

RESEARCH ARTICLE

# Rendering Inuit cancer “visible”: Geography, pathology, and nosology in Arctic cancer research

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## Argument

In August of 1977, Australian pathologist David W. Buntine delivered a presentation at the Annual Meeting of the Royal College of Pathologists of Australia in Melbourne, Victoria. In this presentation, he used the diagnostic category of “Eskimoma,” to describe a unique set of salivary gland tumors he had observed over the past five years within Winnipeg’s Health Sciences Center. Only found amongst Inuit patients, these tumors were said to have unique histological, clinical, and epidemiological features and were unlike any other disease category that had ever been encountered before. To understand where this nosological category came from, and its long-term impact, this paper traces the historical trajectory of the “Eskimoma.” In addition to discussing the methods and infrastructures that were essential to making the idea of Inuit cancer “visible,” to the pathologist, the epidemiologist, and to society at large, this paper discusses how Inuit tissue samples obtained, stored, and analyzed in Winnipeg, Manitoba, came to be codified into a new, racially based disease category – one that has guided Canadian and international understandings of circumpolar cancer trends and shaped northern healthcare service delivery for the past sixty years.

**Keywords:** Cancer; Epidemiology; Classification; Pathology; Indigenous tissue; Circumpolar Health

In August of 1977 Australian pathologist David W. Buntine delivered a presentation at the Annual Meeting of the Royal College of Pathologists of Australia in Melbourne, Victoria. In this presentation, he used the diagnostic category of “Eskimoma,” to describe a unique set of salivary gland tumors he had observed over the past five years within Winnipeg’s Health Sciences Centre (Buntine 1978, 194). Only found amongst Inuit patients, these tumors were said to have unique histological, clinical, and epidemiological features. Not only were they microscopically distinct from other tumors of the parotid gland, they were also rapidly growing, associated with a high mortality rate, and surprisingly common within the high Arctic. Although similar to a form of nasopharyngeal tumour observed within southern China, Buntine stated that this type of salivary gland cancer represented only one percent of all parotid tumors, and, as a result of its population-specific nature and unique histopathological and clinical features, was unlike any other disease category that had ever been encountered before (Buntine 1978, 194).<sup>1</sup>

In the months and years following Buntine’s 1977 presentation, the term “Eskimoma” would capture the imagination of pathologists, epidemiologists, and health policy officials around the world. For instance, this diagnostic label has been the focus of numerous academic journal articles. Biospecimens of this seemingly uniquely Inuit pathology have also been in high demand, and have been analyzed by some of the most prominent pathology laboratories and tissue registries in

<sup>1</sup>While living in Hong Kong, British surgeon Kenelm Hutchinson Digby drew attention to the high prevalence of a specific type of lymphoepithelioma of the nasopharynx within south east China (Digby 1941, 519). Similar epidemiological patterns were also emphasized by British head and neck oncologist Peter Clifford (1970).

North America and Europe, including the California's Tumor Tissue Registry and Denmark's Gentofte Hospital (Azzopardi 1977, 44-46; Sehested et al. 1985). Although popular use of this term has died out over the past fifteen years, references to "Eskimomas" can still be found in pathology journals, textbooks, and health policy reports in places as diverse as Canada, the US, Russia, India, Thailand, Greenland, and China (Ellis et al. 1991, 137; Friberg and Hassler 2008, 324). For instance, the term appears in the 2015 edition of Sriram Bhat M's *Manual of Surgery* (Bhat M 2006, 412), as well as a 2017 article on cancer research and clinical oncology published in the *Chinese Journal of Cancer* (Wee and Poh 2017, 3).

The "Eskimoma" has also crossed over into the public sphere. Appearing in magazine articles, newspaper columns, and even museum exhibits, the diagnostic category has been invoked to draw attention to the issue of cancer among northern Indigenous peoples and reconstruct Inuit experiences of disease (Ludington Daily News 1971; Brandon Sun 1975). For instance, in 2013 the Canadian Museum of Civilization adopted Buntine's language in an attempt to describe and explain some of the materials found in their northern collections. In response to a 2010 repatriation request made by the Inuit Heritage Trust, officials started to catalog Inuit human remains and burial objects held within the museum so that they could be returned to their home territories. In this process, Karen Ryan, an Arctic archaeologist and curator of the Northern Canada Collection, came across a figurine that had been excavated from Tunirmiut (Native Point), a peninsula in the Kivalliq Region of Nunavut, Canada, in 1959. Ryan was particularly interested in this object because of a few prominent holes that appeared to have been deliberately etched into the head of the sculpture. Since the artifact had been found in a burial site, Ryan hypothesized that these markings might be related to the cause of death of the woman whom the figurine was found beside (whose remains were also held within the museum's collection). When Ryan, with the help of fellow archeologist Janet Young, examined the woman's body, they discovered several facial deformities in locations corresponding with the holes in the figurine. Ryan diagnosed these skeletal abnormalities as tumors, stating that they were possibly cancerous. In a 2013 article published in *Arctic Anthropology*, Ryan and Young put forward the idea that the woman was afflicted with salivary gland cancer, because of the high frequency of "Eskimomas" observed within Inuit populations (Ryan and Young 2013, 34).

Despite the "Eskimoma's" relative ubiquity in popular, histopathological, and public health discourse, the origins of the term are far less well known. How did this disease category come to be? Through what means did stained cells on glass slides come to represent a specifically Inuit pathology? And what impact has this eponym had for how salivary gland cancer is understood and addressed within northern settings? Answering these questions requires that we shift our attention away from Buntine and his 1977 presentation to Australia's Royal College of Pathologists. This is because, as this paper will show, although Buntine played an important role in the term's popularization, he was not its inventor. Rather, the roots of this label stretch back to the mid-twentieth century, to a series of scientific research activities carried out by Jack A. Hildes in his role as Director of the Arctic Medical Research Unit— an initiative developed by the Canadian Government's Defense Research Board (DRB) and the University of Manitoba's Physiology Department to support medical studies of relevance to northern military operations. Inspired by events occurring in the field of international cancer control, during the late 1950s to the late 1970s, Hildes carried out a series of pathology studies whereby he collected clinical data and tumor tissue from Inuit cancer patients in an attempt to ascertain whether the factors underpinning the disease were environmental or biological in origin. It would be these tissue fragments, accompanied by the medical and social technologies for their sourcing, storage, distribution, and analysis that would result in the creation of this new diagnosis.

Looking at the role of race, tissue extraction, and tumor pathology reveals a rich history of international information exchange, the rise of surveillance medicine, and the emergence of new technological and material practices used to make certain types of cancer "visible." To understand how these ideas played into disease classification, this paper will chart the historical

trajectory of the “Eskimoma,” focusing particularly on the researchers, institutions, approaches and social contexts involved in the emergence of this new diagnostic category. This paper begins by providing a brief overview of how ideas about race, primitivism, and civilization played into early mid-twentieth-century ideas about cancer risk, and will describe a variety of early efforts to measure cancer incidence within circumpolar populations. The second section discusses how increasing international efforts to standardize the collection of cancer data, facilitate comparative studies of the disease, and establish a truly global centralized pathology-based tumor registry, provided Canadian health researchers with the impetus and infrastructures necessary to make epidemiological studies of “Inuit cancer” a national priority. The third section will describe the results of these transnational collaborations by examining the life and work of Dr. Jack Hildes, the Director of the Canadian Department of Defense’s Arctic Medical Research Unit based at the University of Manitoba. Through examining the inceptions and implications of Hildes’ cancer research program, this section reveals how Inuit tissue samples obtained, stored, and analyzed in Winnipeg, Manitoba, came to be codified into a new, racially-based disease type that would come to dictate how chronic diseases in circumpolar settings would be understood and addressed by the Canadian state and healthcare organizations around the world.

To emphasize the politics of epidemiological knowledge production, this paper draws on a wide variety of archival and published sources, including government records, university documents, international health organization files, and published research studies. It also engages with number of theoretical frameworks advanced by scholars engaged in the critical history of chronic disease (Wailoo 2012; Livingstone 2012; Mika 2016, Caduff & Van Hollen 2019). These scholars have played a key role in framing cancer care as a complex biosocial phenomenon and revealing the constellation of bureaucracy, vulnerability, power and biomedical science, that underlies who is identified as a high or low risk population, whose interests are being served by these designations, and what “visibilities and invisibilities” ultimately ensue (Livingston, 2012, 8; Caduff & Van Hollen 2019, 490).

Following a number of experts who have attempted to understand the implications of assembling and maintaining archives of human bio-variability, this paper also draws attention to how concepts and practices of preservation converged to “fix” Indigenous peoples and their bodily extracts into ongoing objects of study. For instance, Jenny Reardon, Joanna Radin and Emma Kowal have all chronicled how technologies as mundane as cold storage have played a central role in making Indigenous biological materials mobile through time and space (Kowal, Radin & Reardon 2013; Radin 2017). Hannah Landecker (2006; 2007; 2009, 709) too, has outlined how modes of visualization in the life sciences generate “cycles of action and reaction.” For instance, while the advent of histology fundamentally changed “the sights of scientific work and the mode of experimental looking,” the kinds of images it produced suggested a very particular way of viewing the world (Landecker 2006). As these researchers have shown, the process of taking something that used to be biological, alive and cellular, and transforming it into something “suspendible, interruptible, storable, [and] freezable in parts,” served to sever biospecimens from the people from whom they originally came (Kowal & Radin 2020). Thus, while the development of various fixatives, stains, and modes of tissue storage, helped open up the scientific gaze to some areas, it also closed it to others.

In addition to shedding light on the material tools and technologies of cancer epidemiology, this history also reveals the political rationalities underpinning processes of cancer reporting and the reification of this data into an identifiable pathology. In my analysis, I draw upon the large body of scholarship that has explored how colonial spaces have functioned as scientific resources (Gouda 2000; Lock and Nguyen 2010, 179; Tilly 2011). Just as scholars have shown how Indonesia and Africa came to be reconfigured as experimental or “living laboratories” over the course of the twentieth century, the North was similarly seen as an important site of biological knowledge production (Tuhiwai Smith 1999; Farish 2013; Wiseman 2015; Piper 2015; Lanzarotta 2020). As we will see, this was especially true in the domain of cancer research, as polar places and peoples were

increasingly conceptualized as important medical resources that could be leveraged for the benefit of white Euro-American society. By showing how mid-twentieth century healthcare professionals transformed Indigenous lands and bodies into useful sites through which theories of carcinogenesis could be both developed and tested, this paper seeks to further deepen our understandings of how northern environments and their inhabitants have shaped southern mainstream conceptualizations of, and responses to, chronic disease.

Finally, it would be impossible to talk about circumpolar cancer research without discussing what is at stake for Inuit populations, as these processes of disease-naming, scientific representation, and medical knowledge-making took place within a colonial context. Issues of sovereignty and national defense not only engendered Indigenous subjugation and territorial dispossession, but also helped fashion Inuit communities into resources for research. This resulted in exploitative collection practices whereby the pathological specimens obtained from Inuit patients were obtained involuntarily, without permission from either patients or their families. The bodily materials obtained from this research would never be returned to the communities from which they were taken. Instead, they would circulate between autopsy tables, patrol ships, boardrooms, and pathology labs, ultimately ending up as glossy images in tumor atlases, forgotten microscope slides in tumor banks and tissue registries, and as human remains still stored in museums much like Canada's Museum of Civilization, where the "Eskimoma" figurine described at the beginning of this paper was found. Furthermore, the information obtained from these bodily samples would be used to underwrite racialized perceptions of Indigeneity – ones that would permeate Canadian medical consciousness and guide cancer care delivery within northern communities for the next sixty years.

Just as the creation of diagnostic categories is implicated in settler statecraft, so too are mechanisms of place-naming. As geographer Daniel Clayton has pointed out: processes of Euro-American map-making can be seen as a form of representational violence, as the creation of new forms of geography were also attempts to strip away Indigenous territory and models of sovereignty (Clayton 2000, 232). Western topological surveys would reposition Indigenous people in a rationalized cartographic space – a space that was created by explorers and politicians for the benefit of settlers and colonial administrators. To avoid reproducing these colonial representations, I have chosen to privilege Inuit toponyms in my own writing.<sup>2</sup> As a result of this choice, some of the place names I use to describe geographic locations may be unfamiliar to individuals more comfortable with European geographic descriptors. In order to help orient readers, for each Inuit place name used I provide the corresponding European place name in parenthesis.

### Circumpolar cancer as a disease of civilization

By the turn of the twentieth century the topic of cancer was riddled with "controversy and bewilderment" (Patterson 1987, 21). This popular and medical anxiety over the disease stemmed from a lack of certainty about its underlying etiology, as medical professionals could reach no consensus about how and why cancer cells developed. In the absence of a satisfactory explanation for the disease, many theories about cancer's origins were put forward. One popular idea was that germs were to blame. Emerging in the late 1880s and early 1890s, during the "heyday" of microbiology, this theory resulted in a number of scientific studies investigating whether parasites, viruses, bacilli, molds, and protozoa were implicated in carcinogenesis (Patterson 1987, 22). Another popular hypothesis was that cancer was a "blood disease" – a heritable illness that could be transmitted easily from one generation to the next (Clow 2001, 12). Although some doctors doubted the reliability of this theory,

<sup>2</sup>As scholars Béatrice Collognon and Margaret Wickens Pearce have noted, Indigenous toponyms are much more than geographical markers. They also describe the appearances, shapes, effects, characters or cultural and material resource bases of the larger cultural landscapes in which they are embedded. Historically, they have served as directional aids, oral histories, landmarks and statements of ownership, use, and occupation of traditional territories (Collognon 2006, 187-205; Wickens Pearce 2017).

the idea was particularly well-received by the general public, especially with the rise in hereditarian thinking inspired by Charles Darwin's 1859 publication of the *Origin of Species*.

One of the most compelling theories of cancer causation, though, was the idea that the disease was tied to industrialization and the rise in urbanization and economic growth that accompanied technological innovation. As has been described by historians James Patterson (1987, 24) and Charles Rosenberg (1998), it was thought that these factors, either independently or in confluence, were disrupting the important balance between humankind and their "natural" environments and were thereby inimical to a healthy body and mind (Clark 2013, 92). Eager to retain the productive powers of civilization, such as the march of modern infrastructure and commerce, many medical professionals focused their attention on identifying which particular aspects of the civilizing process, in particular, were responsible for the disease, so that they could swiftly be dispensed with. Stemming from the idea that cancer was a by-product of the urban-industrial complex, broadly construed, likely causes of the disease abounded, ranging from specific behaviors to luxury goods. For instance, tea and cosmetics were implicated in the disease's genesis. So too were alcoholic beverages and high protein diets (Wailoo 2012, 21). In the words of nineteenth-century London physician Charles H. Moore, cancer rates grew in tandem with the well-being of the nation and could be ascribed to "corn-laws and good living, to the discoveries of gold [and] to the good government which has reared to adult life" (Moore 1965, 209). As a result, many physicians working within the late nineteenth and early twentieth centuries believed that cancer was rare amongst Indigenous populations. In their eyes, Native communities represented a Rousseauian "state of nature" in which humans were free from not only modern cultural and societal constraints, but also physical ailments (Gil-Riano and Tracy 2016, 179-209). The apparent absence of cancer found within Indigenous communities captured the imagination of many early twentieth-century healthcare professionals. Viewing native populations as a sort-of time "portal" into an imagined, healthful Euro-American past, some researchers began to hypothesize that learning more about the ways and frequencies at which cancer manifested in Indigenous groups could elucidate which particular aspects of civilization were responsible for the spread of the disease in the general population (Radin 2013, 487). In this way, Indigenous lands and bodies could function as testing-sites, or laboratories, for white-settler theories about cancer and its underlying causes (Tuhiwai Smith 1999, 65; Farish 2013; Wiseman 2015).

Although individuals had speculated about the relationship between indigeneity and cancer since the mid-late nineteenth century (Tanchou 1844, 263; Williams 1895, 248), one of the first individuals to frame this correlation as a potential biomedical resource was Frederick Hoffman, chief statistician of the Prudential Insurance Company (Patterson 1987; Triolo and Shimkin 1969, 1617-1618). In his influential 1915 monograph *Mortality from Cancer throughout the World*, Hoffman argued that although cancer mortality was increasing "at a more or less alarming rate" across the globe, it did not appear to be rising among American Indians (Hoffman 1915, 151). This argument stemmed from a study he carried out in conjunction with the US Commissioner of Indian Affairs in 1914, whereby he surveyed a number of Indian Agency physicians working in seventeen different American states. In analyzing this data, Hoffman observed that: "Among some 63,000 Indians of all tribes living under a variety of social, economic, and climatic conditions, there occurred only 2 deaths from cancer as medically observed during the year 1914" (Hoffman 1915, 151). In interpreting this finding, he suggested that the relative absence of cancer within Native American populations demonstrated the "practical importance of further research into the underlying causes or conditioning circumstances of their apparent immunity" (Hoffman 1915, 151).

Hoffman was popular in Canada. During the mid-1920s he delivered a series of public lectures in Montreal, Toronto and Winnipeg (Hayter 2005, 76). In these speaking engagements, Hoffman recommended that Canadian medical officials leverage their proximity to Indigenous populations to carry out epidemiological research. Although he conceptualized cancer as a disease of civilization and believed that its origin had something to do with Western "modes of life," he stated that incidence disparities between Indigenous communities and the general (white) population had

never been “properly explained” (Hoffman 1925, 13). He suggested that an investigation into the habits, particularly in regard to diet, of local Indigenous populations would “make an extremely valuable contribution to the scientific study of [cancer],” and that it was this particular direction where cancer research was most urgently needed (Hoffman 1925, 9).

Hoffman’s plea for further research into the relationship between cancer and indigeneity was relatively well received within Canada. This was, in part, due to a number of government policies which made Indigenous lands, resources and peoples more accessible to researchers than they had ever been before. This was especially true in northern settings, as a number of state efforts to assert Canadian sovereignty over the Arctic created many opportunities for individuals to carry out medical research on northern Indigenous populations. Most of these efforts would take place aboard the Eastern Arctic Patrol (EAP), an annual government-sponsored voyage to the Eastern Arctic. Although initially established to maintain northern police posts, the 1940s saw the role of the Patrol expand substantially, as the provision of medical care to northern communities came to be seen as an essential part of the ship’s activities (Olofsson, Holton, and Imaapik 2008; Grygier 1994; Tester, McNicoll, Tran 2012). Over the course of the 1940s and 1950s, the patrol provided a “floating base for many itinerant scientists of many disciplines,” including health researchers (Phillips 1967, 264). In addition to conducting physical examinations, personnel aboard the ship would also track infant growth rates, take chest x-rays, collect blood-samples, and conduct pelvic examinations in the hopes that this information would not only offer insights into the current state of Inuit health, but also shed light on the mechanisms underpinning disease causation.<sup>3</sup> Perhaps the best-known mass-survey carried out aboard the EAP was a large-scale Inuit tuberculosis case-finding study that took place during the 1940s–1960s—the results of which were used to facilitate the mass evacuation of Inuit tuberculosis patients to southern Canadian hospitals for treatment (Olofsson, Holton and Imaapik 2008).<sup>4</sup>

Cancer surveys also took place aboard the EAP. One such study was carried out by Montreal physician Israel Rabinowitch in the mid-1930s. While working as a biochemistry professor at McGill University’s Department of Metabolism and Toxicology, Rabinowitch began to wonder if Inuit “could, if properly studied, furnish a good deal of light on some phases of medicine which are at present not understood” (Birchard 1935). In particular, he wondered if conducting biomedical studies in the Arctic could elucidate on the role of “fat metabolism, the effects of lead and other inorganic elements, and the possible bearing of diet” upon ailments such as cancer and heart disease (*ibid.*). With these questions in mind, in 1935 Rabinowitch joined the EAP on its 1935 summer voyage. Over the course of his trip, Rabinowitch performed general physical examinations, and collected blood and urine samples to take back to his Montreal laboratory for metabolic analysis. While carrying out this work, he also actively searched for cases of cancer. While he did find one suspected case of the disease, in the form of a 60-year-old Kinngait (Cape Dorset) man who presented with a small tumor on his lower lip (Rabinowitch 1936, 493), the lesion did not appear to be malignant. He therefore concluded that “cancer must be extremely rare in the Eastern Arctic” and speculated that this absence was likely due to hereditary factors, modes of food preparation, or some combination of the two (*ibid.*).

G. Malcolm Brown was another such Canadian physician who believed that Inuit lands and bodies could serve as valuable reservoirs of biomedical knowledge. Over the course of his career, he made several trips to the North as part of the Queen’s University Arctic Expedition—a series of research trips supported by grants from the Canadian government’s Department of National

<sup>3</sup>As Lanzarotta (2019) has rightly noted, healthcare providers aboard these ship-based clinics tended to be more concerned with collecting health data than providing clinical care. For more information on the forms of gynecological care provided aboard the Eastern Arctic Patrol, see Jennifer Fraser’s “Seizing the Means to Reproduction? The Colonial History of the Cytopipette (Forthcoming, 2021).

<sup>4</sup>The Canadian government’s handling of the tuberculosis epidemic is something that has been widely criticized. In 2019, Canadian Prime-Minister Justin Trudeau made a formal apology to Inuit for these forced medical evacuations—a process which saw many Inuit patients separated from their immediate and extended families for years at a time (CBC News 2019).

Health and Welfare, National Research Council, and Defence Research Board. Most of Malcolm Brown's research centered on the topic of cold acclimatization, as he believed that Inuit physiology was better adapted to extreme temperatures and that understanding the mechanisms underpinning these biological processes could help the Department of National Defence select personnel that were biologically better suited for northern climates. However, he was also interested in cancer epidemiology, as he believed that, in addition to Arctic militarization, Inuit biology could also be mobilized in the fight against chronic disease.

Brown undertook many trips to the Arctic from 1947–1954. Over the course of his fieldwork, he only identified one case of cancer. Treated in 1947 and 1948 for a “chronic productive cough,” this patient returned to the Salliq (Coral Harbour) medical station in 1949, complaining of a “severe left-sided headache” and exhibiting a “large mass at the upper end of the left sternomastoid” (Brown et al. 1952, 142). According to his family, he was “grossly emaciated,” and had been in bed for over a month (*ibid.*). When, on August 3, 1950, the man passed away from a “wasting illness,” Brown concluded that the tumour was likely epithelial in origin, and “because of its location and general appearance, had probably arisen in the thyroid” (*ibid.*, 143). This case not only suggested to Malcolm Brown that cancer could, in fact, occur among Inuit—but it also helped him devise a hypothesis about the disease's underlying etiology. For instance, he concluded that the most likely cause of the man's cancer was cellular irritation, based on his observation that Inuit frequently used “seal-oil stoves within the confines of a tent or igloo” (Brown et al. 1952, 143).

Many of these early studies were largely observational and opportunistic in nature. Although researchers were able to make judgments about the presence or absence of cancer in the Arctic, their data was collected on an ad-hoc basis and was, therefore, difficult to generalize to the larger Inuit population. This was, in part, due to the many practical challenges associated with conducting epidemiological research aboard a mobile vessel. In order to not get caught in the ice and be forced to winter in the Arctic, the EAP took place during the summer. This short window meant that the ship could only spend a few days at each of the twenty ports it visited over the course of its annual voyage. This not only limited what types of care could be provided to local patients, but also affected data collection. Although some Inuit actively sought out the EAP for medical care, others stayed away (Qikiqtani Inuit Association 2004, 30). Furthermore, mobility was a defining feature of Inuit society, and the fact that many Inuit spent the summer on long-range hunting trips, or living on the land in “usual” or “occasional” *ilagiit nunagivaktangit* meant that Patrol researchers were only ever able to access a small subsection of Inuit society (Rabinowitch 1936, 488).<sup>5</sup> These issues were also compounded by the fact that, during the early twentieth century, the field of chronic disease epidemiology was still very much in its infancy. In fact, up until the 1950s, the lack of a consistent tumor nomenclature, accurate methods of diagnosis, or standardized methods of cancer reporting meant that statistical studies of the disease were difficult, if not impossible, to carry out. This would all change in the mid-twentieth century, though, as the result of a number of developments taking place within the field of international health.

As we will see in the next section, the 1950s saw comparative studies emerge as an important tool for understanding the existence, extent, and nature of cancer risks in human populations. Although Canada's Indigenous peoples had been framed as a valuable resource for this kind of work since the early twentieth century, the impetus to conduct coordinated epidemiological and pathological studies of northern populations emerged from the promotional work of a few particularly vocal individuals, both within and outside of Canada. These individuals, based at prominent supranational health organizations like the International Union Against Cancer, not only helped strengthen the idea that Inuit cancer data could serve as a valuable biomedical

<sup>5</sup>In English, *ilagiit nunagivaktangit* (plural *ilagiit nunagivaktangit*) refers to a place used regularly for hunting, harvesting and gathering. For more information on the harsh realities and biopolitical logics underpinning itinerant forms of research and clinical care in northern settings, see Tess Lanzarotta's “The Disappearing Clinic” (2019).

resource, but also helped set up the tools, methods and infrastructures necessary to carry out large-scale investigations into this area of enquiry.

### International cancer collaborations: Epidemiology, autopsy, and geographic pathology

The International Union Against Cancer (UICC) was established in 1933 out of the need for a supra-national organization to coordinate cancer control on a worldwide scale (UICC 1980, 3). The creation of a group to promote the fight against cancer through research, therapy, and the development of social activities, had been a long time coming. Since the end of the First World War, cancer researchers had been fighting for a forum for their ideas to be exchanged, and their data shared (UICC 1980, 2). They also believed that some international cooperation was necessary to avoid research duplication, improve the circulation of knowledge, and promote the standardization of statistics so that cancer data could be comparable across nations. The first few years of the UICC were particularly active. During the 1930s, the organization developed an international quarterly devoted to cancer problems experienced throughout the world (the first of its kind), prepared an illustrated tumor nomenclature, and helped organize the Second and Third Cancer Congresses, held in Brussels, Belgium (1936) and Atlantic City, USA (1939), respectively (UICC 1980, 3). The activities of the UICC stalled during the late 1930s and early 1940s as a result of the Second World War. However, during the postwar period the UICC's executive committee was quick to re-establish the Union's head offices, and launch a new International Cancer Congress, which would ultimately be held in St. Louis, Missouri, from September 2-7, 1947 (*ibid.*, 4).

An interesting development that emerged out of this Fourth International Cancer Congress was the establishment of the International Cancer Research Commission (ICRC), a quasi-autonomous section of the UICC charged with promoting international cooperation and developing the Union's scientific research program (Cowdry and Gardner 1949, 758). By the time of the Fifth International Cancer Congress, held in Paris in July of 1950, the membership of the Executive Committee had been finalized, and ultimately included Dr. V.R. Khanolkar (Tata Memorial Hospital for the Treatment of Cancer for Allied Diseases, India), Dr. W.U. Gardner (American Association for Cancer Research, USA), Dr. C. Dukes (Great Britain), Dr. J. Clemmesen (Danish Cancer Registry, Denmark), Dr. P. Barcia (Uruguay), Dr. Bakke (Norway), Dr. J. Kretz (Austria), Dr. C. Ortega (Peru), and Dr. O.H. Warwick (National Cancer Institute; Canada) (Maisin 1966, 36). These men would serve as the driving forces behind the ICRC's focus on comparative studies of cancer. Many of these researchers had considerable experience with this type of research and were convinced that knowledge about cancer variations in different population groups would not only validate existing etiological hypotheses, but could also provide new insights into the causes and behavior of the disease. Thus, these men took steps to ensure that these types of studies were a key feature of the UICC's scientific program.

The first action towards achieving this goal was the "Symposium on the Geographic Pathology and Demography of Cancer," an international workshop that took place at Regent's Park College, in Oxford, England, from July 29-August 3, 1950 (Maisin 1952, 19). This meeting brought together a group of twenty well-known scientists from the fields of pathology, demography, experimental and clinical oncology, physiology, parasitology, nutrition, and human geography. In addition to Clemmesen and Khanolkar, some of the more prominent attendees included Richard Doll (Member of the Statistical Research Unit of England's Medical Research Council), Harold Dorn (US National Institutes of Health), Pierre F. Denoix (France's Institut National d'Hygiène) and Harold Stewart (Chief of the Pathology Section, US National Cancer Institute) (Preliminary Report 1950, 627-8; CCICMS 1951, 2-6). Symposium participants were asked to share and review the data currently available on existing geographic discrepancies in cancer patterns, as well as prepare a blueprint for future research on these variations through an integrated multidisciplinary approach (Higginson et al. 1992, xx; Higginson 1997, 135; Higginson 1998, 80).



Although the idea that the cancer was somehow related to the environment, broadly construed, can be traced all the way back to antiquity, geographic explanations of the disease intensified during the nineteenth and twentieth centuries. Interest in this subject arose from a number of factors. For instance, the increased collection and tabulation of vital health statistics over the course of the nineteenth century made it much easier to measure and compare disease rates. This period also witnessed the growth of medical cartography, which played an important role in solidifying the notion that a person's surroundings could have a real and observable effect on their health (Walter 2001; Arnold-Forster 2018). However, despite calling itself a symposium on the geography and demography of cancer, disease mapping was not the primary focus of this 1950s meeting. While maps did play an important role in symposia presentations, notions of "geography" deployed by attendees extended far beyond that of physical location. This was because, in organizing the meeting, Clemmesen had given "geographic pathology" a surprisingly flexible definition, arguing that the term could be used to refer to "any variations in the distribution of cancer in various parts of the world" (Preliminary Report 1950, 631). Although Clemmesen's definition was embraced by conference attendees, it also created ambiguity in terms of research methodology, and what kinds of populations these studies should target.

All of the talks delivered at the Regent's Park College symposium fit under Clemmesen's umbrella definition. However, in analyzing the content of the presentations delivered at the event, it is clear that attendees understood the concept of geography in markedly different ways. In fact, by the end of the symposium it seems that "geography" rarely referred to geography at all. Rather, it was used as a stand-in for a host of other factors. Some conference attendees, to be sure, used the term in a fairly traditional sense, and reported on research that compared the cancer rates of different countries, cities or towns. Others, however, used the term to describe discrepancies in cancer patterns between different social strata, religious affiliations, and ethnic groups.

While the notion of biological race was experiencing its political demise in the postwar period (partially as a result of UNESCO's four statements on race—the first of which was published on July 18, 1950, just one week before the symposium's start date), its pairing with other related ideas kept its conceptual flame alive. In this way, geography served as a powerful proxy for racial biology, as ideas of geographical difference were often mapped onto existing racial hierarchies and systems of classification. While true for many disciplines, this tendency was especially pronounced in medical research. As Osagie Obasogie and colleagues (2015) have shown, in an attempt to avoid biologically essentialist language, many health researchers would often conflate race with a host of social, environmental, cultural, and geographical factors. However, these multiple concepts served to reinforce each other—establishing racial difference as a powerful explanatory force.

This can be seen in the research of Symposium attendees, as discussions of geography were often couched attempts to bolster imperial ideologies as well as race-based classificatory schemes. Pierre Denoix's conference presentation, for instance, was titled "Cancer in French North West Africa." However, his paper focused almost exclusively on the cancer patterns of "African Negroes"—suggesting that race, rather than physical location was the variable he was most interested in analyzing. Denoix was far from alone in this regard. By the end of the symposium, attendees had heard presentations describing the high rates of liver cancer among Indigenous Indonesians, the low rates of cervical cancer found among American Jewish women, how cancer of the scalp seemed to be a significant health problem for Black North Africans, and that certain populations within India and Indochina appeared to be at a greater risk of developing head and neck cancer.<sup>6</sup> As we can see, the tendency to equate place with race was especially stark in cases where the cancer data being analyzed had been retrieved from colonial and settler colonial contexts (Kennaway 1948, 193).<sup>7</sup>

<sup>6</sup>Additional information on the history of geographic pathology and its relationship to Africa can be found in Mueller's "Cancer in the tropics: Geographical pathology and the formation of cancer epidemiology" (2019).

<sup>7</sup>It should be noted that the Dutch formally recognized Indonesia's independence at the end of 1949. However, by the time of the 1950 "Symposium of Geographic Pathology" many colonial infrastructures were still in place.

Despite the various ways in which “geographic pathology” had been understood and deployed by symposia attendees, most agreed that these findings were not only interesting, but important as well. They believed that this population level data could function as a “vast experiment of nature”—allowing researchers to develop and validate etiological hypotheses in a way that could bypass “the unquestionable moral blocks to human experimentation.” (Stewart 1951, p. 148). To promote, assist, and coordinate this growing field of study, conference participants petitioned the UICC to establish a special study section on the geographic pathology of cancer (*ibid.*, 630). Through the efforts of the UICC’s General Secretary J. H. Maisin, a “Committee on Geographic Pathology” was formed in December of 1951. In addition to serving as a point of contact and communication between investigators in different parts of the world, this committee would encourage the formation of national and regional study sections, procure grants-in-aid for research; organize international meetings in the field; and promote the establishment of statistical facilities and methods in regions where these resources did not currently exist. This group was also charged with creating a global tissue registry, which would allow researchers to compare lesions to determine whether the morphological features of cancer cells were the same or different across populations. These researchers argued that such a facility would be of paramount medical importance, as it would offer clues into cancer etiology by evaluating the impact of different demographical and “ethnological” conditions on tumor biology.

It was ultimately decided that Dr. Harold Stewart would preside over the committee as president (ICRC Session 1952, 111). He was a natural choice for this role. Not only was he himself a prominent cancer researcher, but he also had substantial administrative experience. In addition to being the Chief of the Laboratory of Pathology at the American National Cancer Institute (NCI), he had also recently established a Geographical Pathology Unit in Bethesda, MD with his NCI colleague Dr. A. Symeonidis in the early 1950s (Stewart 1951, 147-150).<sup>8</sup> Although the unit was still in its planning stages, Stewart imagined that it would leverage comparative analysis to shed light on the “intrinsic and extrinsic causes of human cancer” (*ibid.*, 147). He also had ambitions to create a centralized tumor registry. This is because Stewart believed that anatomical and histological studies of cancer cells could be used to validate cancer diagnoses, help elucidate the underlying cases of disease, and inspire better strategies for cancer prevention.

Medical interest in amassing and maintaining collections of anatomical specimens was not unique to the mid-twentieth century. Medical professionals have long tried to preserve human remains for the purposes of teaching and research, and examples of anatomical collecting and display can be found throughout history, from public dissections and natural history cabinets to anatomical museums and biobanks. However, a number of developments taking place within the late nineteenth and early twentieth centuries had made it much easier for individuals and institutions to accumulate large collections of biological specimens. The microtome facilitated the mass production of thin microscopic tissue sections, and the increasing use of paraffin wax and formalin to embed and fix tissues further engendered their long-term preservation (Titford 2006). As Hannah Landecker (2007, 36) has noted, these developments marked a watershed moment in anatomical collecting by freeing researchers from temporal exigencies by allowing them to examine tissue samples for “as long as necessary, at any time, over a period of months, repetitively.”

While the emergence of these new tools and techniques for handling tissues certainly contributed to the impulse to create large-scale collections of pathological material, another important factor was the rise of experimental biology. Usually traced back to the work of Jacques Loeb and Alex Carrel, biologists working within the late nineteenth and early twentieth centuries increasingly came to view organisms as raw materials that could be dismantled and reformed in novel ways. For instance, this period saw researchers isolate and disrupt the cells of developing embryos,

<sup>8</sup>For more information on the institutional context of the NIH during this period, see Warwick Anderson’s *The Collectors of Lost Souls: Turning Kuru Scientists into Whitemen* (2008).

induce cell division in unfertilized eggs, and even graft healthy or cancerous parts between animals in the attempt to shed light on manifestations and natural history of the disease over time (Wilson 2011, 12-13). Often predicated on the availability of human and animal tissue specimens, researchers began cultivating relationships with animal breeders and nearby hospitals to gain ongoing access to biological materials (*ibid.*, 62-63). As a result, academic institutions began to amass vast archives of tissue specimens. Usually comprised of left-over aliquots, these specimens would be placed in university freezers and storerooms where they would be retained for immediate or future use (Korn 2000, E4; Coppola et al. 2019).

By the mid-twentieth century, these repositories had grown so large that some researchers began to see these collections as important medical resources that should not only be protected but also made publicly available (Landecker 2007, 140-179; Radin 2013).<sup>9</sup> Harold Stewart, in particular, seems to have been at the forefront of many of these conversations. Stewart was himself involved in the experimental ethos that permeated much of early twentieth century biology and spent many of his early years as a cancer researcher carrying out tumor transplantation studies and trying to induce cancer of the stomach and intestines in laboratory mice and other animal species (Stewart 1939). Therefore, he was acutely aware of the scientific value of human and animal tissue samples, as well as the many challenges associated with procuring and preserving them (Stewart 1973, 4).<sup>10</sup> When Stewart became head of the Pathology Division in 1944, he (along with a team of three other pathologists) quickly created a comprehensive indexing system to compile and catalog the pathological material that had accumulated over the years from various NCI experiments (*ibid.*). Containing nearly three quarters of a million accessions, this collection would ultimately form the basis of the NCI's Registry of Experimental Cancers—a permanent collection of histological slides, paraffin blocks, autopsy findings, pathological diagnoses and experimental records of spontaneous and induced lesions in laboratory animals that, at the time of its establishment, represented one of the largest collections of normal and pathological material in the world (Stewart, 1976).<sup>11</sup> Stewart played a leading role in the creation of this registry, even after his retirement in 1969. When asked what inspired him to create this research resource, Stewart responded that he thought the NCI's collection of animal tissues constituted a “priceless” repository of medical information—one that not only could serve as a permanent archive of notable experiments, but could also drive future research through offering diagnostic consultation services and by offering “leads to epidemiological investigations, particularly through evidence of variation in naturally occurring tumors that might result from environmental factors” (*ibid.*, 448). It appears as though Stewart's enthusiasm for collecting pathological materials and developing more sophisticated systems for their storage and organization was not limited to experimental animals. As we can see from his work as Director of the Committee for Geographic Pathology, many of these same ideas—including the notion that normal and pathological tissues could be leveraged for the benefit of humankind—were the driving force behind his desire to collect and catalogue human tumor tissue as well.

After establishing the Committee's headquarters at the NCI, Stewart began devising a strategy to promote studies of geographic pathology at a global level (ICRC 1952, 90). He decided to draft a

<sup>9</sup>The development of tissue culturing, and the many research opportunities the technique engendered, also served to stimulate scientific interest in the collection and categorization of human tissue in the mid-twentieth century. For instance, the history of cell line biobanking started with the generation of the HeLa cell line in 1951 at Johns Hopkins Hospital, when medical staff obtained the first cancer cell line from a patient named Henrietta Lacks (HeLa). As Joanna Radin has shown, the International Biological Programme (1964-1974) also played a role in the history of biobanking, and brought many issues associated with the collection and long-term storage of human tissues to the fore.

<sup>10</sup>In his retirement, Stewart stated that he and his research team often cared for the experimental animals involved in his research recalling that when a janitor was not handy, he or one of his colleagues were responsible for finding a suitable food source, feeding the animals, and cleaning their cages.

<sup>11</sup>The Registry of Experimental Cancers was formally established in March of 1970, largely as a result of the organizing efforts of Harold Stewart.

list of all known persons and institutions that might be interested in the geographical and demographical study of cancer, alert them to the creation of the committee, and ask if they could encourage this type of research within their home countries (Stewart, 28 Jan 1952; Clemmesen, 11 Feb 1952). This list was completed by 19 February 1952 and by April of that same year Stewart, along with his colleague Clemmesen (who had been appointed the Executive Secretary of the Committee) had started contacting national governments and cancer organizations, asking them to report on whether or not they were currently involved in any comparative studies of cancer, or if they had any comments or suggestions for instituting studies of this nature in the future (Stewart, 4 April 1952).

In addition to reaching out to countries like Sweden (Stewart, 15 Aug 1952; Stewart, 25 Sept 1952), Israel (Dorn, 11 Sept 1952) and Switzerland (Dorn, 15 Dec 1952), in the summer of 1952, Stewart also contacted a number of prominent Canadian health researchers. As we have seen previously, members of the Committee of Geographic Pathology had a longstanding interest in measuring Black and Indigenous cancer patterns. However, Stewart's interest in Inuit cancer rates, in particular, appears to have begun when he stumbled across a reference to G. Malcolm Brown's 1947 research in Cape Dorset, the results of which were published in a 1952 edition of the journal *Cancer* under the title: "The Occurrence of Cancer in an Eskimo" (Brown et al. 1952). Intrigued by the article's content, Stewart decided to write to Brown to see if he could provide him with information about the current state of cancer research within the Canadian Arctic. (Brown, 13 Oct 1952). He was particularly interested in the prevalence of autopsy studies in circumpolar settings, and whether it would be possible for Inuit tissue samples to one day be incorporated into a centralized cancer registry center.

By the mid-twentieth century, autopsies were a fairly routine part of Canadian medical practice. In fact, some estimates suggest that by the 1950s, nearly half of all patients dying in North American hospitals were autopsied (Roberts 1978; Hill & Anerson 1992). In addition to being used to ascertain accurate cause of death information, autopsies were also an integral part of the field of oncology (Mitchinson 2005). Ever since the 1850s, researchers had been subjecting excised tumor tissue to microscopic analysis, and by the mid-twentieth century, biopsies had become a popular, though debated, method of cancer detection.<sup>12</sup> Although biopsies could be taken from living patients, autopsies provided an unparalleled opportunity for researchers to collect large volumes of cancer tissue from multiple sites across a metastatic cancer patient's body—something that was not usually feasible during the standard clinical course. This material could then be used to shed light on tumor morphology, improve the accuracy of hospital records and health statistics, or reveal hidden biological processes relating to cancer and its causes. While not all hospitals in Canada had the laboratory facilities and personnel required to undertake pathological analysis, many did, and the period from the 1940s to 1960s saw a number of autopsy-related research projects, many of which were funded by notable national funding bodies, including the National Cancer Institute of Canada, Canada's national charitably funded cancer research granting organization, established in 1947 (Edwards, Steinthorsson, & Nicholson 1953; Sellers 1963).

Despite their ubiquity in southern Canadian hospitals, though, autopsies do not seem to have been a common feature of northern medical practice. In his response, to Stewart, Brown stated that "post-mortem studies on Eskimos in the Eastern Canadian Arctic are not available in great number and often when autopsies have been carried out circumstances have meant that they were not as complete as one would have liked" (Brown, 13 Oct 1952). He thought that there was the possibility that some pathological materials might have been produced from cases where Inuit men and women had been transported to Southern Canadian hospitals for tuberculosis treatment.

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<sup>12</sup>As Wendy Mitchinson has noted, the interwar period saw some debates emerge over the safety of cancer biopsies in live patients, as some researchers believed that the procedure could facilitate the disease's spread (Mitchinson, 2013, 230).

However, he wasn't certain.<sup>13</sup> Brown therefore suggested that if Stewart was interested in pursuing the matter further, he should write to the Canadian federal government.

In November of 1952 Stewart took Brown's advice and wrote to the Canada's Department of Health and Welfare (DNHW), the body responsible for the provision of medical care in Indigenous communities. In his letter he asked if they were involved in any studies that looked at differences in the geographic and ethnic distribution of cancer, as this type of research had the potential to "throw a great deal of light on the etiology and pathogenesis" of the disease (Stewart, Dec 1952). In particular, Stewart was interested in whether the department had conducted any studies on "the types of tumors and their frequency in Eskimos" (Stewart, November 1952). From his experience, there was, "a great deal of difference in the site distribution of cancer in different populations throughout the world, and it would be important to know whether, first of all, the Eskimo develops tumors very frequently and secondly, whether such tumors, if they occur, are primary at the same sites that cancers occur in whites" (Stewart, November 1952).

Stewart's letter was answered by Arthur F. W. Peart, the Chief of the Epidemiology Division of the federal government's DNHW (Peart, 8 Aug 1952). Peart was sympathetic to Stewart's request, as he himself had a vested interest in understanding Inuit disease patterns. In fact, just a few years earlier, Peart had been involved in a large-scale study of a 1949 polio epidemic that had taken place in Igluligaarjuk (Chesterfield Inlet) and was aware of the many biomedical insights that research into Arctic bodies and environments could provide (Piper 2015). Peart replied that although he was most interested in the epidemiology of cancer, neither he nor his department had the resources available to carry out a study of this kind (Peart, 8 Aug 1952). However, he encouraged Stewart to reach out to Percy E. Moore, the Director of Indian Health Services (IHS). Not only was IHS the group in charge of supplying medical services to Canada's Indigenous population, but Peart also knew that Moore was an epidemiologist by training and, over the course of his nearly twenty-year directorship spanning the period from 1946-1965, had commissioned hundreds, if not thousands, of health surveys designed to assess the current state of health amongst Canada's Indigenous populations.

Stewart wrote to Moore in November of 1952. In addition to alerting Moore to the aims and goals of the Committee for Geographic Pathology, Stewart also drew his attention to the "possible untapped pathologic material from Eskimos" and urged IHS to "collect this material with as much clinical data as is available" (Stewart, 12 Nov 1952). He suggested that such an initiative could be undertaken with the "assistance and administrative support of pathologists and tumor boards associated with the National Cancer Institute of Canada" (Stewart, 12 Nov 1952). Stewart concluded his letter by stating that to facilitate this connection, he would put Moore in touch with his UICC colleague Orlando H. Warwick, who, in addition to being on the Executive Committee of the ICRC, was also the Director of the National Cancer Institute of Canada. In the meantime, he requested that Moore compile a list of all cases of Inuit cancer that either he, or his regional superintendents, had encountered through their work in either the Canadian Arctic or in Southern Canadian hospitals (Stewart, 12 Nov 1952).<sup>14</sup> One underlying motivation for this request was that these identified Inuit tissue samples, along with pathological materials obtained from places like

<sup>13</sup>Canada's medical evacuation program can be traced back to 1946 when the federal government decided to halt hospital construction in the North, and instead transport Inuit patients to southern Canadian healthcare facilities (Olofsson, Holton, and Imaapik 2008). Although this policy was implemented specifically for Inuit who were ill with TB, the latter half of the twentieth century would see this policy gradually come to include gynecological and obstetrical care as well as cancer diagnosis and treatment.

<sup>14</sup>To oversee and coordinate the provision of healthcare, Indian Health Services divided Canada into five administrative regions (Eastern Region, Central Region, Saskatchewan Region, Foothills Region, and Pacific Region). Each Region had its own administrative team, the nucleus of which was a medical superintendent, an administrative officer and a nursing supervisor trained in public health nursing. In 1945, the IHS appointed three medical superintendents to the regional offices in Ottawa, Winnipeg and Edmonton who were charged with the task of overseeing departmental activities in the Eastern, Central and Western Arctic, respectively (McCallum 2007; Young 1984).

Israel (Dorn, 17 March 1953), Syria (Dorn, 17 March 1953), and East Asia (Kouwenaar, 26 Nov 1952) could eventually be stored in a centralized tumor registry, housed at the US National Cancer Institute where they could be further studied and subjected to comparative analysis.

It appears that Moore did, in fact, work closely with Warwick to compile a list of all cases of cancer observed within Southern Canadian Indian hospitals. They would also collaborate on an epidemiological study which was published in the *British Journal of Cancer* in 1954 under the title “Cancer Among the Canadian Indians” (Warwick and Phillips 1954). Although this study aligned itself with the field of geographic pathology, explicitly citing the 1950 Regent’s Park College Symposia and drawing on the published work of the Committee’s membership, Warwick and Moore’s examination was a large departure from the pathological project that Stewart initially requested in the summer of 1952. Whereas Stewart was interested in identifying the unique histological features of tumors drawn from Inuit patients, Warwick and Phillips’ research was geared towards ascertaining cancer incidence. As a result, they relied on patient records instead of biospecimens, and opted for statistical analysis over pathological anatomy. Another key difference was that Warwick and Phillips’ 1954 paper focused on “Indian” as opposed to Inuit populations. The reason for these choices is not entirely clear. The decision to make southern (as opposed to northern) native communities the focus of their study might have stemmed from inadequate data. Although the mid-twentieth century saw Indian Health Services increasingly place Inuit bodies under state-surveillance, there might not have been enough recorded cases of cancer on-file to warrant a stand-alone investigation (Stevenson 2014; Drees 2013, 16; Piper 2011).<sup>15</sup> The choice to utilize statistical, as opposed to histopathological, methods might have similarly arisen from a lack of relevant pathological material, as suggested by Brown.

Although Warwick and Moore chose to take their 1954 study in a different direction from Stewart’s initial proposal his 1952 request for a histopathological study on Inuit tumors was not forgotten. In the years following the publication of “Cancer Among the Canadian Indians,” Moore would continue to look for opportunities to collect and analyze Inuit tissues, in the hopes that these biospecimens could shed light on the etiologic factors underpinning neoplastic disease. He would find the perfect vehicle for this type of research in the Arctic Medical Research Unit (AMRU). Funded by the Canadian Defence Research Board, this body was established in 1952 for the purpose of generating information about northern regions that would be of practical use to the Canadian Armed Services. Although this unit was, in its early years, meant to focus on “the defense aspects of [certain] fields of medical science,” one of the largest initiatives undertaken by this body was a large-scale autopsy study designed to determine the rates at which cancer occurred within Inuit communities in the hopes that this information would serve as a key to help “unlock” valuable secrets about the nature of neoplastic disease (Stevenson 22 Oct 1952; Wiseman 2015, 200).

### “On much thinner ice”: Transforming carcinomas into “Eskimomas” at the Arctic Medical Research Unit

The formation of the AMRU occurred in the context of increasing Arctic militarization taking place within the mid-twentieth century. Although some steps had been taken to establish a military presence in Canada’s northern landholdings in the years leading up to and following the Second World War, these efforts would intensify amidst increasing Cold War concerns over Arctic sovereignty. From the 1950s onwards, the North became a stage for tight military escalation between the United States and the Soviet Union. Although the likelihood of an invasion or the establishment of enemy lodgment in the Arctic was remote, Canada undertook a number of

<sup>15</sup>In addition to mass health surveys, the federal government also tried to serialize Inuit bodies through Canada’s Eskimo Identification System—a mid-twentieth century initiative whereby the federal government required Inuit to wear small, numbered disks (Dunning 2012).

precautionary measures—including the establishment of the Distant Early Warning (DEW) System. Comprised of sixty-three radar stations strung across the 69<sup>th</sup> parallel, roughly 300km above the Arctic Circle, the DEW line was designed to detect incoming Soviet bombers and provide early warning of any sea-and-land invasion (Wiseman 2015, 199).

Scientific research was another important feature of Canada's national and international security posture. From the 1950s onwards, the North experienced an influx of researchers and bureaucrats, as the federal government poured hundreds of millions of dollars into the development of northern research infrastructures. Over the course of the period from 1947-1950, a series of government funded research laboratories were established, including the Defense Northern Research Laboratory in Kuugjuaq (Fort Churchill), Manitoba; the Pacific Naval Laboratory in Esquimat, British Columbia; the Operational Research Division at the University of Ottawa, Ontario; and the Defense Research Medical Laboratories in Toronto, Ontario. Although these facilities were spread across the country, many of their research activities were focused on issues related to northern defense. The AMRU is no exception as it, too, was an outgrowth of Cold War militarization and strategic policymaking.

The AMRU emerged out of a conversation between Joseph Doupe and James Stevenson, two physiology professors based at the University of Manitoba and the University of Western Ontario, respectively. Both of these men had been involved in a Defense Research Board (DRB)-sponsored research project on cardiovascular and nutritional-metabolic diseases during the early 1950s. Throughout this project, these men noticed the lack of “adequately trained and educated people,” like themselves, who were “interested in the defense aspects of [certain] fields of medical science” (Stevenson, 22 Oct 1952). Believing that most researchers tended to focus on the theoretical, over the practical and applied, aspects of medical research, Stevenson and Doupe wondered if it would be profitable to offer “certain professional positions of a semi-DRB, semi-university nature” (*ibid.*), so that individuals could continue their theoretical work within the academy, while also contributing to the nation's security. In 1952 Doupe and Stevenson brought their idea to Omond Solandt, the Chairman of the Canadian Defense Research Board (DRB). Solandt was receptive to their proposal, believing that such a hybrid position had the capacity to “attract able men to this vital work” (*ibid.*). It was thus decided that this new unit would be based at the University of Manitoba, as its close proximity to Churchill's Defense Research Northern Laboratory provided opportunities for productive collaboration (MacCharles, 13 Sept 1955). While the plans for the unit were initially much more grandiose in nature, the partnership between the University of Manitoba and the DRB only gave Doupe and Stevenson enough institutional support to create one paid position so that a medically qualified member of the University's staff could devote themselves to the study of Arctic medicine (Doupe, 18 Nov 1952).

Although a number of candidates were considered for the position, the physician Jack Hildes was ultimately selected as the unit's director (Doupe, 14 May 1954). Hildes was born in Toronto in 1918 (Brosnahan 1984). He spent his early years living in Northern Ontario. However, in 1934 he returned to Toronto to study medicine. Upon graduation, Hildes served with the army medical corps in India and Burma during the Second World War, where he quickly rose to the rank of Lieutenant Colonel. He then moved to London, England to pursue post-graduate work at Hammersmith Hospital (MacCharles, 31 Dec 1954). Once his post-graduate studies were complete, he took up an assistant professorship at the University of Manitoba's department of physiology (Carr and Beamish 1999, 163). Although he had no background in cold adaptability studies, or Arctic medicine per se, Hildes did enjoy a close personal and professional connection with Doupe.<sup>16</sup> In addition to being colleagues

<sup>16</sup>In addition to having close ties with Doupe, Hildes also came highly recommended by Dr. OG Edholm, a physiologist and “polar human biology” expert based at England's Medical Research Council Laboratories in Holly Hill. Also based in Hampstead, London, it is likely that Hildes was introduced to Edholm over the course of his graduate education (Edholm 20 Jan 1955).

at the University of Manitoba's Department of Physiology, these two men also served together in Burma from 1941-6 (Carr and Beamish 1999, 163).

Since the AMRU was funded by the Department of Defense, it was expected that the information generated from this unit would be of practical use to the Canadian Armed Services. Hildes was therefore encouraged to carry out studies on cold injury, along with cold acclimatization research. Much like Kaare Rodahl's work at the Air Force's Arctic Aeromedical Laboratory in Fairbanks, Alaska, the impetus behind this type of research was to acquire a "better understanding of the factors affecting human efficiently in the Arctic so that they could be better managed in military contexts (Farish, 2013; Condo, 22 June 1954). The science of cold weather physiology was particularly amenable to this goal. In addition to being used to develop better means of personnel selection, contemporaries believed that this knowledge could also feed into clothing and equipment design (Spencer 1997, 247; Wiseman 2015,194).

Shortly after the unit's inception, Hildes' began to liaise with a number of Canadian and international scholars involved in the field of cold tolerance research. For instance, Hildes visited the Scott Polar Research Institute at Cambridge, UK; the Body Temperature Regulation Unit at St. Mary's Hospital, UK; the Quartermaster Corps Research and Development Centre in Natick, Mass; and the Arctic Aeromedical Research Laboratory in Fairbanks, Alaska (Blake, 7 Feb 1957). He also met with the Canadian researcher G. Malcolm Brown, who, in addition to searching for cases of circumpolar cancer, was also involved in the field of cold tolerance research (Hildes, 18 April 1955). These meetings provided him with the necessary information to conduct his own research on the topic, and in the mid 1950s, Hildes published a number of papers on the subject of cold adaptability and cold injury, including "A Report on the Treatment of Hypothermia," (Hildes 1 March 1955) and "Some physiological aspects of Arctic Warfare (Hildes 1956a).

While the majority of the AMRU's research activities from 1953-55 centered on issues that were of obvious or potential military importance, during the late 1950s Hildes interest started to shift away from cold acclimatization, and towards the study of disease epidemiology. Hildes' interest in this subject seems to have emerged in the late 1950s, when he undertook a visit to DEW-line sites in the Spring of 1956. An Executive Staff Officer of the Canadian Forces Medical Council had expressed misgivings about the adequacy of the living quarters provided at the radar stations, so Hildes was asked to assess the hygiene of the facilities to see if they posed a potential public health problem. Although he found the stations to be in good working order, his investigation exposed him to the Arctic's unique health challenges. It also gave him an opportunity to connect with many other individuals involved in Indigenous health administration, such as PE Moore (Hildes 9 April 1956). Inspired by these experiences, Hildes began lobbying the federal government to take further action against Arctic medical issues, as Inuit not only appeared to be "more susceptible to tuberculosis and certain virus diseases than Europeans," but also to "parasitic infections normally not seen in southern Canada" (Hildes 1956b). He suggested that in addition to hiring additional personnel, they should also "make laboratory facilities for the detection of such diseases available," as he believed that these modifications would not only help preserve the health of Canada's military service workers but would also help researchers follow "the incidence of diseases in the far northern regions" (*ibid.*, 6).

Hildes would maintain this interest in Arctic epidemiology over the course of his career and would frequently collaborate with Moore on a variety of IHS-sponsored projects throughout the 1950s. For example, in 1957 Hildes joined the Eastern Arctic Patrol's 1957 summer voyage (Beaton, 15 July 1957). While he stated that the purpose of his mission was to observe the state of living conditions, hygiene, and sanitation of Inuit and "isolated white settlements" located in the North" (Hildes, 24 Oct 1957, 1), his attention ultimately shifted to the subject of human health. In his final report, he engaged in an exhaustive discussion of the many diseases he observed over the course of the ship's two-month-long mission, including tuberculosis. Hildes also made reference to a number of ailments that appeared to occur less frequently amongst Inuit populations, including



measles, arteriosclerosis and cancer.<sup>17</sup> Hildes was also involved in the IHS' 1958 Central Arctic Medical Survey—a summer-long voyage that saw the Hudson Bay Company supply ship “Rupertsland” visit three Inuit settlements located on the west coast of Hudson Bay: Arviat (Eskimo Point), Igluligaarjuk (Chesterfield Inlet) and Kangiqliniq (Rankin Inlet) (Reed and Hildes, 1959). On this mission, Hildes assisted University of Manitoba ophthalmologist Harold Reed carry out an epidemiological study on the incidence of corneal scarring among Inuit.<sup>18</sup>

However, even while engaging in these more epidemiological-oriented projects, Hildes remained firmly committed to the task of carrying out the research program set up by the Canadian Department of Defence. He often qualified his epidemiological observations by emphasizing their relevance to Canada's Armed Forces, sometimes by adding the corollary that the “health and welfare of all the widely separated and sparsely inhabited communities of the Arctic are of considerable importance to the . . . defensive operations now being carried out in these regions” (Hildes, 24 Oct 1957). However, in the late 1950s, as the result of a series of national and international events taking place in the field of global health, the Department's research priorities would slowly start to shift away from cold tolerance, and towards studies of geographic pathology.

In the years following his correspondence with Moore and Warwick, Stewart continued to take steps to create a centralized cancer registry for pathological tissues from around the world. Realizing that the UICC did not have the budget or manpower necessary to support this initiative (as such a facility would require laboratory space, in addition to two senior pathologists, a cancer statistician, a linguist secretary, clerk typist, and several histopathological technicians) (Stewart 1951, 147), in the summer of 1955 Stewart decided to reach out to the World Health Organization (WHO) to see if they might be willing to provide funds or other institutional support (Stewart, July 1956). He hoped that the WHO would be sympathetic to this request, as they had supported similar initiatives in the past. For instance, in June of 1949, in response to cancer's “growing importance in the world” (World Health Organization 1949, 6), the WHO established a Subcommittee on the Registration of Cases of Cancer to deliberate on the statistical issues arising from the study of the disease and draft a standardized set of solutions that would improve the collection and calculation of cancer data (World Health Organization 1949, 6-7).

In June of 1955 Stewart submitted a proposal to the Executive Board of the WHO, asking them to extend their network of facilities for biological standardization and for the exchange of information on cancer through supporting the creation of a reference center that could assist national institutions and services in the diagnosis and definition of pathological tissues (World Health Organization 1956, 81). He suggested that that this repository be held at the US Armed Forces Institute of Pathology (AFIP) in Washington, DC (Consultant Group for the World Health Organization Cancer Program 1955).

Founded in 1862 on the grounds of the Walter Reed Army Medical Centre, the Armed Forces Institute of Pathology (AFIP) was the central laboratory of pathology for all branches of the armed forces (McCook, 2011). It was created in the hopes that by careful collection, comparison and study of the anatomical wreckage of war, “there might emerge a body of knowledge and understanding which would in time lead to the lessening of human suffering and the saving of human

<sup>17</sup>The fact that Hildes included measles in this list is interesting. Measles did affect northern communities during the mid-twentieth century, and many medical professionals and government officials were aware of the significant health challenges the disease posed to the Inuit. In fact, in 1954, Arthur Peart published a ten-page-long journal article in the *Canadian Journal of Public Health* that described how Indian Health Service physicians responded to a measles epidemic that had taken place in Ungava Bay in the winter and spring of 1952. However, it should be noted that Peart characterized the outbreak as a “virgin soil” epidemic, meaning that he and his research team believed that prior to the 1950s, Indigenous communities living in the Eastern Arctic had no previous contact with the disease. (Peart 1954).

<sup>18</sup>In his later years, Harold Reed would also become interested in the collection and storage of human tissue, and would play an instrumental role in setting up the first eye bank in Manitoba for corneal grafts (Anon, 2010).

life” (Henry, 1964, 1). By the mid-twentieth century, AFIP was the primary storage facility for pathologic specimens gathered over the course of US military endeavours and would come to house millions of glass slides, paraffin-embedded tissue blocks, and wet specimens.<sup>19</sup> Stewart believed that AFIP was the perfect place to house his tumor tissue registry. Not only did AFIP staff members already have experience in the collection and analysis of pathological materials from around the world, but the Institute was also located in Washington, DC, in close proximity to the American National Cancer Institute—the place where Stewart and his Geographic Pathology Unit was based.

Stewart’s proposal was reviewed by the Executive Committee of the WHO in January of 1956. In discussions, WHO board members were largely favorable to his proposition. They noted that the WHO was already involved in setting up international disease surveillance laboratories designed to ascertain “the world distribution of prevalence of strains of important pathogens” (such as the WHO’s global network of Influenza and Brucellosis centres) and thought that getting involved in the establishment and upkeep of pathology centres was a natural extension of this kind of work (Brady, 1956). They also seemed to share Stewart’s opinion that tissues drawn from different geographical locations were sources of valuable cancer knowledge. For example, American representative Frederick Jonathan Brady stated that subjecting specimens obtained from settings with “bizarre” and “unexplained” disease distribution patterns to pathologic analysis could “uncover clues into the etiology of cancer not obtainable by [other types of] laboratory research” (ibid., 1956). These discussions ended with the Executive Committee putting forward a request to the WHO’s Director-General to “explore the possibility of WHO’s organizing centres in several places in the world which would arrange for the collection of human tissues and for their histopathological examination” (Sobin, 1981, World Health Organization, 1956, 81).<sup>20</sup> Although it would take a few years, a Division of Geographic Pathology was established in AFIP in February of 1961 under the direction of the pathologist Chapman H. Binford (Henry, 1964, 385).

Stewart’s ongoing efforts to create a global cancer biobank coincided with the 13<sup>th</sup> Meeting of the Canadian Defense Research Board Panel on Arctic Medical Research held in Toronto in October of 1956. Aware that many national and international health organizations were making the collection and calculation of health data a priority (World Health Organization 1956, 81), many panel participants pointed to the “unsatisfactory state of mortality statistics amongst Eskimos” (Hildes, 25 July 1958). These researchers held that the use of death certificates to attain this information were “practically useless since a doctor is often not in attendance [at the time of illness] and, except in the case of death by violence, the information . . . regarding diagnosis is unreliable” (Lederman et al. 1960, 5).

G. Malcolm Brown and Percy Moore both sat on the Panel for Arctic Medical Research and were likely the driving forces behind these discussions. Likely aware that the World Health Organization had just endorsed Stewart’s project of creating a global reference center for pathological tissues earlier that year (World Health Organization 1958, 81), it is possible that these men saw the Defence Research Board’s newfound interest in health statistics as an opportunity to realize Stewart’s 1952 request for the increased collection and analysis of Inuit cancer tissue. While discussions about the reliability of northern health statistics didn’t initially touch on the subject of chronic disease, by the end of the meeting it was decided that Hildes would conduct an “autopsy study of Eskimos and northern Indians” for the purpose of establishing the cause of death in individual cases, as well as “defining the incidence of certain types of diseases in Eskimos of particular

<sup>19</sup>As Susan Lindee (1998; 2020) has noted, the Armed Forces Institute of Pathology also housed the bodily materials of Japanese atomic bombing victims.

<sup>20</sup>In addition to agreeing that the storage and study of cancerous tissues drawn from different populations could have potential etiologic value, the WHO Executive Committee also hoped that Stewart’s tissue repository could serve as a potential resource for the newly formed Study Group on Histological Classification. Charged with the task of developing histologic definitions and a uniform nomenclature for tumors of various organs, this group would ultimately come to produce the influential monograph series: *The International Histological Typing of Tumors*.

interest,” including cancer (Hildes, 25 July 1958). To carry out this work, the panelists suggested that Hildes partner with Alexander Cameron Wallace, an Associate Professor in pathology at the University of Manitoba.<sup>21</sup> Wallace had just carried out a number of post-mortem examinations in Hanningajuq (Garry Lake), in the wake of a two-year-long famine that had resulted in widespread starvation and was responsible for the death of fifty-three Inuit community members.<sup>22</sup> Interested in extending this work, Wallace was receptive to the idea of carrying out a long-term autopsy study with Hildes. Thus, with the blessing of the DRB’s Panel on Arctic Medical Research and the Department of National Health and Welfare, along with the promise that “every possible assistance and support [would] be given to the project,” in the summer of 1958 these two men commenced their research (Defense Research Board 1959).

Although the DRB had commissioned Hildes and Wallace to carry out an autopsy study, these two researchers would not carry out their own post-mortems right away. Instead, they would rely on autopsal data obtained from a network of pathologists spread across North America. For the first year of their project Hildes and Wallace engaged in a thorough investigation of all post-mortem examinations conducted in “the various Indian and Eskimo hospitals [located] across the country” (Hildes, 25 July 1958). By the end of 1959 they had gained access to the results of ninety-one autopsies of Inuit patients, including thirty post-mortem examinations preformed at Edmonton’s Camsell Hospital, twenty at Hamilton’s Mountain Sanatorium, fourteen at the Fort Churchill Military Hospital, eight at the Clearwater Lake Sanatorium at Le Pas, and five cases at Manitoba’s St. Boniface Hospital. In this total they also counted the twelve autopsies Wallace had performed at Hanningajuq (Garry Lake) in 1958, and two autopsies by the Manitoban bacteriologist Dr. Wilt that had been carried out in Igluligaarjuk (Chesterfield Inlet) as the result of the polio outbreak that had taken place there in 1949 (Hildes 1959).<sup>23</sup>

Since there was no standardization in how these autopsies were preformed, or how much of the excised tissue was preserved (for instance, some researchers saved the whole tissue block, while others only retained certain microsections), Hildes and Wallace were not sure if these examinations could be “legitimately utilized” for an effective study on cancer incidence within the Canadian Arctic. To get guidance on this issue, they reached out to “several authorities in geographic pathology” to see if there was any way that this data could be turned into a valid study (*ibid.*). Although the names of particular individuals were not disclosed in Hildes’ writings, it is likely that these authorities were somehow connected to Harold Stewart or the larger UICC Committee on Geographic Pathology. These anonymized experts advised that Hildes and Wallace’s investigation could “only be valid if pursued for several years in order to obtain sufficient volume for statistical studies” (*ibid.*). As a result, it was suggested that (in addition to conducting additional post-mortem examinations) it might be beneficial to initiate correspondence with individuals conducting similar studies in Alaska and Greenland, “with a view to possible pooling and comparison of some results” (*ibid.*).

Over the next few years Hildes and Wallace networked with a variety of institutions and scholars in an attempt to secure additional autopsy material. In 1959 they approached Dr. McKinnon, the superintendent of the Whitehorse General Hospital. In addition to discussing possible “causes of morbidity and mortality amongst the Indians of the Yukon Territory,” Hildes also asked if he might be willing to appoint someone to conduct post-mortem examinations of Inuit patients

<sup>21</sup>Wallace would later go on to work as an Assistant Professor in the Department of Medical Research at the University of Western Ontario (1961 onwards). Here, he would establish the Cancer Research Laboratory. D Haust, “The Life and Work of Professor Alexander Cameron Wallace,” *Pathology* 32 (2000): 301-303.

<sup>22</sup>As has been noted by many scholars, this famine was likely exacerbated by the shifting patterns of caribou migration brought on by increasing settler incursions, combined with a number of federal policies that curtailed the administration of relief. This famine would ultimately result in another forced relocation of remaining community members to Baker Lake by the Department of Northern Affairs (Tester and Kulchyski 1994, 238; Hamilton 1994, 67).

<sup>23</sup>For more on Wilt, and the research he carried out in the context of the 1949 polio epidemic in Chesterfield Inlet, see: Liza Piper, “Chesterfield Inlet, 1949, and the Ecology of Epidemic Polio.” *Environmental History* 20, no.4 (2015): 671-698.

(*ibid.*)<sup>24</sup> At the same time that they were involved in these networking efforts, Wallace and Hildes began to wonder if northern epidemics with high mortality rates could also serve as a source of cadavers. For instance, upon hearing of a recent influenza outbreak that had taken place in Kugaaruk (Pelly Bay) resulting in four to six deaths, Hildes wrote to PE Moore to ask if it would be possible for the AMRU to gain access to these bodies to see if any cases of cancer could be found. Moore replied that it was a sensitive time for many Inuit families, and that he did not believe that it was a good idea to “attempt to secure permission from the Eskimo relatives of the deceased for autopsies” (Moore, 28 March 1960).<sup>25</sup>

Moore’s tepid response to Hildes request gestures towards the difficult and often questionable nature of acquiring Inuit remains. Scholars have long drawn attention to the contested and fraught nature of medical dissection, including its overreliance on the bodies of marginalized populations, often procured through exploitative means of exhumation and exchange (Davidson 2007; Sappol 2004; Fabian 2010; Turnbull 2017; Ramey Berry 2017; Doubek and Grauer 2019). While the AMRU’s Arctic cancer research is far removed, both spatially and temporally, from the body-snatching, grave-robbing and other illicit means of obtaining cadavers undertaken by medical professionals during the seventeenth to the nineteenth centuries, Hildes and Wallace’s autopsy study is similarly bound up with systems of oppression. This is, in part, because one of the biggest factors underpinning the availability and use of Inuit bodies and body parts for the purposes of scientific research was the Canadian government’s creation of a segregated healthcare system.

In an attempt to isolate and separate Native men and women from the rest of the population, the Department of National Health and Welfare established a series of Indigenous-only healthcare facilities across the country—the majority of which were located on or near reserve communities in southern Canada. As discussed previously, over the course of the twentieth century Inuit patients were increasingly taken from their communities to southern Canadian hospitals to receive treatment. Although Indian Health Services had a robust system in place to facilitate this movement of patients south (primarily via the Eastern Arctic Patrol) very few protocols were in place to address what would happen if and when these patients passed away. Much like many other aspects of the medical evacuation process, government decision making surrounding Indigenous internment was characterized by coercion, experimentation and tragedy.

Although there is some evidence that hospital staff attempted to relay medical information back to patients’ families, getting messages to remote northern communities was difficult. Hospital administrators could not speak Inuktitut, leading to much confusion about the identity of Inuit patients, both living and deceased (Stevenson 2004, 55). This meant that, oftentimes, news of a patients’ death was not communicated back to his or her home community. Furthermore, the Canadian federal government was resistant to cover the embalming and transportation costs associated with repatriating patients’ bodies, and so the onus was placed on hospitals to dispose of these remains. Whereas some hospitals placed deceased patients in unmarked graves, others held on to them for the purpose of scientific research (Lux 2016, 122). As Maureen Lux has shown, many Indian Health Service hospitals maintained large museums of Indigenous biospecimens. Although some these materials would have been taken from living patients, some would have also been obtained through post-mortem analysis, which, under federal policy, could be undertaken by healthcare professionals without having to secure family consent (Lux 2016, 122). The Charles Camsell Indian Hospital located in Edmonton, Alberta, for instance, housed a particularly large

<sup>24</sup>McKinnon ultimately turned down Hildes’ request, stating that the lack of an on-staff pathologist, combined with an ill-equipped morgue made it impossible for the Whitehorse General Hospital to assist the AMRU with this project.

<sup>25</sup>Moore’s comments also allude to a tacit awareness of the many ways in which settler-colonial policies and practices impacted the spread and effects of communicable disease in northern settings. Many scholars have drawn attention to the relationship between infection rates and Canadian Arctic administration, as increased Arctic militarization, combined with the growth of the Canadian mining industry and other forms of resource extraction saw greater and greater numbers of non-Inuit people move through northern settings in transient and mobile ways, facilitating the spread of disease (Mitsuyo Ishiguro 2008, 52-69).

collection of Indigenous remains that would, as we will see, play an important role in Wallace and Hildes cancer research (Lux 2016, 60).

These practices serve as important reminders of the pervasive and ongoing nature of colonial oppression and frontier violence. In addition to offering yet another example of how Indigenous peoples' biological resources have been exploited for scientific knowledge production, they have also been a persistent source of unresolved grief for Inuit families who, for decades, have wondered if their loved ones have passed, or where their remains might be. Thus, when the Hildes and Wallace's cancer investigations are discussed, they should be understood in this context, as their research was crucially dependent on bodies acquired involuntarily, in disregard of patient and family wishes and desired burial practices.

By the late 1950s, Hildes and Wallace acquired enough autopsy data to carry out a retrospective study. Combining their data from the ninety-one autopsies conducted on Canadian Inuit patients between the years of 1948-1959 with pathological information drawn from fifty-three post-mortem examinations conducted between 1956 and 1958 at the Arctic Aeromedical Laboratory at the Ladd Air Force Base in Alaska by researcher Arthur W. Gottman (1960), Hildes and Wallace were able to identify twenty-six "cases of histologically proven malignancies which occurred in Central Arctic Eskimos," over a ten-year period (Lederman et al. 1960). These cancers included carcinomas of the uterus, lung, breast, liver, ovaries, stomach, esophagus, colon, nasopharynx and parotid gland (ibid., 4-5). Although Hildes and Wallace concluded that the cancers observed within Inuit populations were "generally the same as those seen in white people," they stated that when it came time to consider the frequency of cancer deaths or the incidence of specific cancers, they were "on much thinner ice" (ibid., 5). Their study indicated that Inuit seemed to be particularly vulnerable to salivary gland cancer. According to Hildes, "of all the cancers in Eskimos we know about, approximately 15 percent are malignancies of the parotid gland, compared to 2-3 percent for Canada as a whole" (ibid.).

To follow up on this unusual finding, in 1960 Hildes and Wallace launched a spin-off study focused on validating the incidence of salivary gland tumors within Inuit populations. In addition to recruiting J.T. MacDougall, a professor of surgery at the University of Manitoba, and J.M. Lederman, the Chairman of the university's pathology department (Quinonez 2007, 136), they also partnered with PE Moore's Indian Health Services, and the National Cancer Institute of Canada (Wallace et al. 1963, 1338). To carry out this project, Hildes, Wallace, McDougall, and Lederman approached all of the "hospitals in Canada where Eskimos were known to have been treated," searching for cases of salivary gland cancer (ibid.). They were able to secure tissue blocks/microsections of fourteen salivary gland tumors, along with all associated case-files, which contained clinical information about the disease's progression and the course of treatment (ibid.). Drawn from hospitals and healthcare facilities within Edmonton, Winnipeg, Montreal, Halifax, and Aklavik, Hildes and colleagues would proceed to analyze this pathological information both histopathologically and statistically. While Hildes, Wallace, and MacDougall took charge of the histological aspect of this research, the statistics were done by Alex J. Phillips, a National Cancer Institute of Canada staff-member who had collaborated with Orlando H. Warwick on the Institute's 1954 study on "Cancer Among the Canadian Indians" (ibid.).

The findings of this study were ultimately published in a 1963 edition of the *Canadian Medical Association Journal* entitled: "Salivary Gland Tumors in Canadian Eskimos" (Wallace et al. 1963). This paper outlined their main research result: that both the incidence and type of salivary gland tumors experienced within Inuit communities differed from those found in other North American populations. Whereas salivary gland tumors only accounted for 0.43 percent and 0.25 percent of cancers experienced in Chicago and Los Angeles, respectively, they accounted for 25 percent of all cancers experienced within the Inuit population (ibid., 1347). Furthermore, rates of salivary gland cancers in northern Canada were up to thirty times higher than rates found in Saskatchewan (one of the first Canadian provinces to set up a comprehensive system of cancer reporting) (ibid.).

More striking than the incidence of salivary gland tumors, though, was their character, as nine of the fourteen tumors included in the study's sample showed interesting variations in "appearance and behavior," suggesting that cases of "Inuit cancer" were not only unique on an epidemiological level, but on a biological level as well (ibid., 1349). According to Hildes, Wallace, MacDougall, and Lederman, these tumors all shared four common characteristics. Firstly, they all involved the parotid gland, and presented clinically as a large mass at the angle of the jaw. They were all also "grossly large and nodular," showing "local invasion of a fairly pronounced degree" (ibid.). Microscopically, they all consisted of atypical epithelial cells that formed "no demonstrable structures to indicate the cell of origin, such as duct, glandular, transitional, or epidermoid" (ibid.). Finally, lymphoid tissue appeared to be intimately associated with the epithelial tumor in the majority of sections in all cases. In spite of these identifiable characteristics, these tumors did not seem to belong to any pre-existing diagnostic category. For instance, they did not seem to align with any of four types of carcinoma, including six subtypes of adenocarcinoma, identified in the "Tumors of the Major Salivary Glands" fascicle of the *Atlas of Tumor Pathology* – a monograph published by the Armed Forces Institute of Pathology in 1954, which marked one of the first attempts to develop a uniform classification of tumors by histological type (Foote and Frazell 1954). Researchers commented that these tumors bore some resemblance to the lymphoepithelial lesions of the parotid gland described by pathologists Fein and Godwin in 1940 and 1952 respectively (Fein 1940; Godwin 1952); however, since these individuals regarded these tumors as benign, the malignant nature of the lesions found within Inuit patients suggested that they represented a disease category that had not yet been classified in Western pathology atlases.

While the original purpose of Hildes and Wallace's research was to standardize the collection of Inuit health statistics, presumably for the purpose of generating novel hypotheses about cancer's underlying causes, their analysis of their collected tissue blocks and microsections offered little information on how or why these tumors were manifesting. In their 1963 publication, Hildes, Wallace, McDougall, and Lederman admitted that despite extensive histopathological analysis, "the increased incidence of salivary gland tumor in Canadian Eskimos . . . [could not be] readily explained." However, they did suggest that "racial purity" (Lederman et al. 1960, 7) or genetics (ibid., 9) might play a role in generating this epidemiological and pathological anomaly. They also pointed to the possible impact of environmental factors, such as the Inuit habitat (characterized by a treeless, arctic environment), or diet. Contrary to many nineteenth- and early twentieth-century cancer researchers, Hildes and Wallace did not attribute this type of tumor to "civilization." These researchers argued that this was because "most of the Eskimos in the present series lived largely in the traditional manner," and had not yet adopted Western customs concerning, "food, clothing, housing and occupation" (Wallace et al. 1963, 1349). In reality, this was a flagrant overgeneralization. The patients whose tissue blocks were used for this study came from a variety of different interior and coastal communities spread across Inuit Nunangat. Although experiences would have varied from community to community, by the time Wallace and Hildes' 1963 study was published, most Inuit would have been living with a number of government policies designed to encourage more centralized and permanent patterns of settlement, be they family allowances, educational and health and welfare programming, forced relocations or the provision subsidized housing (Damas 2002). Furthermore, some of these patients had actually resided in southern Canadian urban centres for the majority of their lives, as in the case of one patient who was seemingly born and raised near Halifax, Nova Scotia (Wallace et al. 1963, 1339). However, by representing the lives and lifestyles of their Inuit cancer patients in this way, Hildes and his colleagues were tapping into the long-held, though erroneous, tendency to romanticize northern places and people, and represent them as isolated, backward and, above all primitive (Grace 2001, 143). It was these kinds of representations that would ultimately bolster their claims that salivary cancer was not associated with any easily identifiable risk factors, but, rather, was something endogenous to the Inuit population (Wallace et al. 1963, 1349).

## Tissue samples and truth claims: Turning salivary gland tumors into an Inuit pathology

Hildes and Wallace did not come up with a name for these tumors at the time of their 1963 article. However, these “pure carcinomas of an unusual type” would eventually come to be known as “Eskimomas” within the University of Manitoba. Although David Buntine was the first individual to use this term in his published work, this new disease classification was likely colloquially used amongst Hildes and his colleagues since the late 1960s. Although Hildes might not have been the one to propel the term “Eskimoma” onto the global stage, his work in this area formed the basis of this new diagnostic label, providing the histopathological and clinical benchmarks for what could and could not be included in this category. By writing at a time when the world was focused on developing a uniform system of tumor classification of tumors by histological type and making factors like race and place defining features of this new disease category, Hildes’ research created the idea that certain types of cancer were idiosyncratic to circumpolar populations, on both an epidemiological and pathological level. This idea would come to dominate how cancer within northern regions would be conceptualized by medical officials and policymakers during the late twentieth century.

Although the AMRU dissolved in 1963 when the Defense Research Board withdrew their funding, the legacy of Hildes’ work on the incidence and character of Inuit salivary gland tumors has lived on. His research would influence a variety of other researchers in the field of circumpolar health, including J. Bradley Arthaud (1970, 1972) and Robert Fortune (1969). Beginning his career as a surgical pathologist in Washington, Arthaud would go on to employ histopathological methods to assess the incidence of parotid tumors found within the Alaska Native Medical Center. He would also spend his career advocating the importance of autopsies in advancing medical knowledge (Arthaud 1970, 1195). Fortune was another individual who was inspired by Hildes’ findings. In his role as director of the Alaska Native Medical Center (1971–1977) Fortune not only drew national attention to Inuit nasopharyngeal cancer rates through his own epidemiological research in Southwest Alaska, but he also set up the infrastructure necessary for the establishment of the Alaska Native Tumor Registry (Fortune 1969). This body, which was founded in Anchorage, Alaska, in 1974 by Dr. Anne Lanier, in collaboration with colleagues from the American National Cancer Institute and the Centers for Disease Control and Prevention would routinely draw attention to rates of salivary gland cancer found within northern Native populations (Nielsen, Storm, Gaudette, and Lanier 1996; Alaska Native Tumor Registry 2018). Hildes’ presence would have also loomed large over David Buntine’s 1978 presentation on unique salivary gland tumors observed within Winnipeg’s Health Sciences Center. Although Buntine introduced the diagnostic category of “Eskimoma” to international audiences, his topic of enquiry, methodology, and analysis were by and large extensions of Hildes’ DRB-sponsored work (Young 2018).

Hildes’ research would also live on in other ways. For instance, his tissue specimens likely ended up in the Armed Forces Institute of Pathology, and his findings, coupled with microscopical images of tissue samples taken from Arthaud’s autopsy studies, were published in the 1974 edition of the AFIP’s *Atlas of Tumor Pathology* – a renowned medical resource that contains the classifications of all the tumors and tumor-like non-neoplastic conditions of salivary gland (Armed Forces Institute of Pathology 1974, 15). References to Hildes’ work on salivary gland cancer can also be found in H.C. Trowell and D.P. Burkitt’s *Western Diseases: Their Emergence and Prevention* (1981, 125, 127). Published in 1981 by two researchers actively involved in the field of geographic pathology, this monograph was highly influential in the field of cancer epidemiology. In addition to rehashing old ideas about the relationship between chronic diseases and urban industrial civilization, this work also framed certain cancer-types as the result of the complex interplay between environmental factors and a community’s unique genetic pool, thus transmitting mid-twentieth century ideas about race, place, and disease incidence to a new generation of researchers (Trowell and Burkitt 1981, xiv).

The use of the “Eskimoma” category at the University of Manitoba, in circumpolar health communities, and in international pathology atlases, served to naturalize the idea that certain forms of cancers were inherently “Inuit” or “non-Inuit.” A good example of this essentializing tendency can be observed in the opening address at the 1982 International Symposium for Circumpolar Health. In this presentation, Theodore (“Ted”) Mala, an Associate Professor of Health Sciences at the University of Alaska Anchorage, and future Secretary General of the International Union for Circumpolar Health, provided attendees with an overview of “a selected number of circumpolar health topics,” of special interest to Alaskans (Mala 1984, 108).<sup>26</sup> Although Mala began his address by stating that there were no “circumpolar pathologies per se”—only “distinct and complex problems with the provision of services to small villages widely scattered over a vast territory of land,” in his discussion of Alaska’s cancer burden, he was quick to point out the high rates of “Eskimomas” found in the state, a disease that, he argued was found “only among [Inuit] . . . and rarely anywhere else in the world” (ibid., 109). As we can see, while both Hildes and Wallace had acknowledged in their 1963 paper that they had no idea of the disease’s underlying etiology, their assertion that the disease did not seem to stem from “civilization” resulted in the labelling of the disease as a “traditional” Inuit cancer by medical professionals from the 1980s onwards. By advancing the idea that the high rate of salivary gland cancer found within Arctic communities was related to Inuit genetics, cultural practices and lifestyles, or some combination of the two, this label suggested that, unlike other cancer-types, “Eskimomas” should not be seen as by-products of Western industrialization or environmental degradation. Rather, it implied that this form of cancer was unique to polar peoples and places and that its pathogenesis was somehow linked to the physical and cultural properties of Inuit bodies and behaviors.

“Naming and framing” salivary gland tumors in this way has had a significant impact on the way that cancer control is carried out in northern regions (Brown 1995). Since these cancers are viewed as static, racially bound diseases, many national and territorial cancer-prevention strategies have neglected this disease-type. Viewing oral cancer rates as something that is fixed and is unlikely to change, northern cancer resources are typically channeled towards lung and colon cancers—disease types that are often associated with individual behaviours. Whereas many cancer control programs across Inuit Nunangat are directed towards smoking cessation and the promotion of country-foods, few are aimed towards modifying salivary gland cancer risk (NWT Department of Health and Social Services 2006, 13). For instance, little time, money and personnel have been directed towards improving Inuit access to oral health services (most cases of salivary gland cancer are identified during regular dental exams) or to environmental protection initiatives (recent findings have suggested that exposure to radiation/radioactive materials, nickel alloys/compounds, silica dust and asbestos increases a person’s salivary gland cancer risk).<sup>27</sup>

In recent years, physicians have pointed to the relationship between nasopharyngeal cancer and the Epstein Barr Virus (EBV) in an attempt to explain the unusually high incidence of parotid tumors within northern populations. This is because research stretching as far back as 1985 has indicated that oral cancers are often experienced in tandem with heightened EBV antibody titers, which are assumed to be an after-effect of exposure to a large inoculum of the virus at an early age (Melbye et al. 1985). Although these findings have been echoed by a number of scientists over the past three decades (Friborg 2005; Boysen et al. 2008), few studies have looked at *why* Inuit

<sup>26</sup>Mala was the only child of a Russian mother, Galina Liss, and an Iñupiaq father, Ray Mala, who was one of the first Indigenous American movie stars. After graduating medical school in 1977, he moved to Anchorage and began working for the Alaska Federation of Natives. In 1982, he accepted an Assistant Professorship in the Health Science Department at the University of Alaska Anchorage (Lanzarotta 2019, 259).

<sup>27</sup>It should be noted that the oral health inequities described in this article are, themselves, linked to exploitative policies carried out at the hands of the Canadian settler state. As has been recently demonstrated by Catherine Carstairs and Ian Mosby, from 1945 to 1979, the federal government made only limited attempts to provide oral health care to Indigenous communities, despite treaty promises of care (Carstairs & Mosby, 2020). Many of these environmental contaminants are also the result of settler-colonial incursions, such as Cold War militarization and the growth of the Canadian mining industry.



populations, in particular, seem to be particularly susceptible to early EBV infection, or how this risk could be mitigated.

As Charles Rosenberg has argued, disease is at once a biological event, a generation-specific repertoire of verbal constructs reflecting medicine's intellectual and institutional history, an aspect of and political legitimization for public policy, a potentially defining element of a social role, a sanction of cultural norms and a structuring element of doctor/patient relations (Rosenberg 1989). And just like all other disease categories, the "Eskimoma" is an outgrowth of these various convergent variables. As we have seen in the previous sections, Arctic cancer epidemiology and the methods by which this data has historically been collected and analyzed, represented and acted upon, did not take place in a vacuum. Rather, the field is steeped in processes of Arctic militarization, international information exchange, and statistical and material practices used to make certain types of cancer "visible" to researchers and society at large. It is also intimately linked to settler colonialism, as Inuit cancer research not only took place alongside settler-state violence, but actively served to further it through treating Indigenous lands, bodies, and body parts "population" laboratories through which valuable information about cancer's underlying etiology could be derived. Undertaken for the benefit of white settler society, these studies also served to promote Indigenous subjugation and erasure by placing some disease types under extensive systems of medical surveillance, while at the same time ignoring others.

The harm of these extractive epidemiological practices has been acutely felt by Indigenous communities, not only in the past, but also in the present as these ideas continue to circulate within Canadian medical discourse, and structure health service delivery. Furthermore, as we have seen, the remains of Indigenous people, violently taken, made into specimens, and used to test etiological theories about cancer, continue to be stored in institutional repositories. Here these specimens remain, sliced thinly into slides, stored indefinitely in jars of formalin or divided into small pieces and encased in cubes of wax—serving as ongoing and ever-present reminders of a brief but sustained period of international interest in Inuit tumor tissue, whereby Indigenous people were seen as scientific resources as opposed to sick patients, and their remains were treated as national property, as opposed to important objects of familial mourning and commemoration (Kowal, Radin & Reardon 2013; Lindee 1998).

In addition to forcing us to think about how diagnostic categories get created, and for what purpose, the enduring legacy of "Eskimoma" also encourages us to focus on the role that international organizations play in creating "serviceable truths" (Jasanoff 1990, 250) about population health, and how these processes of epidemiological knowledge production come to produce health policies that govern healthcare delivery. In the words of Marissa Mika, examining the role of these institutions can not only demonstrate how new diagnoses are brought into being, but can also show how healthcare inequalities develop between those who have cancers that are deemed interesting (and potentially valuable) to international researchers, and those who have cancers that are not (Mika 2016, 408). It is only through analyzing the material, technological, and infrastructural elements of cancer, that we can understand how shifting international research priorities as well as local social, political, and technological contexts, structure the ways that epidemiological and pathological research is carried out and limit the ways that care can be enacted.

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