymphoma. I have published many chapters in medical textbooks focused on lymphoma and its treatment, including in UpToDate. I am an organizer of national and international meetings, give lectures at national and international meetings, and lead many lymphoma-focused grants. I have been awarded research grants from the National Cancer Institute totaling more than 25 million dollars over the years including 8 million dollars for studies related to the diagnosis of lymphoma for the years 2023-2028.

I teach courses for medical students and graduate students in the Johns Hopkins Medical School, and lecture in courses in the Johns Hopkins School of Public Health and the Johns Hopkins School of Nursing. I have led the Lymphoma Clinical Service at Johns Hopkins since 1995. I supervise the clinic at which lymphoma patients are seen at Johns Hopkins, and the clinical training of resident physicians and hematology and oncology fellows in the treatment of lymphoma. I also lecture in courses to update community oncologists and internists. I treat patients in clinic and consult on questions from physicians in the community relating to lymphoma. I served on the National Cancer Center Network guideline panels that make recommendations for the diagnosis and treatment of cancer including panels focused on non-Hodgkin lymphoma, Hodgkin

lymphoma, and AIDS malignancies. I also sit on the National Cancer Institute Lymphoma Steering Committee that helps prioritize clinical research studies.

My current curriculum vitae is attached as Appendix A. It includes a list of my publications for the last ten years and a list of all other cases in which, during the previous four years, I have testified as an expert at trial or by deposition.

# Preparations & Methodology

I base these opinions on my review of relevant literature and case materials, including the Complaint by Mr. Carter's estate, medical records relating to Mr. Carter's case, deposition transcripts, medical literature relating to causes of lymphoma, and expert reports submitted by both the United States and plaintiffs' counsel. In formulating my expert opinions, I drew upon several sources: my extensive clinical experience in managing patients with lymphoma and other hematologic malignancies; my research expertise in studying the biology and epidemiology of lymphomas through laboratory investigations, clinical trials, pharmacologic studies, and epidemiologic analyses; and my thorough review of the relevant scientific and medical literature. Additionally, I employed a differential diagnostic approach to systematically consider and exclude known causes of non-Hodgkin lymphoma.

My opinion relies on the United States' general causation report by Goodman, Trichloroethylene, Perchloroethylene, Benzene, Vinyl Chloride, and trans-1,2-DCE Exposure and NHL Risk, February 7, 2025; and the United States's specific exposure and risk assessment reports for Mr. Carter, Expert Report of Judy S. LaKind, April 8, 2025; Expert Report of Dr. Lisa Bailey, April 8, 2025. My opinion also considers the United States' general causation reports by McCabe, General Causation Report Camp LeJeune Water Volatile Organic Chemicals and Non-Hodgkins Lymphoma and Leukemia, February 7, 2025, Lipscomb, Expert Report of John C. Lipscomb, February 7, 2025, and Shields, General Causation, February 7, 2025. I have also reviewed the January 20, 2017, ATSDR Public Health Assessment for Camp Lejeune Drinking Water, U.S. Marine Corps Base Camp Lejeune, North Carolina, and the report by Dr. Hu that was submitted by plaintiffs' counsel.

# Compensation

I charge \$700 per hour for case review, \$1,000 per hour for deposition testimony, and travel expenses.

# Lymphoma Background Information

Lymphomas are cancers of lymphocytes [1]. Lymphocytes are part of the body's immune system. There are several classification systems: World Health Organization (WHO)[2] and the International Consensus Classification (ICC)[3] have each published classifications in 2022. Malignant cells proliferate and accumulate in lymph nodes or extranodal tissues. When the proliferation/accumulation occurs in solid masses, this is typically referred to as lymphoma. When the proliferation/accumulation is primarily in the blood, it is typically referred to as leukemia. As elaborated below, many entities may

involve solid masses and blood, so the classification system of lymphoma, leukemia and some related lymphoid related diseases overlaps.

Hodgkin lymphoma (HL) and non-Hodgkin lymphoma (NHL) are the two main types of lymphoma. HL is characterized by the presence of Reed-Sternberg cells, which are recognized by their distinctive appearance. NHL lack Reed-Sternberg cells and have a different appearance under the microscope. NHL is subclassified based on the cell of origin (B-cell, T-cell, NK-cell), the patterns of arrangements of cells under the microscope (which we refer to as histological features), and genetic characteristics such as chromosomal translocations and specific mutations. More than 60 types of NHL are recognized including chronic lymphocytic leukemia (CLL).

Each type of lymphoma has distinct characteristics, and the prognosis and treatment options vary depending on the specific type and stage of the disease.

### Incidence

NHL accounts for approximately 4% of cancer diagnoses in the United States [4]. B-cell NHL comprise 85-90% of NHL cases. There are approximately 100,000 new cases of B-cell NHL, including CLL, diagnosed in the United States each year [5]. In the United States population, the lifetime risk of developing B-cell NHL is approximately 2%.

# Pathogenesis

In terms of pathogenesis, it is important to understand a bit about B lymphocytes, what they do and how they develop [6]. B-cells may be likened to factories that produce antibodies, which are special proteins that help fight off diverse invaders like viruses and bacteria. In order to generate antibody diversity, B cells undergo somatic hypermutation and class switch recombination during their development. These processes involve breaking and rejoining of DNA strands which create opportunities for genetic errors that can lead to development of lymphomas.

Chromosomal translocations where chromosomes break and rejoin other chromosomes are frequently identified in B-cell NHL. These translocations often involve the immunoglobulin loci and various genes that regulate cell proliferation and cell death. Follicular lymphoma, Burkitt lymphoma and mantle cell lymphoma all have associated characteristic chromosomal translocations. These translocations are thought to result from errors in normal developmental processes that involve breaking and rejoining DNA strands. In addition to translocations, the processes for generating antibody diversity also lead to mutations. The enzyme that produces these mutations usually acts on particular regions of the immunoglobulin genes, but can act on distant genes and in so doing also contribute to lymphoma development.

# Staging

It is standard practice to assess how widespread the lymphoma is at presentation and whether there are specific symptoms associated with the lymphoma[7]. This is called staging. Lymphomas are typically staged according to the

## Ann Arbor staging system.

- **Stage I**: Involvement of a single lymphatic area (e.g., one lymph node region or one extranodal site).
- **Stage II**: Involvement of two or more lymph node regions on the same side of the diaphragm, or one lymph node region and a nearby extranodal site.
- **Stage III**: Involvement of lymph node regions on both sides of the diaphragm, which may also include the spleen or a nearby extranodal site.
- **Stage IV**: Disseminated involvement of one or more extranodal organs, such as the bone marrow, liver, or lungs, in addition to lymph node involvement.

When there is direct extension from a lymph node to an extra-lymphatic site such as bone, that is referred to as an E-lesion.

# Performance Status.

The functional or performance status of patients is typically evaluated at the beginning and during therapy[8]. Several different scales are often used, but among the most widely used is the ECOG (Eastern Cooperative Oncology Group) performance status. It is a scale to measure the patient's ability to perform daily activities.

#### **ECOG Performance Status Scale**

- **6: Fully active**: Able to carry on all pre-disease performance without restriction
- 1: Restricted in physically strenuous activity: Ambulatory and able to carry out work of a light or sedentary nature (e.g., light housework, office work)
- **2: Ambulatory and capable of all self-care**: Unable to carry out any work activities. Up and about more than 50% of waking hours
- **3:** Capable of only limited self-care: Confined to bed or chair more than 50% of waking hours
- **4: Completely disabled**: Cannot carry on any self-care. Totally confined to bed or chair
- 5: Death

#### Causation

In most instances, the causes of NHL are poorly understood [9]. Genetic mutations are associated with many cancers including lymphomas. These mutations may be inherited or may develop specifically in the cells that will ultimately become cancerous. There is increased risk of lymphoma in people with first degree relatives (parent, child, sibling) with lymphoma, but most people with lymphoma do not have first degree relatives with lymphoma. When there are family members with lymphoma, typically predisposing mutations are not identified but there are exceptions [10]. Thus,

individuals with the Li-Fraumeni syndrome (mutations in TP53) inherit a predisposition to lymphoma, although other cancers are much more common in this syndrome [11]. Similarly, mutations in BRCA1 and 2 have also been linked to increased risk of lymphoma, especially in children and adolescents—but these mutations are more commonly linked to breast and ovarian cancer.

When causes of lymphoma are known, they are often associated with particular types of lymphoma rather than lymphoma in general. Consider Epstein-Barr virus (EBV) [12]. This virus was first discovered in African Burkitt lymphoma, a specific type of non-Hodgkin lymphoma. Because viral DNA is consistently found in African Burkitt lymphoma cells, it is generally accepted that the virus is a cause of African Burkitt lymphoma. However, the story is much more complicated.

We know that almost all adults worldwide (>90%) are infected by EBV, and once infected, the virus never leaves the body. We also know that if you test the saliva of a general population on any given day, approximately 40% will be shedding the virus in their saliva. What seems to make children in certain regions of Africa especially susceptible to this lymphoma is that they live in areas where almost everyone has malaria. How malaria, the virus, and perhaps other factors interact to cause the tumor is a subject of ongoing research, but the answers aren't very clear.

What is clear is that most people diagnosed with lymphoma have this cancer-causing virus in their bodies[13]. However, the virus isn't the cause of most lymphomas; it is associated with only a small subset. This subset doesn't represent a percentage of all the different types of lymphomas but, instead, relates only to particular types of lymphoma. For example, in people living with HIV before the advent of effective antiretroviral therapy, the risk of lymphomas of the brain (primary central nervous system lymphomas) was increased hundreds or thousands of times[14]. These lymphomas always carried EBV. However, in people without HIV, these lymphomas are very rarely associated with the virus. Moreover, most lymphomas in the world are not related to EBV, even though most people in the world are infected by the virus.

HIV infection and Hepatitis C are two other viral infections linked to B cell lymphomas[15, 16]. There is a broad consensus that splenic marginal zone lymphomas may be hepatitis C related, but there are some investigators who believe that virtually any sort of B-cell NHL may be hepatitis C related. Other NHL that involve T cells are associated with a virus called HTLV1[17]. This is a virus that is prevalent in very specific geographic regions (certain areas of Japan, central Africa, Caribbean islands, certain native populations in South America). Among individuals who have been infected by this virus, approximately 2-5% will develop adult T-cell leukemia/lymphoma. Worldwide, most T-cell NHL is not associated with this virus.

Breast implant-associated anaplastic large cell lymphoma is a rare lymphoma that is associated with particular types of breast implants [18]. This type of lymphoma only occurs in people with breast implants—but the great majority of people with breast implants never develop this type of lymphoma.

A few B-cell NHL types have been linked to bacterial infection, most notably gastric MALT lymphoma, which is linked to Helicobacter pylori [19]. Infection with this bacteria, which lives in the stomach, is usually not associated with symptoms or disease, and more than 40% of the adult population is infected by the bacteria [20]. When infection with the bacteria causes symptoms these are usually ulcers. But in a tiny fraction of those infected, MALT lymphoma of the stomach develops. Often these lymphomas can be treated and even cured with antibiotics. Most MALT lymphomas of the stomach are associated with this bacteria [21]. However, MALT lymphomas occurring elsewhere in the body are not associated with this bacteria and treatment with antibiotics to eradicate this bacteria have no effect on these other lymphomas. This is despite the fact that many people with MALT lymphomas outside the stomach are also infected by the bacteria.

When considering age as a risk factor for lymphoma, the particular type of lymphoma is important. For example, while it is true that diffuse large B cell lymphoma occurs more commonly as people age (median age 67 with 30% of patients are older than 75)[22, 23], the same cannot be said for primary mediastinal B cell lymphoma which usually occurs in younger patients (median age 37) [24]. And Burkitt lymphoma in equatorial Africa occurs mainly in children ages 3-15 [25].

The same is true for sex [26]. Primary mediastinal B cell lymphoma is less common in men than women (0.71 incidence ratio) while diffuse large B cell lymphoma is more common in men than women (1.56 incidence ratio).

As these examples demonstrate, hen trying to identify the cause of a lymphoma, it is essential to consider the specific type of lymphoma and the evidence that a particular factor is associated with that specific type. The oversimplification that all lymphomas or all NHL share the same causation leads to serious errors. See Expert Report of Michael McCabe (February 2025) at pp. 26-27.

With regard to studies of environmental exposures to benzene, trichloroethylene, perchoroethylene, and vinyl chloride, I have relied on the expert report prepared by Goodman, who concluded that epidemiology studies do not consistently show any association between NHL and benzene, perchloroethylene, or vinyl chloride, and that weak associations between trichloroethylene and NHL are explained by noncausal alternatives. See Goodman (February 2025) at p. 5. In particular, Goodman noted that among the four studies that evaluated NHL risk at Camp Lejeune, there were no consistent associations reported for NHL overall or any specific type of lymphoma. See Goodman (February 2025) at pp. 44-49.

# Mantle Cell Lymphoma (MCL)

MCL is a less common type of lymphoma [27]. The incidence increases with age with a median age at diagnosis of 68 years. The incidence of MCL is higher in men (0.84 of 100,000) than in women (0.34 of 100,000) (P < .05), and higher in whites (0.61 of 100,000) than in African Americans (0.32 of 100,000). An epidemiologic study found that

risk was inversely associated with history of hay fever (those with hay fever were less likely to get mantle cell lymphoma) while having ever lived on a farm was associated with a modestly increased risk (OR = 1.40, 95% CI = 1.03 to 1.90)[28]. There was also a modestly increased risk associated with having a first degree relative (parent, sibling, child) with any hematologic malignancy. This association was stronger for men than women (OR = 2.21, 95% CI = 1.44 to 3.38). Risk factors associated with other NHL's have also not been found to be significantly associated with MCL. Specifically, autoimmune disorders, tobacco smoking, alcohol intake, body mass index, and ultraviolet radiation have not been found to be associated.

MCL is usually associated with a characteristic chromosomal translocation in which one piece of a chromosome is exchanged with a piece of another chromosome. The result is a chromosome in which the immunoglobulin heavy chain (IgH) regulatory region is adjacent to the cyclin D1 gene and leads to aberrant expression of cyclin D1.

Cyclin D1 plays an important role in regulating cell division and other cellular functions. Uncontrolled proliferation of B cells leads to the growth of tumor masses (mantle cell lymphoma) or tumor cells in blood (mantle cell leukemia) or both. It also may present as colonic polyps and is often discovered on colonoscopy. Mantle cell lymphoma typically presents with stage III or IV disease [23, 24].

# Prognostic Factors.

An MCL International Prognostic Index (MIPI) has been developed that stratifies patients into risk groups that have been associated with different 5-year survivals [29]. Refinements have been suggested to include the Ki-67 proliferative index, the presence of TP53 mutations, and the microscopic appearance (blastoid, pleomorphic). However, 5-year survivals are improving substantially since the index was developed [30].

#### *Treatment* [31-33].

MCL responds to a variety of therapies. In the past high dose therapy with autologous stem cell rescue has been standard in younger patients and may result in some cures but most patients ultimately relapse [34]. Time to treatment failure (TTF) and overall survival (OS) curves from a recent study are shown below in Exhibit 1.

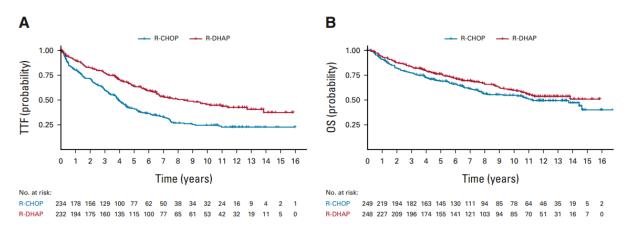


Exhibit 1: Time to Treatment Failure and Overall Survival Curves for MCL

However, with new drugs being used, some have argued that autologous stem cell transplant is not necessary [35, 36]. Very recently there are several new drugs that are quite effective at bringing about remissions as shown below in Exhibit 2.

Year	Treatment	Туре
2014	Ibrutinib	BTK Inhibitor
2014	Bortezomib	
2017	Acalabrutinib	BTK Inhibitor
2018	Venetoclax	BCL-2 Inhibitor
2020	Brexucabtagene autoleucel	CAR T-Cell Therapy
2021	Zanubrutinib	BTK Inhibitor
2023	Pirtobrutinib	Noncovalent BTK Inhibitor
2023	Lenalidomide	
2023	Lisocabtagene maraleucel	CAR T-Cell Therapy

Exhibit 2: Summary of Recently Introduced Drug-Based MCL Therapies

Many of the approaches being used for treatment are so new that we don't know the long-term results.

# Ronald Carter's Pertinent Medical History

Mr. Carter worked as a civilian employee in maintenance, as a carpenter, and as a housing inspector at Camp LeJeune from 1972 to 2007. In 2011, at age 63, at colonoscopy he was found to have a cecal mass and was diagnosed with mantle cell lymphoma based on abnormal B cells expressing CD20 and cyclin-D1, and FISH positive for t(11,14). He was also found to have bone marrow involvement (Stage IV).

Mr. Carter was treated with aggressive combination chemotherapy with R-hyperCVAD. There were infectious complications and he was switched to RCHOP alternating with RDHAP (<u>rituximab</u>, <u>dexamethasone</u>, <u>high dose ara-C</u>, cis<u>platin</u>). At the conclusion of this therapy, he had some residual disease in marrow. He went on to autotransplant (9/24/12).

With the exception of respiratory infections, sinus infections, and heart issues that included arteriosclerotic cardiovascular disease, Mr. Carter did well for several years. However, in March 2022, evaluation of a runny nose led to discovery of a nasal mass which proved to be mantle cell lymphoma on biopsy (3/8/22). He also had a new squamous cell carcinoma in the salivary gland diagnosed at the same time. There was a plan for PET-CT to re-evaluate the extent of disease and to follow-up with oncology, but before that could happen, he developed nausea, vomiting, and severe vertigo and was admitted to the Carolina East Medical Center (3/16/22) where a stroke was diagnosed. MRI of the brain showed acute ischemia in the right and left occipital lobes and the left cerebellar hemisphere. The findings were thought to represent "multifocal multi age infarcts, suggestive of embolic phenomenon." The MRI did not show any

evidence of lymphomatous involvement. Mr. Carter expressed a clear preference for transitioning to comfort/supportive care. He was discharged 3/24/22 to hospice and died 5/9/22.

Family history is notable for a brother who died with a blood cancer, father who suffered acute myocardial infarction, and a son who had a myocardial infarction and stroke.

Before Mr. Carter's diagnosis of mantle cell lymphoma, he had a history of smoking, myocardial infarction with coronary stents, chronic obstructive pulmonary disease, sleep apnea, Bell's Palsy, calcified pleural plaque, multiple calcified pulmonary nodules in the lungs, chronic rhinitis, migraines, and hyperlipidemia. In 2013 after completion of chemotherapy, auto-transplant, he had another myocardial infarction.

# **Opinion**

Mr. Carter died following discovery of relapsed mantle cell lymphoma and a stroke. As noted above, since Mr. Carter's autologous stem cell transplant in 2012, there were many advances in the treatment of MCL. In particular, ibrutinib, acalabrutinib, and venetoclax are pills that were all approved for the treatment of relapsed MCL in the interim. For most patients, these are well tolerated with minimal side effects. While not curative, these pills are very active in MCL and are associated with long remissions in many instances. In addition, CAR T cells were approved for the treatment of mantle cell lymphoma. This therapy is very effective in patients who have failed other treatments. Had Mr. Carter not had a stroke (or strokes), he likely would have been treated with effective therapy for recurrent MCL with newly approved and very effective drugs.

I must differ with Dr. Hu's assessment of the cause of Mr. Carter's death. He notes, "...Mr. Carter experienced an acute cerebrovascular event; work-up revealed occlusion of the right posterior cerebral artery with suspected intravascular lymphoma that was untreatable." Intravascular lymphoma is a rare entity that is distinct from MCL. The diagnosis requires a biopsy or autopsy to diagnose. Dr. Hu does not explain how he came to infer that there was intravascular lymphoma, and Mr. Carter's oncologist, Dr. Taylor, stated at his deposition only that there was "concern for intravascular disease" and was unable to identify testing to support a diagnosis.

Mr. Carter's family history is notable for cardiovascular disease that leads to myocardial infarctions and strokes. Mr. Carter's father, brother and son all had myocardial infarctions, and his son also had a stroke. It is also well established that cardiovascular disease leads to myocardial infarctions and strokes and runs in families. I therefore conclude that there is insufficient evidence that Mr. Carter's life-ending stroke or strokes were caused by rare intravascular lymphoma, and Mr. Carter's family history of strokes and his cardiovascular disease are more likely causes.

With regard to Mr. Carter's specific risk from exposure to chemicals in water at Camp Lejeune, I have relied upon the reports from LaKind, who estimated Mr. Carter's exposure, and Bailey, who used LaKind's exposure estimate to evaluate risk. Bailey

concluded that "at the highest potential exposure for Mr. Carter – and applying conservative, health-protective assumptions – Mr. Carter's exposures to chemicals in the Camp Lejeune drinking water increased his overall cancer risk by 0.01% (*i.e.*, 1 × 10<sup>-4</sup>, or 1 cancer case in 10,000 exposed people) over his background cancer risk. This excess lifetime cancer risk does not exceed US EPA's acceptable risk range." Bailey report at p. 37. It follows that based on Bailey's risk assessment, Mr. Carter's background risk of B lymphoma was about 200 times higher than his increased risk of *all* cancers from exposures at Camp Lejeune.

With regards to Dr. Hu's comments on differential etiology, i.e., what risk factors might have contributed to MCL, Dr. Hu relies on **elimination rather than evidence-based causation**. He considers a variety of etiologies that have not been linked to MCL, rules them out, and then concludes that exposures at Camp Lejeune must be the cause. In what follows, the details of Dr. Hu's opinions in italics followed by my specific responses.

"Given that MaCL is a relatively rare form of NHL (~5%), research specific to environmental risk factors for MaCL is challenging, and few such studies exist<sup>29</sup>. A 2008 Swedish case control study of NHL found that infection by Borrelia (the agent that causes Lyme Disease) was associated with a significantly increased risk of MaCL<sup>30</sup>. However, such an association has reportedly not been found in studies of Borrelia infection in the USA<sup>31</sup>, and a review of Mr. Carter's medical records has not uncovered evidence of Borrelia infection."

Dr. Hu recognizes that there is no evidence that Borrelia is linked to MCL in the United States and appropriately dismissed Borrelia as a cause of Mr. Carter's MCL.

... previous treatment with cancer chemotherapy drugs, radiation exposure, weakened immune systems (e.g., those weakened by immunosuppressive drugs of HIV/AIDS), certain inherited syndromes associated with immunodeficiency (e.g., ataxia-telangiectasia, Wiskott-Aldrich syndrome), autoimmune disease (such as rheumatoid arthritis, systemic lupus erythematosus), previous lymphoma, chronic infections that cause continuous immune system activity (e.g., Helicobacter pylori; Chlamydophila psittaci; Campylobacter jejuni, Hepatitis C), and breast implants.

Dr. Hu then lists and dismisses other risk factors without providing evidence for their relevance. We can consider these factors individually:

"previous treatment with cancer chemotherapy drugs"

There are cancers such as acute myeloid leukemia that are related to previous treatment with chemotherapy drugs—but not cancers in general and not NHL in general. So even had Mr. Carter had previous treatment with chemotherapy drugs before initially developing MCL—it would not be reasonable to attribute causation of

MCL to these drugs. Similarly, radiation exposures have not been linked to MCL[37].

"weakened immune systems (e.g., those weakened by immunosuppressive drugs of HIV/AIDS)"

I suspect this statement is a typo and that Dr. Hu meant to say, "immunosuppressive effects of HIV/AIDS" because it is HIV/AIDS itself that is immunosuppressive. Many, many cancers are increased in HIV/AIDS. As noted above in the introduction, several lymphomas are increased and some increased hundredsor thousands-fold. Many of these lymphomas that are increased in HIV/AIDS are much less common than MCL (e.g., primary brain lymphoma, plasmablastic lymphoma, primary effusion lymphoma), yet their association with HIV/AIDS is well established. MCL is not among them. Indeed it appears that MCL may be less common in people with HIV/AIDS than in the general population. In a series of 976 HIV-NHL cases, only 8 cases were mantle cell[38]. The authors note, "This study represents the only series of HIV-MCL reported to date. MCL accounts for <1% of NHL in the HIV-lymphoma cohort, while it represents 5%–7% in the general population". Thus, even had Mr. Carter been infected by HIV, it would be difficult to attribute MCL to HIV/AIDS. These results underscore the importance of considering the particular type of lymphoma when trying to infer causation.

"certain inherited syndromes associated with immunodeficiency (e.g., ataxiatelangiectasia, Wiskott-Aldrich syndrome)"

The inherited immunodeficiency syndromes that Dr. Hu refers to are associated with particular types of NHL or HL. My search of databases (pubmed, Google scholar) on 3/30/25 found no cases of MCL in patients with ataxia-telangiectasia or Wiskott-Aldrich—although many, many cases of other particular types of lymphoma have been reported with these inherited immunodeficiencies.

"...Carter ... had low-level and low-duration radiation exposure from radiology studies."

Again, Dr. Hu appropriately dismisses the contributions of radiation to MCL in this case but should have gone further. The literature suggests that radiation exposure is not associated with MCL[37].

"In terms of his residential history,... Mr. Carter spent his entire life (age 6 months onwards) living in Hubert, NC, which is not known to be a geographic area associated with high rates of cancer"

There are geographic areas that have been associated with increased risks of some cancers, but none have reported an association with MCL.

"Mr. Carter was a smoker, and benzene is one of the contaminants known to be associated with cigarette smoke. However, epidemiological studies of both

MaCL and NHL have not identified cigarette smoking as a risk factor for either cancer<sup>33</sup>."

Another suspect that Dr. Hu dismisses that is irrelevant to the case. Smoking has not been identified as a risk factor for MCL.

"Thus, given my general causation assessment and the factors reviewed above, it is my opinion, to a reasonable degree of medical certainty, that the combination of Mr. Carter's exposures to TCE, PCE, and benzene from Camp Lejeune more likely than not was a substantial contributing factor to the causation of his mantle cell lymphoma."

Dr. Hu reviews possible suspects for NHL in his differential etiology review as though there are only a handful and having eliminated all the suspects that there is general agreement are not contributors to MCL, he attributes the cancer to exposures at Camp Lejeune. However, as reviewed above, the causes of MCL are almost entirely unknown, so eliminating things that are not known to cause MCL doesn't make it at all plausible that exposures at Camp Lejeune had anything to do with the development of MCL in Mr. Carter. As reviewed in Dr. Goodman's and McCabe's reports, there is no evidence linking these exposures to MCL, and there are no animal models that suggest these exposures have any relationship to MCL.

In summary, immune disorders, infection, and obesity, although linked to other sorts of lymphoma, have not been linked to MCL. The cause, or causes, of MCL are unknown. No specific etiologies for MCL have been generally accepted in the medical literature in any setting. Mr. Carter was typical of those who get MCL in that he was an older white male, and his family reported that he had a brother with a blood cancer. The cause or causes of his MCL, however, remain unknown.

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# Attachment A – Curriculum Vitae

#### **CURRICULUM VITAE**

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Richard F. Ambinder, MD, PhD

April 7, 2025

#### DEMOGRAPHIC AND PERSONAL INFORMATION

#### **Current Appointments:**

University:

Program Co-Leader, Hematological Malignancies and Bone Marrow

Transplantation

James B. Murphy Professor of Oncology

Professor, Department of Pharmacology and Molecular Sciences

Professor, Department of Pathology Professor, Department of Medicine

The Johns Hopkins University School of Medicine

Hospital:

Active Staff

The Johns Hopkins Hospital

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#### **Education and Training:**

Undergraduate:

1972-75 B.A., Biochemistry, cum laude in General Studies, Harvard College, Cambridge

Massachusetts

Doctoral/Graduate:

1975-79 M.D, Johns Hopkins University School of Medicine, Baltimore, Maryland

Postdoctoral:

1979-81 Residency in Internal Medicine. Johns Hopkins Hospital, Baltimore, Maryland

1981-82 Fellowship in Medicine, Johns Hopkins Hospital, Baltimore, Maryland

Page 18 of 57

1982-84	Fellowship in Oncology, Johns Hopkins University School of Medicine, Baltimore
Maryland	
1985-89	Ph.D., Pharmacology and Molecular Sciences, Johns Hopkins University School of
	Medicine, Baltimore, Maryland

#### **Professional Experience**

1981-84	Assistant, Department of Oncology, Johns Hopkins School of Medicine, Baltimore,
Maryland	
1981-84	Associate Staff, Oncology, The Johns Hopkins Hospital, Baltimore, Maryland
1984-89	Instructor, Department of Oncology, Johns Hopkins School of Medicine
1984-present	Active Staff, Oncology, The Johns Hopkins Hospital, Baltimore, Maryland
1989-93	Assistant Professor of Oncology, The Johns Hopkins University School of Medicine,
	Baltimore, Maryland
1991-93	Assistant Professor, Pharmacology and Molecular Sciences, The Johns Hopkins
	University School of Medicine, Baltimore, Maryland
1993-98	Associate Professor of Oncology, The Johns Hopkins University School of Medicine,
	Baltimore, Maryland
1998-present	Professor, Oncology, Pharmacology and Molecular Sciences, Pathology, Medicine, The
_	Johns Hopkins University School of Medicine, Baltimore, Maryland
2000-present	Director, Division of Hematologic Malignancies (Lymphoma, Myeloma,
	Leukemia, BMT), Department of Oncology
2000-present	James B. Murphy Professor of Oncology
2002-2010	Director Johns Hopkins Lymphoma SPORE
2017-present	NCCN Cancer in HIV Positive Patients Panel, The Sidney Kimmel Comprehensive
	Cancer Center at Johns Hopkins, Baltimore, Maryland
2017-2020	Associate Editor for the Journal of Clinical Investigation
2018-present	Editorial Board for Infectious Agents and Cancer

#### **RESEARCH ACTIVITIES**

#### **Publications: Peer-reviewed Original Science Research**

- 1. **Ambinder RF**, Burns W, Forman M, Charache P, Arthur R, Beschorner W, Santos G, Saral R. Hemorrhagic cystitis associated with adenovirus infection in bone marrow transplantation. Arch Intern Med. 1986;146(7):1400-1. PMID: 3013110.
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- subtypes of Kaposi's sarcoma-associated herpesvirus reveals evidence for recombination and for two distinct types of open reading frame K15 alleles at the right-hand end. J Virol. 1999;73(8):6646-60. PMID: 10400762.
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# Extramural Funding Current Grants:

4/1/20-3/31/25 Molecular Markers Hodgkin Lymphoma in PLWH in South Africa: TB, EBV, and Tumor

R01CA250069

NCI \$4,336

\$4,336,949 Role: PI: 17%

9/8/20-8/31/25 AIDS Malignancy Consortium

UM1CA121947

**NCI** 

\$23,700,979

Role: Johns Hopkins site PI

PI: J. Sparano: 9%

3/31/22-3/30/26 BMT CTN Protocol 1903 (AMC-109) Administration of HIV-specific T cells to

HIV+ Patients Receiving High Dose Chemotherapy Followed by Autologous

Stem Cell Rescue -Auto-RESIST

1903

National Marrow Donor Program

\$130,028 Role: PI: 4%

5/1/22-4/30/27 Johns Hopkins Center for AIDS Research (JHU CFAR)

2P30AI094189-11

NIAID \$19,515,902

Role: Administrative Core Co-Leader

PI: RE Chaisson: 15%

6/20/22-5/31/27 Regional Oncology Research Center- Sidney Kimmel Comprehensive Cancer

Center (SKCCC) at Johns Hopkins

2P30CA006973

NCI

\$40,213,299

Role: Program Co-Leader for Hematologic Malignancies

PI: WG Nelson: 5%

9/8/23-9/7/28 Investigating the EBV methylome in PLWH: Discovery and Development of

Novel EBV Diagnostics in Plasma and Saliva

U01CA284811-01

NIH

\$3,369,145 Role: PI: 15%

4/01/24-3/31/29 Enrichment for Tumor-derived Cell-free EBV DNA: Towards a Diagnostic

Assay for Endemic Burkitt Lymphoma

1U01CA271252-01A1

NIH \$1,720,211 Role: PI: 10%

#### **EDUCATIONAL ACTIVITIES**

1983

1995-2010

2000-present

Inhns	Hankins	Teaching	<b>Experience</b>
JUHHS	HUUKIIIS	1 cacilling	Experience

	of Medicine
1984-present	Attending Physician, Bone Marrow Transplant Unit, The Johns Hopkins Hospital
1985	Attending Physician, Leukemia Service, The Johns Hopkins Hospital
1985-present	Lecturer, Virology (Course director, Keerti Shah), The Johns Hopkins University School
	of Hygiene and Public Health
1989-present	Organizer Weekly Multidisciplinary Lymphoma Conference, The Johns Hopkins
	Hospital
1991-present	Tutorial leader, Medical Student Pharmacology (Course Directors, Paul Lietman and
-	Thomas August), The Johns Hopkins University School of Medicine
1991-present	Case Discussant, Clinico-Pathological Conference (CPC) The Johns Hopkins University
•	Medical School
1992-present	Course Director, Antiviral Pharmacology (graduate students), Dept of Pharmacology
-	and Molecular Sciences, The Johns Hopkins University School of Medicine

Physical Diagnosis (course for medical students), The Johns Hopkins University School

Lecturer, EBV and KSHV in the Medical Student Microbiology, The Johns Hopkins

University School of Medicine

Small Group Leader, Vaccines Section, Medical Student Pharmacology (Organizer,

1995-2001

Charles Flexner), The Johns Hopkins University School of Medicine

Lecturer, Herpesvirus Pathogenesis, Advanced Virology Course (Course Director, Marie 1995-2001

Hardwick), The Johns Hopkins University School of Hygiene and Public Health.

Research in Progress Graduate Training Program Seminars in the Department of 1998-present

Pharmacology, The Johns Hopkins University School of Medicine.

Lecturer, Antiviral Chemotherapy in the Graduate Student Pharmacology

Course.

Course Director, Introduction to Clinical Pharmacology for Graduate Students 2000-2010 Lecturer, Monoclonal Antibodies and Gene Therapy in the Medical Student 2002-2010

Pharmacology Course

2002 Centennial Celebration of Dorothy Reed's Description of the Reed-Sternberg

Cell in Hodgkin's Disease, Symposium Organizer

2004-present	Lecturer, Ethics and Clinical Research, Department of Pharmacology
2008-2010	American Society of Clinical Oncology Education Committee Member
2008-present	Lecturer, Viral Oncology Course (School of Medicine)
2010-2021	Course Co-director, Lecturer, Small Group Leader, Hematology/Oncology, First
	Year Medical Student Curriculum.

## Mentoring, coaching, and advising Laboratory Training

Mentoring, coaching, and advising		
Laboratory Tr		
1990-1991	Eithne MacMahon, M.D., Postdoctoral fellow. Projects: Characterization of EBV in primary central nervous system lymphomas. Present position: Consultant Virologist, Guy's and St Thomas' Hospital Trust Honorary Senior Lecturer, UMDS Guy's and St	
1000 1000	Thomas' Medical & Dental Schools.	
1990-1992	Tzzy-Chou Wu, M.D., Ph.D., Pathology resident. Project: In situ hybridization to detect EBV in clinical specimens. Present position: Associate Professor, Department of Pathology, The Johns Hopkins University School of Medicine, Baltimore, Maryland.	
1992-1993	Judy Ryon, M.D., Postdoctoral fellow. Project: Characterization of EBV lytic infection in clinical specimens. Present position: Research Associate, Department of Neurology,	
1992	The Johns Hopkins University School of Medicine, Baltimore, Maryland. Douglas Kingma, M.D., Visiting pathology fellow from the National Cancer Institute. Project: In situ hybridization to detect EBV in Hodgkin's disease. Present position: Staff Hematopathologist, National Cancer Institute, Bethesda, Maryland.	
1992-1994	Marcie Weil, M.D. Postdoctoral fellow. Project: EBV and Hodgkin's Disease. Present	
1992-1994	position: Private practice oncology. Paul Murray, Ph.D. Visiting graduate student from the University of Wolverhampton. Projects: EBV gene expression in various tumors. Present position: Principal Lecturer in	
	Biomedical Science, School of Health Sciences, University of Wolverhampton, 62-68 Lichfield Street, Wolverhampton, WV1 1SB, United Kingdom.	
1993-1996	Keith D. Robertson, Ph.D. Graduate student, Pharmacology and Molecular Sciences, Graduate Program. Dissertation: "Analysis of the Role of DNA Methylation in the Regulation of the Epstein-Barr virus <i>Bam</i> HI C Promoter." Present position post-doctoral fellow, University of California at Los Angeles, Los Angeles, California.	
1993-1996	M. Victor Lemas, Ph.D. Project: EBV Immune Response. Present position, Research Associate, Department of Oncology, The Johns Hopkins University School of Medicine,	
	Baltimore, Maryland.	
1993-1996	Rimas J. Orentas, Ph.D. Postdoctoral fellow. Project: EBV Cytotoxic T Cells. Present position, Assistant Professor, Medical College of Wisconsin, Milwaukee, Wisconsin.	
1993-1995	Sen-Tien Tsai, M.D. Postdoctoral fellow. Project: PCR and in situ hybridization for detection of EBV in nasopharyngeal carcinoma. Present position: Associate Professor, Department of Surgery, National Cheng Kung University Medical College, Tainan, Taiwan.	
1995-1999	Stacy M. Moore, Graduate student, Pharmacology and Molecular Sciences, Graduate Program, The Johns Hopkins University School of Medicine, Baltimore, Maryland.	
1995-1999	Qian Tao, Postdoctoral fellow. Project: EBV Gene Expression in Tumors. Present position: Assistant Professor in Oncology at The Johns Hopkins University School of Medicine, Singapore.	
1995-2001	Jie Yang, Graduate student, Pharmacology and Molecular Sciences, Graduate Program, The Johns Hopkins University School of Medicine, Baltimore, Maryland.	
1995-2000	Jennifer S. Cannon, Graduate student, Pharmacology and Molecular Sciences, Graduate Program, The Johns Hopkins University School of Medicine, Baltimore, Maryland.	
1996-1997	Ian Flinn, M.D. Postdoctoral fellow. Present position: Assistant Professor, The Johns Hopkins Oncology Center, Baltimore, Maryland.	

1998-2001	Wen-Son Hsieh, M.D. Clinical postdoctoral fellow, The Johns Hopkins School of Medicine, Baltimore, Maryland.
1999-2001	Meghan Higman, M.D., Ph.D. Postdoctoral fellow. Present position: Assistant Professor, The Johns Hopkins University School of Medicine, Baltimore, Maryland.
1999-2001	Olivia Y. Hwang, Graduate student, Pharmacology and Molecular Sciences, Graduate
2002-2003	Program, The Johns Hopkins University School of Medicine, Baltimore, Maryland. Alvin Wong, M.D. Research postdoctoral fellow. National University of Singapore,
1999-2005	Singapore.  Lan Lin, Graduate student, Pharmacology and Molecular Sciences, Graduate Program,
1999-2004	The Johns Hopkins University School of Medicine, Baltimore, Maryland. Yvette Tanhehco, Graduate student, Biochemistry and Molecular Biology, The Johns
2002-2007	Hopkins University School of Medicine, Baltimore, Maryland.  Jianmeng Chen, Graduate student, Pharmacology and Molecular Sciences, The Johns Harling University, Politing on Maryland.
2006-2013	Hopkins University, Baltimore, Maryland. Andrew Dufresne, Graduate student, Pharmacology and Molecular Sciences, The Johns Hopkins University, Baltimore Maryland
2008-2012	Courtney Shirley, Graduate student, BCMB, The Johns Hopkins University, Baltimore Maryland
2012-2012	Courtney Shirley, Postdoctoral fellow, BCMB, The Johns Hopkins University, Baltimore Maryland
2008-2014	Suntra Biswas – Graduate student, BCMB, The Johns Hopkins University, Baltimore Maryland
2009-2014	Nene Kalu – Graduate student, BCMB, The Johns Hopkins University, Baltimore Maryland
2011-2013	Jennifer Kanakry - Postdoctoral fellow, Virally-related lymphomas, The Johns Hopkins University, Baltimore Maryland
2011-2012	Songmei Wang, Postdoctoral, DNA damage and EBV lytic activation. Fudan University, China.
2012- 2017 2013-2019	John Kosowicz, Graduate Student, BCMB, Stony Brook University, Stony Brook, NY Jaeyeun Lee, Graduate Student,
2013-2019	Genevieve M. Crane (Eve), Resident, Anatomic Pathology, PGY3, The Johns Hopkins Hospital, Baltimore, Maryland.
2015-2018 MD.	Samantha Vogt, Clinical Fellow, Medical Oncology, Johns Hopkins Hospital, Baltimore,
2019-2022	Maggie Li, Undergraduate, Johns Hopkins University, Baltimore, MD.
2019-2022 MD.	KC Rappazzo, Clinical Fellow, Medical Oncology, Johns Hopkins Hospital, Baltimore,
2020-present 2021-2022 MD.	Logan George, Graduate Student, Pathobiology, Johns Hopkins School of Medicine, MD. Cole Sterling, Clinical Fellow, Medical Oncology, Johns Hopkins Hospital, Baltimore,
2022-present	Sydney Ghoreishi, Graduate student, Biochemistry and Molecular Biology PHD Program, The Johns Hopkins University, Baltimore, MD.

### **Training Grant Participation**

1992-present	Pharmacology and Molecular Sciences Graduate Training Grant (Graduate)
1993-present	Biological Chemistry and Molecular Biology Graduate Training Grant (Graduate)
1994-present	Laboratory Research Training Grant in Pediatric Oncology/Hematology (Postdoctoral)
1997-2017	Graduate Training Program in Cellular and Molecular Medicine (Graduate)
2002-present	Graduate Training Program in Clinical Investigation
2006-present	Graduate Training Program in Pathobiology

### **CLINICAL ACTIVITIES**

#### Certification

1979	FLEX Exam (6/12/1979)
1979	License to Practice Medicine, State of Maryland (#D23887)
1979	National Board of Medical Examiners

Board Certified in Internal Medicine (September 15, #86149)
Board Certified in Medical Oncology (November 19, #86149)

### **ORGANIZATIONAL ACTIVITIES**

## Institutional Administrative Appointments 1992-1995 Oncology Fellowship Admissions Com

1992-1995	Oncology Fellowship Admissions Committee
1993-present	Graduate Student Steering Committee, Pharmacology and Molecular Sciences
1998-2000	Johns Hopkins Cancer Committee
1998-2002	Appointments & Promotions Committee
2000-present	Sidney Kimmel Cancer Center Research Council

### **National/International Committees:**

1993-2001	Co-Chair, Eastern Cooperative Oncology Group (ECOG) AIDS Committee
1994-2000	Co-Chair, NIH/NCI AIDS Malignancy Bank Research Evaluation and Decision Panel
1995-2001	Chair, AIDS Malignancy Consortium Laboratory Committee
1996-2002	Member, AIDS Malignancy Conference Program Committee
1996-2002	Member, National Comprehensive Cancer Network (NCCN) Panel for the Development
	of Guidelines for the Treatment of Non-Hodgkin's Lymphoma
1998-2018	Eastern Cooperative Oncology Group (ECOG) Lymphoma Core Committee
2002-2004	Vice President, AIDS Malignancy Consortium
2004-2019	Laboratory Committee Chair, AIDS Malignancy Consortium
2012-2018	Editorial Board, Blood
2013-	CFAR Leadership Committee, Johns Hopkins Center for AIDS Research
2004-2019	Chair, Translational Research Working Group, AIDS Malignancy Consortium
2019-present	Hematologic Malignancies Working Group Chair, AIDS Malignancy Consortium
2016-present	JHH Antimicrobial Stewardship Committee Meeting
2017-present	Member of the National Cancer Institute (NCI) Board of Scientific Advisors ad hoc
	Subcommittee on HIV and AIDS Malignancy
2020-present	NCI Lymphoma Steering Committee Member
2020-present	Chair, Hematologic Malignancies Working Group, AIDS Malignancy Consortium
2018-present	National Comprehensive Cancer Center Guidelines Panel for Cancer in People Living with HIV

### **Professional Societies**

American Association for the Advancement of Science American Society for Clinical Oncology American Society of Hematology American Society of Microbiology Epstein-Barr Virus Society

### RECOGNITION

### Awards, Honors

John W. Graham Award
Henry Strong Denison Scholarship
Alpha Omega Alphal
Phi Beta Kappa
Physician Scientist Award (NIH K11)
Scholar, Leukemia Society of America
Visiting Professor, Chinese University of Hong Kong
American Society for Clinical Investigation
Director's Basic Sciences Teaching Award, Johns Hopkins Oncology Center
Stohlman Scholar, Leukemia Society of America
James B. Murphy Professorship in Oncology
American Society for Clinical Investigation
Fellow of the American Association for the Advancement of Science
Director, Johns Hopkins Lymphoma SPORE
Director's Basic Sciences Teaching Award, Johns Hopkins Oncology Center
Director's Clinical Sciences Teaching Award, Johns Hopkins Oncology Center
Director's Basic Sciences Teaching Award, Johns Hopkins Oncology Center
Director's Basic Sciences Teaching Award, Johns Hopkins Oncology Center

### **Invited Talks**

- 1991 Educational Session at the American Society of Hematology, December 6-9, Denver, CO. "AIDS Primary Central Nervous System Lymphoma."
- 1991 Invited speaker at the Annual Meeting of the Laboratory of Tumor Cell Biology, National Cancer Institute, September 1-8, Bethesda, MD. "EBV and AIDS Primary Central Nervous System Lymphomas."
- 1991 Tutorial Leader at the Annual Meeting of the Laboratory of Tumor Cell Biology, National Cancer Institute, September 8, Bethesda, MD. "Human Herpesviruses: Pathogenesis, Oncogenic Potential."
- 1992 Invited speaker at the AIDS Lymphoma Meeting sponsored by the National Cancer Institute, May 11-12, Bethesda, MD. "Epstein-Barr Virus Gene Expression in Lymphoma."
- 1992 University of Maryland Hematology Conference, October 26, Baltimore, MD. "Epstein-Barr Virus and Hodgkin's Disease."
- 1992 Invited speaker at the Hemophilia Malignancy Study Group Meeting, November 20, Atlanta, GA. "Epstein-Barr Virus and Malignancy."
- 1993 Invited speaker at the AID-Related Malignancy Strategies Meeting sponsored by the Cancer Therapy Evaluation Program, National Cancer Institute, January 11, Bethesda, MD. "Treatment of AIDS Central Nervous System Lymphoma."
- 1993 Invited speaker at the AIDS Lymphoma Coordinating Group Meeting sponsored by the Epidemiology and Biostatistics Program, National Cancer Institute, March 8, Bethesda, MD. "Epstein-Barr Virus and Lymphoma."
- 1993 Invited speaker of the "AIDS Malignancy Task Force, Meeting sponsored by the National Cancer Institute, Orlando, FL, May 16."5-Azacytidine for AIDS Lymphomas."
- 1994 Invited speaker at the Biology of B-Cell Malignancies Biology Meeting, sponsored by the National Cancer Institute, April 19. "New Approaches to EBV Lymphomas."
- Invited speaker at the NATO Workshop on The Etiology of Hodgkin's Disease, Glasgow, Scotland, United Kingdom, May 4. "EBV-Associated Hodgkin's Disease."
- 1994 Invited speaker at the Epstein-Barr Virus and Associated Diseases Meeting at Cold Spring Harbor (Cancer Cells Series), September 11. "New Approaches to the Therapy of EBV-Associated Malignancies."

- 1995 Invited speaker at Topics in Pediatric Hematology/Oncology: Update 1995 in New York, for Tomorrow's Children's Institute, April 26-27. "EBV and Hodgkin's Disease" and "Hodgkin's Disease and Bone Marrow Transplantation."
- 1995 Invited speaker at the New Aspects of the Diagnosis and Treatment of Hodgkin's Disease Meeting, Cologne, Germany, September 21. "New Approaches to EBV-Associated Hodgkin's Disease."
- 1995 Chair of the Biology Session at the New Aspects of the Diagnosis and Treatment of Hodgkin's Disease."
- 1995 Invited speaker at the College of Physicians & Surgeons, Columbia University, Department of Pathology, New York, NY, November 6. "Epstein-Barr Virus and Malignancies."
- 1996 Invited speaker at the Molecular Characterization of Lymphoid Neoplasia Workshop, Bombay, India, February 21-26. "In-Situ Hybridization, Epstein-Barr Virus and Hodgkin's Disease."
- 1996 Invited speaker at the First Hong Kong Cancer Institute Annual Scientific Symposium on EBV Related Tumors, Hong Kong, March 4. "Novel Approaches to Treatment of EBV Tumors."
- 1996 Invited speaker at the Hong Kong University, Hong Kong, March 5. "EBV Tumors."
- 1996 Invited speaker at the Special Symposium on AIDS Related Malignancies, Albert Einstein College of Medicine/Montefiore Medical Center, New York, NY, March 25-27. "Treatment of AIDS-Related Lymphoma."
- 1996 Symposium organizer and invited speaker at the 32<sup>nd</sup> Annual Meeting American Society of Clinical Oncology, Philadelphia, PA, May 18-21. "Epstein-Barr Virus and Malignancy."
- 1996 Invited speaker at the Annual Meeting of the Institute of Human Virology, Baltimore, MD, September 7-13. "EBV and B Cell Lymphoma."
- 1996 Invited speaker at the University of Virginia, Pathology Department, Charlottesville, VA, October 8. "EBV and Malignancy."
- 1996 Invited speaker at the Prince of Wales Hospital, Chinese University of Hong Kong, November 13. "High Dose Therapy with Bone Marrow Rescue for the Treatment of Lymphoma."
- 1996 Invited speaker at the Prince of Wales Hospital, Chinese University of Hong Kong, November 20. "EBV and Hodgkin's Disease."
- 1996 Invited speaker at The International Association for Research on Epstein-Barr Virus and Associated Diseases, VII International Symposium, Hong Kong, November 13-16. "Methylation and EBV-associated Tumors."
- 1997 Faculty, National Comprehensive Cancer Network (NCCN), 2<sup>nd</sup> Annual Conference, Practice Guidelines: From Principles to Practice. Ft. Lauderdale, FL. March 3-5. "Guidelines for the Treatment of Non-Hodgkin's Lymphomas."
- 1997 Invited speaker at the First AACR/ASCO Joint Conference, Basic and Clinical Aspects of Lymphoma, Indian Wells (Palm Springs) CA, January 10-14. "EBV and Lymphomagenesis."
- 1997 Invited speaker at the Keystone Symposium on the Genetics of Human Cancer. Keystone, CO, January 27- February 2. "Epstein Barr Virus and Malignancy: Methylation of the EBV Major Latency Promoter."
- 1997 Invited speaker at the Robert H. Lurie Cancer Center of Northwestern University, Chicago, IL, March 17. "Targeting Epstein-Barr Virus in Malignancies."
- 1997 Invited speaker at the 23<sup>rd</sup> Annual Symposium, Diagnosis and Treatment of Neoplastic Disorders, The Johns Hopkins Oncology Center, Baltimore, MD, April 3 4. "AIDS Malignancies."
- 1997 Invited speaker at Hahnemann Allegheny Hospital, Philadelphia, PA, May 7. "EBV and Post-Transplant Lymphoma."
- 1997 Invited speaker at the 10<sup>th</sup> Annual Meeting of The American Society of Pediatric Hematology/Oncology, (ASPH/O) San Francisco, CA, September 20. "EBV and Hodgkin's Disease."
- 1997 Invited speaker at 2<sup>nd</sup> Annual Meeting of the Institute of Human Virology, University of Maryland, Baltimore, MD, September 21. "Cellular Immune Responses and EBV."

- 1997 Invited speaker at Advances in Transplantation, School of Nursing Conference, Washington, DC. September 30. "Lymphoproliferative Disease in Transplant Recipients."
- 1997 Invited speaker at the National Lymphoma Awareness Week Conference, Vienna, VA, October 19. "AIDS-Related Lymphoma."
- 1997 Invited speaker at Massachusetts General Hospital Charlestown Laboratories, Boston, MA, December 1."Targeting Epstein-Barr Virus in Malignancies."
- 1997 Chair of the Hodgkin's disease session, American Society of Hematology, San Diego, CA, December 8.
- 1998 Invited speaker at the 5<sup>th</sup> Conference on Retroviruses and Opportunistic Infections, Chicago, IL, February 1-5. "Epstein-Barr Virus and Lymphoma in Patients with HIV."
- 1998 Invited speaker at the International Union Against Cancer, UICC Workshop on Nasopharyngeal Cancer-Issues and Challenges, Singapore, February 12. "EBV and NPC."
- 1998 Invited speaker at the Fifteen Years Viral Oncopathology Symposium of HPV and EBV, Amsterdam, Netherlands, March 5. "EBV Pathology."
- 1998 Invited speaker at the 8<sup>th</sup> Annual Clinical Care of Patient with HIV Infection, Baltimore, MD, March 31. "HIV-Related Malignancies."
- 1998 Invited speaker at the University of Birmingham School of Medicine, Birmingham, United Kingdom, June 4. "Approaches to Targeting EBV in Tumors."
- 1998 Chair of the Pathology and Pathogenesis Session. International Epstein-Barr Virus (EBV) Meeting, Stockholm, Sweden, June 5.
- 1998 Invited speaker at Progress in Hematologic Malignancies and Bone Marrow Transplantation. Baltimore, MD, September 11. "Aspects of Hodgkin's Disease."
- 1998 Invited speaker at Baylor University, Houston, TX, November 18.
- 1999 Invited speaker at The University of Texas, M.D. Anderson Cancer Center, Houston, TX, March 23 25.
- 1999 Invited speaker at The Mount Sinai Medical Center Hematology Grand Rounds, New York, NY, June 10. "Targeting EBV in Malignancies."
- 1999 Invited speaker at 21st International Congress of Chemotherapy, Birmingham, UK, July 4 7. "EBV Products as Novel Targets."
- 1999 Invited speaker at Leukemia Society of America, Annual Stohlman Scholar Symposium, New York, NY, November 12 13. "EBV Kinases: Novel Targets in EBV-Associated Malignancies."
- 2000 Invited speaker at American College of Epidemiology, Atlanta, GA, September 24-26. "Molecular Aspects of EBV and Lymphoma."
- 2000 Invited speaker at Lymphoma Meeting, Crowne Plaza, Manhattan, NY, October 7-8. "Targeting EBV and Lymphoma."
- 2000 Invited speaker at Cerus Science Retreat, Santa Cruz, CA, October 13-15. "EBV and Transplantation."
- 2000 Invited speaker at American Society of Hematology, San Francisco, CA, December 2-5. "Worldwide Impact of Viral Diseases in Hematology."
- 2001 Invited speaker at University Hospitals of Cleveland, Cleveland, OH, March 16. "Targeting EBV in Tumors."
- 2001 Invited speaker at the 11<sup>th</sup> Annual Clinical Care of the Patient with HIV Infection Course, Baltimore, MD, March 26-27. "HIV Related Cancers."
- 2001 Invited speaker at the Federation of American Societies for Experimental Biology Summer Research Conference, Snowmass, CO, July 29-30. "Mechanisms in AIDS Malignancies."
- 2002 Invited speaker at the 12th Annual Clinical Care of the Patient with HIV Infection Course, Baltimore, MD, April 15-16. "HIV-Related Cancers."
- Invited speaker at the 15th Annual Meeting of the American Society of Pediatric Hematology/Oncology, Baltimore, MD, May 2-5. "Targeting EBV in Tumors and Lymphoproliferative Disorders."

- 2002 Invited speaker at the 10th International Symposium on Epstein-Barr Virus and Associated Malignant Diseases, Cairns, Australia, July 16-21.
- 2002 Oncology Translational Research Conference, University of Pennsylvania, Philadelphia, PA, October 22, 2002. "EBV and Hodgkin's Disease."
- 2003 Invited speaker at the 4th International UICC Symposium on Nasopharyngeal Carcinoma, Hong Kong SAR, China, February 14-16, 2003.
- 2003 Invited speaker at Grand Rounds at Dana-Farber Cancer Institute, Boston, Massachusetts, May 13, 2003.
- 2003 Invited speaker at the First Annual Conference: Targeted Therapies for the Treatment of Hematological Malignancies, Kona, HI, July 16-20, 2003.
- 2003 Invited speaker at the Post Transplant Lymphoproliferative Disorder Meeting, Bethesda, MD, September 15-16, 2003. "Vaccination Against EBV."
- 2003 Invited speaker at the Feist-Weiller Cancer Center, Shreveport, LA, October 27, 2003. "Epstein-Barr Virus and Hodgkin's Disease."
- Invited speaker at the Grand Rounds for the Division of Hematology/Oncology at the Robert H. Lurie Comprehensive Cancer Center of Northwestern University, Chicago, IL, December 12, 2003. "Epstein-Barr Virus and Hodgkin's Disease."
- 2003 Session Chair at American Society of Hematology, San Francisco, CA, December 6th-9th 2003.
- 2004 Invited speaker at the Dermatology Grand Rounds Lecture, Johns Hopkins University, School of Medicine, February 18, 2004. "Kaposi's Sarcoma"
- 2004 Invited Speaker at the AMC Steering Committee Meeting and International Conference on AIDS Malignancies in AIDS and Other Immunodeficincies, Bethesda, MD April 28th -30th 2004. "Viral Load Assavs"
- 2004 Invited Session Chair at the 29th Annual International Herpesvirus Workshop, Reno, NV July 25th-31st 2004.
- 2004 Visiting Professor Yonsei Medical School, Seoul Korea, October 19th -23rd 2004. "Epstein-Barr Virus and Tumors.
- 2004 Invited Speaker at The INTERLYMPH Immunology Subgroup Meeting, Los Angles, CA, December 3rd 2004. "EBV and Inflammation"
- 2004 Invited Speaker American Society of Hematology Educational Session San Diego, CA, December 4-7th 2004."Epstein Barr virus and Hodgkin's Disease: Issues of Causation, Pathogenesis, Prognosis, and Treatment."
- 2005 Invited Speaker at Lymphoma the next questions: Ft. Lauderdale, FL April 7-8 "Allogeneic Transplant for Hodgkin's disease."
- 2005 Invited Speaker at The Rockefeller University, New York, NY, April 6, 2005. "Loaded Questions Regarding Gammaherpesviruses and Tumors."
- 2005 Discussant at ASCO, Orlando, FL May 13-17, 2005. "Hodgkin's Disease Reflections"
- 2006 Invited Speaker at the Tropical Medicine Dinner Club of Baltimore, MD, Februbary 1, 2006 "Gammaherpesvirus Associated Tumors"
- 2009 Invited Speaker at New Directions in Pediatric, Adolescent and Young Adult Lymphoma, July 30-31, 2009, Baylor University, Houston, TX, "Targeted Radiation Therapy for Viral Malignancies"
- Invited Speaker at the Third Annual Review of the ASH Annual Meeting: Nashville, TN, January 19, 2010 "Updates in the Treatment and Management of Hematologic Malignancies".
- 2010 Invited Speaker at the 14<sup>th</sup> Biennial Symposium of the Lymphoma International Association for Research on Epstein - Barr virus and Associated Diseases. University of Birmingham, United Kingdom, September 3, 2010, "EBV-Targeted Raidvatial Therapy.
- 2010 Invited Speaker at 8th International Symposium on Hodgkin Lymphoma, Koln, Germany, October 24, 2010. "The Hodgkin Lymphoma Stem Cell"
- 2010 Invited Speaker at the American College of Veterinary Pathologists, Baltimore, MD, November 2, 2010. "Mechanisms of Herpes Virus-induced Carcinogenesis"

- 2011 Invited Speaker at The Molecular Imaging Seminar, Baltimore, MD September 13, 2011. "Imaging Lytic Induction of Gamma Herpes Viruses in Lymphoma Patients"
- 2011 Invited Speaker at Fourth AACR Conference on The Science of Cancer Health Disparities in Racial/Ethic Minorities and the Medically Underserved, Washington, D.C. September 19, 2011. "EBV as a cause of Hodgkin's Disease, Nasopharyngeal Cancer, Gastric Cancer, and Non-Hodgkin's Lymphomas; New Approaches to EBV Cancer Treatment"
- 2012 Invited Speaker at BMT Tandem "Scientific" Meeting, San Diego, CA, February 4, 2012. "HCT in HIV-1 Infected Patients".
- 2012 Invited Speaker at AACR Annual Meeting in Chicago, IL, April 3, 2012. Session chair and speaker. "HIV Malignancies: Current Dilemmas and Future Directions".
- 2012 Invited Speaker at JHU/Brazil HIV/Aids conference in Rio de Janeiro, Brazil, April 13, 2012. "Bone Marrow Transplantation and HIV Infection".
- 2012 Invited Speaker at Pediatric Lymphoma Symposium in Houston, TX, April 27, 2012. "EBV Associated Lymphoma: Aspects of Diagnosing, Prognosis and Treatment".
- 2012 Invited Speaker at 9th International CGO Lymphoma Symposium, Chicago, IL, April 28, 2012. "EBV Lymphoma and Viral Load Monitoring".
- 2012 Invited Speaker at the Department of Molecular Genetics and Microbiology at Stony Brook University in Stony Brook, NY, May 14, 2012. "Targeting EBV: New Approaches and New Agents".
- 2012 Invited Speaker at the 2012 ASCO Annual Meeting, Chicago, IL, June 2, 2012. Session chair and speaker. "EBV And KSHV In The Epidemiology And Pathogenesis Of Human Tumors"
- 2013 Invited speaker at Hematology/Oncology Grand Rounds at University of Maryland, College Park, MD, February, 8 2013. "Epstein Barr Virus and Cancer"
- 2013 Invited speaker to Johns Hopkins 23<sup>rd</sup> Annual Conference on Clinical Care of HIV Infection, Baltimore, MD, March 18, 2013.
- 2014 Invited speaker to Celgene Corporation, San Francisco, CA, July 30, 2014 "Rael (EBV-positive Burkitt's lymphoma cell line".
- Invited speaker at Carnegie Institution, Johns Hopkins Homewood Campus, Baltimore, MD., September 6, 2014 "Epstein-Barr Virus and Multiple Myeloma"
- 2014 Invited speaker at The 2nd Annual Robert J. Cotter Hopkins Pharmacology Retreat, Mt Washington Conference Center, Baltimore, MD, September 20, 2014.
- 2014 Invited speaker to Festschrift Honoring Rein Saral, MD, Emory Conference Center Hotel, Atlanta, GA, November 15, 2014 "Allogeneic Bone Marrow Transplantation for Patients with HIV"
- 2015 Invited speaker to the Johns Hopkins Oncology Translational Research Conference, Baltimore, MD, January 7, 2015"Epstein Barr Virus and Malignancy"
- 2015 Invited speaker to Delhi, India, March 23, 2015 "EBV, HIV and Tumors"
- 2015 Invited speaker to Seattle, WA on August 13, 2015 to speak at the 2nd Annual Conference on Cell and Gene Therapy for HIV Cure "Allogeneic Transplantation for Patients with HIV"
- Invited speaker to the BMT CTN 2015 Steering Committee in Westin Crystal City, Arlington, VA. on October 23, 2015, "Identification of HIV-Resistant Donors Project"
- 2015 Invited speaker to the 15<sup>th</sup> International Conference on Malignancies in AIDS and other Acquired Immunodeficiences in Bethesda, MD on October 26, 2015, "Non-Myeloablative Haplodidentical Allogeneic Bone Marrow Transplantation in HIV-Infected Individuals".
- 2016 Invited Speaker to Hong Kong on May 14, 2016
- 2016 Invited speaker to the The Medical Council of DKMS in Valencia Spain on April 3, 2016 "Advanced
  - Unrelated Donor Selection Based on Polymorphism in Selected Genes.
- 2018 Invited speaker Sjogren's Syndrome Foundation in Aurora Colorado on April 13, 2018 "Lymphoma: Risk, Treatment and Prognosis"

- 2018 Invited speaker CFAR Cure Symposium, Panel Discussion: "HV Cure; A Reality Check", October 15, 2018.
- 2018 Invited speaker AMC Investigators Fall Meeting in Reston, VA., October 24, 2018.
- 2019 Invited speaker Hillman Cancer Center Viral Oncology Mini-Symposium at the University of Pittsburg Medical Center, April 15, 2019.
- 2019 Invited speaker Clinical Virology Symposium, Savannah, GA, "Circulating EBV and KSHV DNA for diagnosis and monitoring" May 7, 2019.
- 2019 Invited speaker for IVS presentation at Johns Hopkins Pathology Molecular Diagnostics, Baltimore, MD, October 4, 2019.
- 2019 Grand Rounds, Johns Hopkins University, School of Medicine, Baltimore, MD, October 11, 2019.
- 2019 Invited speaker to the 17<sup>th</sup> International Conference on Malignancies in HIV/AIDS (ICMH) in Bethesda, MD, October 22, 2019.
- 2020 Invited speaker for the first year medical students, Johns Hopkins University, School of Medicine, Infectious Disease, Baltimore, MD, February 11, 2020.
- Invited speaker for the resident didactics: Hodgkin Lymphoma, Johns Hopkins University, School of Medicine, Baltimore, MD, 5/1/2020.
- 2020 Invited speaker for the Kaposi Sarcoma meeting, virtual. May 7, 2021.
- 2020 Invited speaker for the Data and Safety Monitoring Board, virtual, June 19, 2020.
- Invited speaker for the graduate pharmacology students, Johns Hopkins SOM, Pharmacology, Baltimore, MD, September 30, 2020. "Gene Therapy/Antibody Drugs".
- Invited speaker for the graduate pharmacology students, Johns Hopkins SOM, Pharmacology, Baltimore, MD, March 3, 2021. "Antivirals".
- 2021 Invited speaker for ARFD virtual meeting, April 29, 2021.
- Invited speaker for Simmons Comprehensive Cancer Center Distinguished Lecture Series virtually, UT Southwestern, May 7, 2021. "New directions for lymphoma in HIV patients: Plasma DNA for diagnosis; allogeneic transplant for cure".
- Invited speaker to fellows, Johns Hopkins University, SOM, Baltimore, MD. July 16, 2021. "Hodgkin Lymphoma".
- Invited speaker for 18<sup>th</sup> International conference on Malignancies in HIV/AIDS (ICMH), Bethesda, MD., October 24, 2022.
- 2023 Invited speaker for EBV-associated Lymphoma Consortium, Bethesda, MD., 10/16/23.
- Invited speaker for graduate pharmacology students, Johns Hopkins SOM, Pharmacology, Baltimore, MD., March 14, 2024. "Antivirals"
- Invited speaker for Department of Molecular Microbiology and Immunology at the Johns Hopkins Bloomberg School of Public Health, Baltimore, MD., September 12, 2024. "Epstein-Barr virus: Facilitating early diagnosis of EBV-associated malignancies".

### Richard F. Ambinder, M.D., Ph.D., Prior Testimony, Depositions 2021-2025

2021--Arbitration - Marvin Smith, Individually and as Administrator of the Estate of Tanya Smith, Deceased v. John Wright, MD, et al., Deposition and Arbitration Testimony

2022—Marvin Smith, Individually and as Administrator of the Estate of Tanya Smith, Deceased v. Annie Kannarkatt, MD, Court Testimony, York County, PA Case number 2018-SU-002317