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Blood and *Chuser* across Research Paradigms: Constitutive Links in Mapping Biomedical Cancer onto Tibetan Medical Nosology

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Abstract

Collaborative research on Tibetan medicine for conditions difficult to treat by Euroamerican biomedicine, such as many intractable types of cancer, has developed in recent years due to treatment outcomes and growing patient interest. In these collaborations, more nuanced analyses of how one medical tradition's etiology maps onto the other are required for productive dialogue and sophisticated research methodologies. Building on earlier work that provides the initial etiologic and diagnostic mapping of biomedical cancer onto Tibetan medical nosology, this article develops a further analytical dimension by describing the specific etiologic role of blood (Tib. *khrag*) and *chuser* (Tib. *chu ser*), as well as their specific ontological characterizations in Sowa Rigpa more generally. The *Four Treatises* and its commentaries elucidate a unique perspective on these substances as implemented in clinical praxis. This analysis furthers work to disentangle contemporary Tibetan medical and biomedical paradigms by highlighting therapeutic and investigative distinctions for cancer and research collaborations more broadly.

Keywords

blood – *chuser* – cancer – Sowa Rigpa – biomedicine – comparative etiologies

Introduction

In recent decades, the growing number of patients seeking Tibetan medical interventions for cases difficult to treat by Euroamerican biomedicine¹ has led to increased interest from biomedical and pharmacological researchers.² One area that has garnered focused attention is cancer. Pilot studies have shown compelling results for several cancer cases;³ and cellular and animal model studies have demonstrated pro-apoptotic and anticancer properties for various Tibetan formulas treating hepatocellular cancer,⁴ gynecological cancers,⁵ and hematologic cancers.⁶ Sowa Rigpa (*gso ba rig pa*), or the “knowledge field of healing,” as Tibetan medicine is called in Tibetan,⁷ has a long history of addressing the full scope of human disease, including the most debilitating and life-threatening conditions, in Tibet and across the Himalayan world. Its rigor in theory and its comprehensively nuanced practice demonstrate the depth and breadth of this highly developed, scholarly medical system. Yet its

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- 1 I use the term “Euroamerican biomedicine” or simply “biomedicine” to refer to the tradition that historically arose out of a Euroamerican context to become what is also contemporarily referred to as “Western medicine” or “Western biomedicine.” Focusing attention on the distinct sociocultural and geographic regions in which Sowa Rigpa and Euroamerican biomedicine arose emphasizes the particular intellectual histories in which they are enmeshed.
 - 2 For systematic reviews of Tibetan medical-related research, see Reuter et al. 2013; Luo et al. 2015. For analyses of the collaborative approach, see Tidwell and Nettles 2019; Gerke, forthcoming. For individual studies, see Brzosko et al. 1991; Jankowski et al. 1991; Korwin-Piotrowska et al. 1992; Matzner and Sallon 1995; Ryan 1997; Split, Szydłowska, and Brzosko 1998; Namdul et al. 2001; Exner et al. 2006; Füllemann 2006; Melzer et al. 2006; Zhang et al. 2006; Choedon et al. 2006; Sangmo et al. 2007; Husted and Dhondup 2009; Dhondup and Husted 2009; Choedon, Dolma, and Kumar 2011; Vennos, Melzer, and Saller 2013.
 - 3 Bauer-Wu et al. 2014; Leeman et al. 2001.
 - 4 Choedon, Dolma, and Kumar 2011.
 - 5 Zhao et al. 2018.
 - 6 Jenny et al. 2005.
 - 7 I choose to translate *rigpa* (*rig pa*) here as “knowledge field” instead of the more common translation “science” to indicate the larger scope of embodied knowledge in Sowa Rigpa and to provide the term with a broader interpretation closer to the original meaning of a field of knowledge that encompasses the logic and science of health and healing but also the art of medical practice. Translating *rigpa* as “science” can also give a false sense that both Euroamerican and Tibetan medical traditions share similar intellectual histories and assumptions of how “science” should be conducted—specifically, what qualifies as valid evidence. Sowa Rigpa originates from a distinct history shared with *pramāṇa* theory (Tib. *tshad ma rig pa*), a rich body of science and logic concerned with constructing valid evidence and the instrumentality required to do so. Much of Sowa Rigpa as a field of knowledge draws from *pramāṇa* theory for its epistemological and ontological views. See Tidwell 2017 for further analysis of Tibetan medical diagnostics as embodied knowledge and the role of *pramāṇa* in shaping knowledge production and evidence validation in Tibetan medicine.

dominant role as the primary healthcare system for regions of greatest Tibetan cultural influence and its fluid ability to participate in integrated medical contexts alongside biomedicine can give a misleading sense that Tibetan medicine's epistemic lens and ontological framework—or at least its explanatory models—have strong coherency with those of biomedicine. The dominant role of Euroamerican biomedicine in providing global healthcare and shaping medical discourse can also eclipse important yet distinctly different understandings of the body,⁸ disease etiology, and treatment paradigms and even discursive analysis of a medical tradition with a disparate intellectual history and its contributions to conceptualizing and treating conditions like some cancers.

Over the last few decades, research collaborations between Tibetan physicians and biomedical researchers have begun exploring preliminary evidence for cancer cases difficult to treat by biomedical standards yet successfully treated exclusively by Tibetan medicine. One such collaboration is the retrospective study published by Bauer-Wu and colleagues (2014) with the Men-Tsee-Khang Clinical Research Department. Tibetan physicians in this collaboration and several others⁹ have followed a contemporary precedent set by Lhasa Men-Tsee-Khang physician-scholar Samten: the use of a simplified, new hybrid category to correlate to biomedical cancer. That is, Tibetan medical *dréné* (*'bras nad*, “fruit-like growth conditions”)¹⁰ and *tren* (*skran*, “mass accumulation”) are fused to create a category called *drétren* (*'bras skran*, “fruit-like growths and mass accumulations”), creating definitional synonymy with cancer as hard, life-threatening masses.¹¹ Conversely, some have chosen to focus on correlating *dréné* to cancer more explicitly,¹² with associated objections to the suitability of a hybrid category.¹³ I participated in many of these studies, conferences, and discussions and have observed that expert explications of Tibetan etiologies reveal that biomedical cancer maps onto Tibetan medical nosology in more manifold ways. Along with previous scholars, I have noted that when cross-tradition dialogues take place, there is a tendency toward

8 See, e.g., Kuriyama 2002.

9 See n. 2, where most studies listed included at least one biomedical and one Tibetan medical collaborator. These include clinical, pharmacological, and patient case study collaborations.

10 All italicized terms are Tibetan unless otherwise noted. Tibetan terms are written in standard phonetic conversion as provided by Germano and Tournadre (2010), followed by the transliteration of the Tibetan spelling as devised by Wylie (1959).

11 Samten 2013.

12 Neshar 2007a, 2007b, 2012; Lhamokyab 2009; Jamyang Tashi 2015; Jokyab Tsering 2017.

13 Döntsé, personal communication, 2013; Dolha 2018.

“categorical collapse,”¹⁴ the discarding of previously distinct categories to forge a new, biomedically correspondent, single classification. Likewise, certain historical and contemporary contexts championing science and biomedical sensibilities have established a specific type of rationality and evidence-based currency to promote the survival and growth of Sowa Rigpa in national and international settings.¹⁵ Yet current research collaborations valuing the theoretical and practical rigor of Sowa Rigpa require a nuanced approach.¹⁶ Drawing on discussions with contemporary Tibetan clinician-scholars and Sowa Rigpa’s canonical root text the *Four Treatises (Rgyud bzhi)*¹⁷ and its most prominent commentaries,¹⁸ I have developed a more complex etiologic analysis of how biomedical cancer and other neoplasms map onto Tibetan medicine’s most proximate etiological categories.¹⁹ Here, I seek to build on my earlier analysis to provide more key etiologic detail to better facilitate current discourse and research collaboration.²⁰

In this mapping, several Tibetan medical etiologies play an essential role in producing conditions that can be related to biomedical cancer: *trak (khrag,*

14 Czaja 2011; Tidwell 2019.

15 Adams, Dhondup, and Le 2010; Adams, Dongzhu, and Le 2010. On the one hand, the impressive successes of biomedical treatments for cancer over the last two decades (Mukherjee 2010) can incite eagerness among Tibetan physicians to demonstrate proficiency and success in cancer treatment. On the other hand, it can intimidate Tibetan physicians and inhibit their descriptions of cancer treatment successes when they cannot explain treatment mechanisms in scientific terms and/or with sufficient documentation (see, e.g., V. Adams 2002; Gerke 2019).

16 A myopic perspective on treatment benefits from either a Tibetan medical or a biomedical perspective is inadequate for characterizing patient outcomes from either medical tradition and likewise is unproductive in facilitating research collaborations. Looking at areas of strength in each tradition is the ideal in defining collaborative research aims that provide the greatest benefit to patients.

17 Written in classical Tibetan, the *Four Treatises* is still memorized by students and used extensively by physicians, along with its hundreds of commentaries composed over centuries. This corpus of literature provides authority in Sowa Rigpa theory and praxis even today. Thus, the current work privileges perspectives from the *Four Treatises* with commentarial references for clarification in both the clinical practice and discursive contexts.

18 Prominent for the discussion here are Kyempa Tséwang (fifteenth century) 2000; Zurkhar Lodrö Gyalpo (sixteenth century) 1989; Deumar Tenzin Püntso (seventeenth century) 2009; Desi Sangyé Gyatso (seventeenth century) 1994, 2005; Kongtrül Yönten Gyatso (nineteenth century) 2005; Troru Tsénam (twentieth to twenty-first century) 2003.

19 See Tidwell 2016, 2017, 2019.

20 I acknowledge that one epistemology can never fully map onto another. However, correlating epistemologies and understanding basic structuring concepts are foundational for collaboration between two intellectual traditions. Such work can even further efforts to retain unique and valuable perspectives on etiology, diagnostics, and treatment by distilling the distinct approaches.

“blood”), *chuser* (*chu ser*, “fulvous fluid”), and *rlung*²¹ (*rlung*, “winds”). *Chuser* comprises the collective fluids of serum, pre-lymph, interstitium, and intra-/extracellular and cerebrospinal regions and is linked by similar functions to an interrelated metabolism of constituents, nutritional essences, and waste products. This article seeks to elucidate the role of these etiologic similarities. I furthermore propose a co-occurrence of several fluid accumulation conditions, like biomedical edema and ascites, which are common in both paradigms when such illnesses progress. This work also illustrates a unique perspective on blood and *chuser* from the Sowa Rigpa perspective. My focus on strategic conceptual intersections aims to disentangle contemporary Tibetan medical and biomedical paradigms by providing key distinctions for facilitating critical therapeutic and investigative collaborative engagement. This is particularly important when developing cogent comparisons of beneficial treatments or approaches for serious illnesses such as cancer.

I will first summarize key points of an etiological mapping (see Figure 1) that I have previously suggested²² that is based on six characteristics that cancer researchers predominantly use to define biomedical cancer and that serve as an analytical foundation to Tibetan medical etiological links. Next, I introduce the understanding of blood and *chuser* as detailed in the *Four Treatises* and its most prominent commentaries; I then discuss the roles of blood, *chuser*, and *rlung* as differentially playing collective roles in Tibetan medical conditions onto which biomedical cancer maps. Finally, I describe the concurrent edema conditions in Sowa Rigpa nosology with which these conditions tend to progress and how they relate to similar conditions in biomedicine.

A Summary of an Etiological Map

Several etiologic similarities among the collection of Tibetan medical conditions onto which biomedical cancer maps might have instructive insights for biomedicine as to how Tibetan physicians understand and have successfully treated cancer patients considered biomedically difficult to treat.²³ Because Tibetan medical interventions are administered without putting patient

21 *Rlung*, pronounced *lōng*, is one of the default physiologic systems called *nyépa* (*nyes pa*) in Sowa Rigpa. Although the standard phonetic conversion (Germano and Tournadre 2010) for *rlung* is *lung*, I will retain the Wylie spelling *rlung* to distinguish the term and prevent confusion with the organ lung, such as in the case of lung *rlung*, which is *rlung* proliferation in the lung.

22 Tidwell 2016, 2019.

23 Bauer-Wu et al. 2014.

lives at risk, unlike many aggressive biomedical interventions, they might provide compelling alternatives for some cancer treatments in Euroamerican biomedicine.

Cellular Model versus Basis and Dependents

Before summarizing six characteristics defining biomedical cancer, as suggested by Hanahan and Weinberg,²⁴ and their closest Tibetan medical etiologic correlates, as described in more detail elsewhere,²⁵ it is important to revisit the units of analysis for each medical tradition as a critical lens shaping the respective approaches. The cellular model for the Euroamerican biomedical tradition frames understandings of anatomy, physiology, and pathology of the body according to the basic structural/organizational unit of the cell for all organisms.²⁶ The cell provides a model of both structure and function as the fundamental unit of reproduction. Groups of cells called “tissues,” and tissues organized and described as “organs” and “systems,” are delineated according to similar function and morphology. Since tissues, organs, and bodies can be described according to adaptive and reactive modes of cell lineages,²⁷ the cell model has served the need of describing both structure and function.

Challenging the cellular model, complexity theory²⁸ has helped reframe how we understand “emergent self-organization.”²⁹ Recent work³⁰ in biomedical research questions the suitability of the cellular model as the primary unit of analysis and explores alternatives, such as fluid-based models, that have greater potential for engaging new paradigms like medical traditions such as Sowa Rigpa.³¹ However, currently Euroamerican medicine still delineates specific body systems according to cellular and tissue activity, grouping organs, pathways, fluids, and metabolites associated with the respective system, such as cardiovascular, nervous, and immune. These activity pathways are

24 Hanahan and Weinberg 2000.

25 Tidwell 2019.

26 Theise 2005.

27 Theise and d’Inverno 2004; Theise 2004; Thiery and Sleeman 2006.

28 Complexity theory is a theoretical framework for understanding agents and interactions within complex systems that engage homeostasis, drive negative-feedback loops, and respond to local environmental cues with limited stochasticity.

29 Theise 2005.

30 Theise and d’Inverno 2004; Theise 2004, 2005; Theise and Kafatos 2013.

31 A similar revelation of the particle-wave duality in modern physics is occurring in contemporary biology as the latter returns to analyses of early Greek debates as to whether the body is “an endless divisible fluid or a sum of ultimately indivisible subunits” (Theise 2005, 1165).

functional in homeostasis and in new heterostatic norms, yet result in disease when incurring dysfunction.

As in biomedicine, body systems in Sowa Rigpa are also described according to activity, but they are delineated differently—as related pathways (*rgyu lam*) and aggregates (*phung po lnga*)³² of physical and mental/cognitive functions. Functional energetic systems called the three *nyépa* (*nyes pa*)³³—known in Tibetan as *rlung* (*rlung*, “winds”), *tripa* (*mkhris pa*, “bile”), and *béken* (*bad kan*, “phlegm”)—have extensive functional activities. Simply, they relate to the dynamics of motility, heat, and solidity/cohesion activity, respectively, in the body.³⁴ The three *nyépa* mobilize and characterize activities of bodily constituents (nutritional essence, blood, muscle, fat, bone, bone marrow, and regenerative fluid); excrements (urine, feces, perspiration, minor excretions); vital, vessel, and sensory organs; and materio-energetic signaling. In their default mode, they describe systemic interrelated psychophysiological pathways for the maintenance of life-sustaining functions. The dynamic of motility for which *rlung* pathways are delineated, for example, manages all movement and mobilization in the body. Such functions link to those of the neuroendocrine system in biomedicine.³⁵ Movements associated with respiration, swallowing, verbal production, mental processes, sensory organ perception, metabolic activities of nutrient and waste separation, waste elimination, and the voiding

32 *gang gso phung po de las byung ba yin* (Yutok Yönten Gönpo 1999, 71).

33 Because of their multivalent and applied use, the three *nyépa* have been linked to various terms in translation (Gyatso 2005/6; Gerke 2010). Gerke (2010) describes the challenges in translating Tibetan medical terms into English, and Czaja (2015) provides illustrative examples. Likewise, Good's (1977) work on “semantic networks” demonstrates that assuming a biomedical equivalent for every Tibetan illness discards their etiological frameworks and attendant ontologies and epistemologies. Accurate, nuanced, and specific translations for disease categories, as well as for foundational concepts and paradigms, has become increasingly important when assessing differences in each system's approach. To retain a more literal translation for the three *nyépa*, I follow Yonten Gyatso's (2005/6) lead by employing the concept of the three “defaults,” or, more aptly, the three “default systems,” for this term, since *nyépa*, in Tibetan, refers to their activity as primary instigators of disease and imbalance. Though the formal term for the functional form is the three *duwa* (*'du ba*), *nyépa* is used interchangeably for both functional and pathological forms in the *Four Treatises* and depends on context for interpretation.

34 These are known as the elemental dynamics of wind, fire, and water and earth (*rlung / me / sa dang chu*), respectively. Here, I choose to use the nominalized adjective forms in translating the terms to facilitate a better recognition of how they are understood by the tradition and employed in a medical context. To retain the complexity of the original Tibetan terms, I will not translate them beyond these adjectival approximations but will expand briefly on their functions for greater understanding of each system.

35 See corollaries between *rlung* descriptions in Yutok Yönten Gönpo 1999, 58–59; and neuroendocrine functional descriptions in Panter-Brick and Worthman 2008, 58–90.

activities associated with the colorectal and urinary systems and the uterus are all managed by *rlung*. *Rlung* functions compose all motility and physiologic/psychologic signal-response.³⁶ During imbalance and dysfunction, the three *nyépa* are characterized as agents of harm, damaging and deteriorating the bodily constituents, disrupting excrement production, and causing organs and pathways to malfunction—thus, resulting in disease.³⁷

Compared with biomedicine, Sowa Rigpa works from a different analytical unit that elucidates structure and function. Structure, referred to as the “support” (*rten*), is provided by the bodily constituents and excrements (*lus zungs bdun, dri ma gsum*), collectively characterized as objects of harm (*gnod bya bcu*). Because of their dependence on the material support of the constituents and excrements, the three *nyépa* are referred to as the “dependents” (*brten pa*):³⁸

Rlung resides in bone, *tripa* in blood and sweat. *Béken* resides in the remaining [constituents (muscle, fat, bone marrow, and reproductive fluids) and excrements (feces and urine)]. In this way, they mutually relate as basis and dependents. If the *nyépa* are disturbed, the bodily constituents are threatened; and thus, disturbance to both then harms the excrements.³⁹

Thus, the material support facilitates the functioning of the *nyépa*, such that the *nyépa* depend on the support to function.⁴⁰

For biomedicine, the cell paradigm defines even cancer types. The term “neoplasm,” or “new growth,” refers to a group of cells with abnormal, unregulated growth either forming a mass or distributed diffusely in the body.⁴¹

36 For descriptions of *tripa* and *béken* activities, see Yutok Yönten Gönpö 1999, 58–60; Troru Tsénam 2003, 1: 177–81.

37 The three *nyépa* can be understood as the thermodynamic, fluid mechanics and materio-energetic activities that comprise, animate and exchange the fluids, substances, and energy in the body. As fire, wind, and water are understood to be thermodynamic fluids in physics, the dynamics of fire, wind, and water would be the activities of movement, heat, and adherence/stability in these fluids.

38 Troru Tsénam 2003, 1: 243.

39 *de yang rlung ni rus la gnas pa te / mkhris pa khrag dang rngul la gnas pa yin / bad kan lhag ma mams la gnas pa'o / de ltar phan tshun rten dang brten pa'i tshul / nyes pa 'khrugs pas lus zungs nyen byas te / gnyis kas dri ma la ni gnod par byed* (Yutok Yönten Gönpö 1999, 78).

40 The *nyépa* also facilitate structure through organization of layers, organs, and bodies and their adaptive and reactive modes, such as internal balance of homeostasis, positive- and negative-feedback loops, and environmental responses and signals.

41 Klotz and Penn 1987; Cooper 1992, 16.

For Sowa Rigpa, abnormal growths and developments in the body, etiologies, and classifications depend on the paradigm of the bodily constituents, excrements, and the *nyépa*, where blood and *chuser* function as bodily constituents. However, like the *nyépa*, blood and *chuser* can become primary drivers of certain diseases. In the *Four Treatises*, growths that form hard masses are termed *dré* or *tren* and can be either a bodily constituent or an excrement. Hard masses such as stones and calcifications may form in the gallbladder and kidneys and are recognized as types of *tren*. This creates a significant conceptual and etiological distinction between *dré* and *tren*, on the one hand, and cancer, benign neoplasms, and calcifications, on the other.

Cancer Characteristics and Sowa Rigpa Etiological Links

Prominent cancer biologists Robert Weinberg and Douglas Hanahan⁴² established an analytical foundation for cancer studies by identifying six functional cellular capabilities that transform normal cells into malignancy:⁴³

1. Self-sufficiency in growth signals;
2. Insensitivity to growth-inhibitory (antigrowth) signals;
3. Evasion of programmed cell death (apoptosis);
4. Limitless replicative potential;
5. Sustained angiogenesis (or the development of blood supply); and
6. Tissue invasion and metastasis.

The first three characteristics relate to cells but have different genetic origins. Here I will explore how the cellular model relates to Sowa Rigpa's model of base and dependents. *Rlung* serves a primary role in facilitating signal transmission, mobilizing signals to take designated action in the body, and driving growth.⁴⁴

42 Weinberg and Hanahan focused their careers on understanding cancer and provided the foundational work on the genetic basis and first transgenic animal models for cancer, respectively.

43 This list is in their seminal 2000 paper and the updated assessment is in their 2011 review (Hanahan and Weinberg 2000, 2011). For related work, see Wright, Pereira-Smith, and Shay 1989; Bonnet and Dick 1997; Coussens, Raymond, and Bergers 1999; Bergers and Benjamin 2003; J. Adams and Cory 2007, 1324; Amit et al. 2007; Ahmed and Bicknell 2009, 3; Baeriswyl and Christofori 2009; Vander Heiden, Cantley, and Thompson 2009; Zumsteg and Christofori 2009; Artandi and DePinho 2010; Patenaude, Parker, and Karsan 2010; Pietras and Ostman 2010.

44 See related passages in the *Four Treatises*. For example, "The functions of *rlung* are the regulation of respiration, movement, action and behavior, impulse [lit. mobilizing energy], and producing response; it animates the bodily constituents" (*nyes pa'i las ni rlung gis dbugs 'byin rngub / bskyod dang las spyod shugs 'byin gnod bya rgyu*); and "without [the function of] *rlung*, growth does not occur" (*rlung med 'phel mi 'gyur*; Yutok Yönten Gönpo 1999, 58, 39).

All three capacities relate to *rlung* excessively driving growth, particularly in bodily constituents. Furthermore, although bodily constituent proliferation arises from localized increased *béken*,⁴⁵ and increased *tripa* drives metabolic activity facilitating growth and ripening,⁴⁶ *rlung* mobilizes these other influences. *Rlung* controls all signaling, motility, and growth.⁴⁷ Likewise, excess *rlung* in specific regions affects specific types of bodily constituents,⁴⁸ a Sowa Rigpa corollary for biomedical cell type related to cancer. Excess *rlung* causes the contrasting *béken* function of growth inhibition through properties of inertia to diminish, dull, or silence, allowing unresponsiveness to antigrowth signals. The ability to evade normal programmed cell death and achieve immortal cell capacity stems from systemic dominance of *rlung*.

From the perspective of the *Four Treatises*, the fourth characteristic, limitless replicative potential of cells, links to the limitless proliferation of region-specific bodily constituents. This capacity requires resource synchronization provisioning mass, growth, and ripening of the sequentially generated seven bodily constituents,⁴⁹ linked with local disturbance in each *nyépa* as outlined above. With particular utilization control of the first two constituents, nutritional essence and blood, this capacity produces excess in and proliferation

45 *Béken* comprises the earth and water elemental dynamics (as indicated in the passage: *bad kan 'khrugs pas lus kyi me drod 'joms / 'di ni sa chu'i rang bzhin lci la bsil*). Without the earth dynamic, matter cannot form; without the water dynamic, it cannot coalesce into tissues, parts, and body constituents (*sa med mi 'grub chu med sdud mi nus*); Yutok Yönten Gönpö 1999, 72, 39). Though matter increases locally when a mass forms, from the Tibetan medical perspective, nutrients are taken from the body and allocated to the mass. Thus, an overall *rlung* proliferation and a diminishing of *béken* occur.

46 *Tripa* is composed of the fire elemental dynamic. "Without the fire dynamic, ripening does not occur" (*me med mi smin*; Yutok Yönten Gönpö 1999, 38). Regarding the function of digestive *tripa*, "Digestive *tripa* ... digests that which is consumed and separates nutritional essence and waste product, producing the heat of the body ... and its strength" (*'ju byed zhu dang ma zhu'i bar na gnas / zas 'jus dangs snyigs 'byed cing lus drod dang / ... stobs skyed byed*; Yutok Yönten Gönpö 1999, 59).

47 Jamyang Gyatso, personal communication, 2018, referring to *nyes pa'i las ni rlung gis dbugs 'byin rngub / bskyod dang las spyod shugs 'byin gnod bya rgyu / dbang po gsal dang lus rjes 'dzin par byed/* (Yutok Yönten Gönpö 1999, 58). Furthermore, *rlung* develops the central life channel in the sixth embryonic week, initiates neural signaling and blood flow in the twenty-fifth week, and incites the initial flow of consciousness by the following week (*drug pa lte ba la brten srog rtsa chags / ... rtsa lnga pa la rlung gi rgyu ba 'byung / rtsa drug pa la sems kyi dran pa gsal/*; Yutok Yönten Gönpö 1999, 42–43). Thereafter, *rlung* manages these activities to sustain life throughout the life course.

48 See, for instance, location-specific *rlung* disorders in the *Four Treatises* (Yutok Yönten Gönpö 2006, 123–25).

49 That is, nutritional essence, blood, muscle, fat, bone, bone marrow, and regenerative essence.

of subsequent constituents. Achieving limitless replicative potential requires the capacity to direct nutritional essence advantageously and, as is the case for all nutritional essence metabolic disorders, which are known collectively as *dangma mazhuwa* (*dwangs ma ma zhu ba*), results in excess blood. *Tripa* drives metabolic activity and thereby drives blood production.⁵⁰ Thus, *tripa* aggravation produces excess blood constituents and its impurities, exacerbating growth and proliferation. The fifth characteristic, blood supply development, relates to excess abnormal blood in coordination with excess *rlung* to facilitate domination of growth resources. This quality is common for *dangma mazhuwa* conditions, as well as the specific conditions of *dréné*, channel *tren*, *méwel* (*me dbal*; burn-like ulcers), and *surya* (*sur'ya*; ulcers that are shaped like the rays of the sun). Finally, the sixth characteristic, tissue invasion and metastasis, relates to reduced *béken* and its adherence-promotion functions.⁵¹ Since *béken* facilitates the adhesive qualities required to tether a mass to its original site, metastatic dispersion and transmission depend on minimizing *béken* adherence, simultaneously increasing the severity of the condition.

Table 1 summarizes these proposed etiological links.⁵²

The Tibetan medical etiological conditions correlated to the six characteristics defining biomedical cancer relate to a subset of nutritional essence metabolic disturbances in the *Four Treatises*: namely, *dréné*, channel *tren*, *méwel*, *surya*, and blood proliferation compounded by aggravated *rlung*.⁵³ These

50 "From the nutritional essence, the digestive heat ripens each successive bodily constituent: nutritional essence moves from the gut to the liver via the nine nutritional essence-conveying channels. At the site of the liver, the nutritional essence is transformed into blood, the blood is transformed into muscle" (*dwangs ma lus zungs rang rang me drod kyis / smin par 'gyur te dwangs ma pho ba nas / dwangs ma len pa'i rtsa dgur mchin lam brgyud / mchin pa'i gnas su khrag 'gyur khrag las sha*;/ Yutok Yönten Gönpö 1999, 56).

51 "Béken produces stability in body and mind" (*bad kan lus dang blo brtan*). "Supporting *béken* resides in the thorax and provides stability for the bodily constituents [of nutritional essence, muscle, fat, bone marrow, and regenerative fluid] and permeating moisture.... Connecting *béken* resides in all interstitial spaces and interconnects joints and regional spaces, as well as facilitates flexion and contraction" (*bad kan rten byed brang la gans pa ste / lhag ma mams kyi rten dang chu las byed/ [...] bad kan 'byor byed tshigs dmigs kun la gnas / tshigs rnams 'byor zhing brkyang bskum byed pa yin*;/ Yutok Yönten Gönpö 1999, 58, 60).

52 In comparing the six cellular capabilities of cancer with their Tibetan medical etiologies, we also see a distinction in two correlated analytical units for these two traditions: the biomedical model of the cell relates to the Sowa Rigpa model of material support, or structural basis (*rten*). The three *nyépa* do not have clear correlates to the biomedical cellular model beyond some similarities with respect to the functions, material properties, and activities of the biomedical body systems.

53 See related etiologies of *dréné* (Yutok Yönten Gönpö 2006, 400); channel *tren* (2006, 176); *méwel* (2006, 407); *surya* (2006, 408); blood proliferation (Yutok Yönten Gönpö 1999,

TABLE 1 Six Cellular Capabilities Defining Cancer and Their Tibetan Medical Etiological Links

	Biomedical Cancer Characteristic	Tibetan Medical Etiological Link
1	Self-sufficiency in growth signals	Excess <i>rlung-tripa</i> activity
2	Insensitivity to growth-inhibitory (antigrowth) signals	Excess <i>rlung-tripa</i> activity
3	Limitless cell replication	Abnormal proliferation of the body constituents
4	Evasion of programmed cell death (apoptosis)	Excess <i>rlung</i>
5	Sustained angiogenesis (or the development of blood supply)	Abnormal proliferation of blood
6	Tissue invasion and metastasis	Diminished <i>béken</i> and aggravated <i>rlung</i>

conditions provide an etiological context onto which to map biomedical cancer, as illustrated in Figure 1.

Before I discuss these etiologic influences, I will take a closer look at how the *Four Treatises* and its prominent commentaries describe blood and the collective fluids that make up aspects of serum, interstitium, pre-lymph, and cerebrospinal spaces, comprehensively described by the term *chuser*.

Understanding Blood and *Chuser* in the *Four Treatises*

Whereas in biomedicine, blood is defined by specific cell types suspended in a plasma fluid,⁵⁴ in the *Four Treatises*, *trak* (*khrag*; “blood”) is defined by its ability to transform nutritional essence into muscle, transmit fluids and life sustainment to the body, and provide support for *tripa*’s dependent activities. It is conceptually distinct from that in biomedicine in that it is defined as the refined essences absorbed from the gut⁵⁵ and processed by the liver and

80–81); and compounding aspects of *rlung* aggravation (1999, 119–23). The etiological links are described in detail in Tidwell 2019.

54 Mader and Windelspecht 2015, 115.

55 Primarily stomach and small intestine (Samten 2013, 29).

from the gut is transported to the liver by nine major vessels and becomes blood at the site of the liver.⁵⁶

Tripa-driven gallbladder activities assist the liver in imparting these proper qualities to transform nutritional essences into blood.⁵⁷ As indicated above, other bodily constituents develop from this initial nutritional input and formation of blood: blood builds muscle, muscle builds fat, fat builds bone, bone builds marrow, and bone marrow develops the reproductive and regenerative fluids. The final product is supreme essence (*bcud mchog*), which develops from the fully ripened regenerative fluids. Supreme essence resides at the heart and distributes throughout the body to sustain life, support longevity, and provide radiance to the body.⁵⁸

The waste product of blood is described as gallbladder bile (*mkhris khu*). One might think that blood without its nutrient constituents (*dwangs ma*) is *chuser*, similar to the characterization of serous fluid in biomedical understandings of blood. However, *chuser* is considered not a waste product, but a functional fluid that can experience imbalance and disease. Thus, *chuser* itself is a nutrient essence product, as discussed further below.

In biomedicine, bone marrow is the site of blood production, where hematopoietic stem cells differentiate into the various cellular blood components.⁵⁹ Spleen, liver, and lymph nodes are blood formation sites during development, and the liver primarily produces blood in fetal development until bones and bone marrow develop to take over. Here, the Euroamerican biomedical tradition analytically focuses on serous fluid components—types and populations of cells—and Sowa Rigpa focuses on functional qualities of these bodily constituents that deliver nutrients to the body and sustain life. Furthermore, biomedicine characterizes blood according to cell lineages, originating as progenitor stem cells in bone marrow and then growing into fully mature cells in body tissues.⁶⁰ There are many components of blood from the biomedical

56 Yutok Yönten Gönpo 1999, 56.

57 *dang po gyur tshul kha zas dwangs ma de / mkhris pa dmar sgyur las kyis khrag tu 'gyur/* (Yutok Yönten Gönpo 2006, 387).

58 Supreme essence has a broad scope that covers functions which extend beyond health and illness as understood in biomedicine and which have larger connotations for realization in the Buddhist context. For example, supreme essence is described as supporting the experience of bliss and, at the time of death, facilitates the suspension of normal death processes so that high practitioners can remain in meditative equipoise (*thuqs dam*) despite the cessation of gross levels of brain, heart, and organ function (Troru Tsénam 2003, 1: 172–73).

59 Gordon-Smith 2013.

60 Theise and d'Inverno 2004.

perspective that Sowa Rigpa would relate to other bodily constituents and/or *nyépa*.⁶¹

From the biomedical perspective, cells differentiate and “mature” by gene expression, undergoing successive changes, until they reach the final cell type as directed by gene and cell-surface protein expression. Here, differentiation and maturation of cells frame the biomedical perspective. By contrast, differentiation and maturation of bodily constituents from nutrient essence frame the Sowa Rigpa perspective.

Function of Blood, Basis for Tripa

Since Sowa Rigpa’s analytical unit paradigm characterizes bodily constituents according to function, not morphological characteristics as in cell theory, blood is considered the bodily constituent that “moistens” (*khrag gis brlan*) and “sustains life” (*srog ’tsho ba’i las byed pa*).⁶² The overall water dynamic generates blood, as well as the sensory organ of the tongue, taste capacities, and moistening activities.⁶³ Blood’s moistening function derives from its functional origins in the water dynamic. Blood also carries and distributes heat throughout the body and facilitates the activities of *tripa*. *Tripa* derives from the fire dynamic—heat—and facilitates skin complexion and pigmentation,

61 For example, Tibetan medicine distinguishes nutritional essence and waste products as distinct from blood. In biomedicine, blood is the primary carrier of metabolites to and waste products from cells and tissues. The Sowa Rigpa approach looks at the quality of blood as well as its ability to separate nutrients from waste products. Biomedicine focuses on cellular processes instead of the preceding steps from gut through blood to supply cells with nutrient and then to remove waste products. These two perspectives could contribute insights into comparisons of cancer treatment approaches in a collaborative setting. As another example, in Tibetan medicine, lymphocytes and lymph glands (*rmen bu*) relate to *béken* activities, which relate to fat and muscle constituents. Likewise, monocytes differentiated into osteoclasts of bones and microglia of the central nervous system produce *béken*-like activities; and Langerhans cells of epidermal layers and Kupffer cells of the liver propagate *tripa*-like activities. Just as the water we drink contains all five elemental dynamics of heat, motility, cohesion, stability, and empty space, blood also embodies all five elemental dynamics and *nyépa*, though some properties are more pronounced than others. The movement of cells and fluid comprise the wind dynamic of motility (*rlung*); the metabolic heat produced by cellular functions and thermodynamic friction of fluid movement forms the fire dynamic of heat (*me*); the cohesion of molecules in fluid and the stability of the constituent masses in the fluid form the respective water and earth dynamics (*sa dang chu*); and the spatial context allows the blood constituents to move and pervade all constituent atoms and molecules and forms the space dynamic (*mkha’*). See Tidwell and Nettles 2019 for further description of such principles in the context of Tibetan pharmacology (*smān sbyor*).

62 Troru Tsénam 2003, 4: 161.

63 *chu las khrag dang lce ro rlan pa skyed* (Yutok Yönten Gönpö 1999, 40).

radiant qualities of the body, and activities of the eye organ and visual perception faculties.⁶⁴ The dynamics—properties of energy and matter, as with the respective activities and functions of bodily constituents—arise from interdependent causes and conditions.⁶⁵

Since blood is the *materia prima* that provides the pathways for *tripa*⁶⁶ to perform its activities, the emotion of anger (*zhe sdang*) also depends on blood for its transmission.⁶⁷ *Tripa* activities derive from the sequelae of psychophysiological events related to anger. *Tripa* thereby drives heat functions and hot illnesses in the body.⁶⁸ Because blood is characterized by functional activities related to the fire dynamic and as the origin of *tripa* activities, it is integrally related to metabolic heat production and thus is responsible for the maturation of the bodily constituents, processes, and the body as a whole.⁶⁹ *Tripa*'s functional activities of digestion and metabolism separate nutrients from waste and transform nutrients into metabolic products, heat, and constituents that impart strength and power to the body.⁷⁰ The activities of *tripa* nourish the complexion and skin functions because of *tripa*'s relationship to the liver and its transmission of nutritional essences to needed areas of the body.⁷¹ These activities also ripen the essences to their proper form.⁷² *Tripa* activities also drive heart functions, and because of the integral Sowa Rigpa relationship between the heart and the locus of the mind, *tripa* activities also facilitate mental, emotional, and physical conditions that enable the physiological impulses by which a person's aims are accomplished, resulting in the related emotions

64 *me las drod dang mdog gsal mig gzugs skyed* (Yutok Yönten Gönpö 1999, 40).

65 *rgyu rkyen rten 'brel 'dzom pas lus su 'grub* (Yutok Yönten Gönpö 1999, 40). In the *Four Treatises*, causes (*rgyu*) provide the “initial conditions” from which phenomena, such as the bodily constituents or a disease, gain the potential to arise (Yutok Yönten Gönpö 1999, 70–72). However, it is the compounding conditions, termed simply “conditions” (*rkyen*), that provide the driving influences for the actual phenomenon or disease to take form (Yutok Yönten Gönpö 1999, 73–77). It is important to keep in mind that these compounding conditions, which apply to each cause, provide the inciting influences to drive activities and functions of bodily constituents, as well as disease initiation and progression.

66 In coordination with other *tripa* pathways, such as the sweat glands, liver, and gallbladder.

67 Troru Tsénam 2003, 1: 139.

68 *ci phyir ma rig med na nyon mongs med/nyon mongs med par zhe sdang mi 'byung ste/ zhe stang med par tsha ba 'byung mi srid/ [...]* *tsha ba kun gyi rgyu ni mkhris pa yin/ mkhris pa med par tsha ba 'byung mi srid/* (Yutok Yönten Gönpö 2006, 204).

69 Yutok Yönten Gönpö 1999, 39.

70 Yutok Yönten Gönpö 1999, 58.

71 Yutok Yönten Gönpö 1999, 59.

72 Yutok Yönten Gönpö 1999, 58. Proper form is characterized by color and other defining features.

of confidence, determination, pride, and desire.⁷³ *Tripa* also facilitates the visual organ and perceptual capacities of sight.⁷⁴

Heat, specifically metabolic heat, exists in each bodily constituent, excrement, and pathologic condition.⁷⁵ Any weakness or lack of heat in body constituents or pathways causes an unripening (*ma smin*) of nutrients and waste products and, thus, bodily constituents themselves. Such unripening is characterized as local metabolic disturbance (*ma zhu ba*).⁷⁶ This can be systemic when originating in the gut or isolated when originating in a specific region of the body.⁷⁷ Insufficient ripening will become important when we look closer at the etiologic role of blood in the Tibetan medical conditions onto which biomedical cancer maps.

Each body should have about seven of its own cupped hands' worth of blood.⁷⁸ Diminished or increased volumes of blood as well as its constituent qualities determine the amount of life-sustaining blood (*zung's khrag*),⁷⁹ or vital blood, that the body is able to produce. Propagated through numerous infinitesimal channels, the amount of vital blood produced by the body affects body constituent development, target organ functions, heat propagation and *tripa* activities, and, particularly, life channel (*srog rtsa*) development and maintenance.⁸⁰ Blood and *rlung* are described as traveling throughout the entire body like "master traders"⁸¹ and appear together in the blood vessels.⁸² Biomedicine tends to view the heart as the engine that drives the blood through the body. However, Sowa Rigpa also recognizes the additional role of breath in the movement of blood vis-à-vis the *rlung* it contains.⁸³

73 Yutok Yönten Gönpö 1999, 59.

74 Yutok Yönten Gönpö 1999, 60.

75 *me drod ces bya 'ju ba'i gzhi yin te* (Yutok Yönten Gönpö 1999, 54).

76 *tshe dang lus zung's me drod stobs 'phel byed/ zhu gnas sgor 'jug zas lam sgo gtan yin/ de stobs ldan na zhu nas thur 'gro ste/ stobs zhan kha zas ma smin nyid phyir 'byung/* (Yutok Yönten Gönpö 1999, 54–55).

77 Yutok Yönten Gönpö 2006, 170.

78 Yutok Yönten Gönpö 1999, 48.

79 Life-sustaining blood (*zung khrags*) has been correlated to arterial blood by several Tibetan medical scholars (see Samten 2013).

80 In death processes, assessing the pulse—characteristics of blood and *rlung* traveling through the radial arterial channel (Yutok Yönten Gönpö 1999, 209–10)—provides a critical indicator of impending deterioration of the body-mind condition (Yutok Yönten Gönpö 1999, 63–64, 68–70).

81 *rlung khrag kun tu rgyu bas tshong dpon bzhin* (Yutok Yönten Gönpö 2006, 644).

82 As such, pulse provides a key diagnostic window into the journeys of *rlung* and blood, reporting back on subtleties of conditions throughout.

83 Jamyang Gyatso, personal communication, 30 December 2018.

Blood Types and Characterizing Disease

Four healthy blood types are described in the *Four Treatises*⁸⁴ and in some ways are similar to how one might think of blood types in biomedicine.⁸⁵ Whereas the latter are based on the presence of specific antigens on the surface of red blood cells, Sowa Rigpa blood types—*rlung*, *tripa*, *béken*, and *dupa* (*'du pa*; integration of all three)—are characterized by their color, texture, odor, froth, scum, feature particularity, and exertion force upon draw. Unlike the *nyépa* forms, these characteristics convey healthy functional variations since they are all types of life-sustaining blood, *zung trak* (*zung's khrag*), the blood that is one of the seven bodily constituents that sustain life processes.⁸⁶ Diseased blood, *né trak* (*nad khrag*), is characterized as that which forcefully releases when drawn and is weakly concentrated and yellow-tinged. It has a disagreeable smell and swells as a fluid. Like the white-speckled back of a nighthawk, it forms a series of white bubbles, as well as mucus, pus, and bile-like contents.⁸⁷ Diseased blood is the central intervention focus for many blood-based conditions in Sowa Rigpa. Unripened blood, *ma min trak* (*ma smin khrag*),⁸⁸ is blood that has not been properly prepared for therapeutic draw.

Life-sustaining and diseased blood are understood to be separable in the body, and for conditions where diseased blood is produced, it is important to therapeutically separate diseased from vital blood. Some conditions are characterized by the mixing of the two bloods, like “milk mixed with water.”⁸⁹ The *Four Treatises* states, “Ripening the heat will help separate the diseased from the vital blood. If the heat is properly ripened, the condition is easily subdued.”⁹⁰ Thus, unripened heat, also known as “unripened fever,” is the preliminary condition preceding all hot disorders. If a physician knows how to recognize and treat unripened fevers, appropriately ripening and subduing the heat, all other hot disorders will be easily treated and vitality restored.⁹¹ Venesection release

84 Yutok Yönten Gönpö 2006, 727.

85 Jamyang Gyatso 2018, 180.

86 The four blood types are as follows: (1) *Rlung*-natured blood is black[-tinged] and rough in texture and forms red-yellow bubbles. (2) *Tripa*-natured blood has a yellowish bright color, is less concentrated, and has a pus-like odor; when exposed to air, the surface tends to form an iron oxide-like residue. (3) *Béken*-natured blood is light red, thick, and smooth. (4) *Dupa* blood is the color and consistency of liquid cinnabar and flows “like the sea.” See Yutok Yönten Gönpö 2006, 727.

87 Yutok Yönten Gönpö 2006, 727.

88 Yutok Yönten Gönpö 2006, 727.

89 *nad khrag zung's khrag 'o ma chu 'dres 'dra* (Yutok Yönten Gönpö 2006, 233), as indicated for unripened fevers (*ma smin tsha ba*).

90 Yutok Yönten Gönpö 2006, 239.

91 Yutok Yönten Gönpö 2006, 239.

of diseased blood is a major external therapy for treating blood, *tripa*, and heat disorders. However, if diseased blood is not separated from vital blood or if heat is not ripened, venesection is contraindicated,⁹² and one may accidentally extract vital, healthy blood.⁹³ Poor-quality or impure blood, *ngen trak* (*ngan khrag*), literally “bad blood,”⁹⁴ occurs when the liver has not ripened nutrient essences into their proper form to create vital blood.⁹⁵ This poor-quality blood enters channels and affects organs, bodily constituents, and systemic functions.⁹⁶ This is a critical causal factor in developing nutrient essence metabolic disorders⁹⁷ and is a key etiological distinction for blood in Sowa Rigpa compared with biomedicine.

Blood also plays a major role in the development of other hot and fever conditions.⁹⁸ Heat resultant from trauma (*grams kyi tsha ba*) occurs when there is injury to bodily constituents and/or organs where a resultant disturbance to blood occurs. Consequently, *tripa* and heat proliferate.⁹⁹ This heat in the blood can be partly likened to inflammatory processes in biomedicine.¹⁰⁰ Though biomedically recognized as a functional body mechanism in acute injury, low

92 Yutok Yönten Gönpo 2006, 722.

93 Such an accident is said to have ended a Harvard collaborative study when, after researchers sampled the blood of an elderly Buddhist practitioner known for his ability to generate inner heat, called *tummo* (*gtum mo*), as a normal investigative procedure to analyse the biomarker effects of his practice, he passed away upon return to India. Those in his community described the extraction of “vital blood” as the cause of his passing. Research in this area paused for decades because of this incident and Tibetan apprehension of participating in these collaborations (Lobsang Tenzin Negi, personal communication, 2017).

94 See, for instance, etiological descriptions of *béken mukpo*, internal illnesses, *tren*, *kyabab*, *ohr*, *muchu*, *dréné*, and so forth (Yutok Yönten Gönpo 2006, 184).

95 As explicated in the relevant sections in the *béken mukpo*, internal illnesses, and *dréné* chapters of the *Four Treatises*, respectively (Troru Tsénam 2003, 2: 136; 2: 182; 3: 151).

96 As explained in the case of *surya* (Troru Tsénam 2003, 3: 185)

97 Troru Tsénam 2003, 2: 182.

98 See, for instance, the *Four Treatises* section on proliferated fevers (*rygas tshad*; Yutok Yönten Gönpo 2006, 240) and relevant sections of commentaries.

99 *lus zungs grams pas khrag khrugs mkhris tshad bslang* (Yutok Yönten Gönpo 2006, 263).

100 Inflammation in biomedicine is understood as the body’s normal response to threat or harmful stimuli to cells and body tissues. The stimuli can be pathogenic infections, irritants, or physical damage. As a protective response, the body releases specific immune cells and molecular mediators that travel primarily in blood vessels to clear dead and damaged cells and repair tissues. In biomedicine, inflammation often presents as heat, pain, redness, swelling, and loss of function. In the Sowa Rigpa context, varying levels of heat content are present in trauma-based hot disorders and define that which is associated with trauma. However, pain, immobility, swelling, and other complications are recognized more from additional aggravating influences of *tripa* and *chuser* than from the heat condition itself, as described in detail in the traumatology section of the *Four Treatises* (see, e.g., Yutok Yönten Gönpo 2006, 463).

levels of inflammation can also occur when the body perceives internal or external threats, whether pathogenic or psychological, over longer durations. In this form, low-level inflammation and its cascade of immune cells and molecular mediators can cause tissue destruction and lead to other conditions. Chronic inflammation can drive disease processes for many conditions, including various allergies, atherosclerosis, rheumatoid arthritis, and cancer. In Sowa Rigpa, chronic forms of heat imbalance stem from underlying *tripa* and *rlung* aggravation, whereas emotional stimuli primarily drive *nyépa* disturbance.¹⁰¹

Chuser in Sowa Rigpa

In Euroamerican biomedicine, fluids are defined by constituent cell types and/or inhabited organ/vessel compartments, such as interstitial fluid, cerebrospinal fluid, lymph fluid, and even blood. In the *Four Treatises*, *chuser* provides a unique integrated conceptual delineation of physiological fluids for Sowa Rigpa based on the processes and pathways in the body it facilitates. Collectively designated and literally translated as “fulvous fluid,” *chuser* comprises interstitial, intra- and extracellular, pre-lymph, cerebrospinal, and blood serum fluids in the body. The constituents of *chuser* and its movement across these respective spaces are important for characterizing health and illness in Sowa Rigpa. The *Four Treatises* designates lymph and endocrine glands with a composite term, *menbu* (*rmen bu*).¹⁰² Lymph originates from the waste products of fat¹⁰³ and shares the fluid-like qualities of both fat and muscle.¹⁰⁴ Biomedicine distinguishes differences in the immune and endocrine activities of lymph and endocrine glands by classifying them separately on the basis of their cellular actors. In Sowa Rigpa, *menbu*, as a single category for both, depends on blood,

101 Another example to illuminate the role of blood in hot disorders is disturbed heat (*'khrugs kyi tsha ba*). Disturbed heat occurs when a *nyépa* disturbance drives heat in the blood to proliferate, affecting bodily constituent development. The various contagious diseases within the hot-disorder classification arise from distinct body entry modes depending on the vehicle or vector of pathogen or toxin, as with various toxins in the toxicology section of the *Four Treatises* (Yutok Yönten Gönpö 2006, 589–92). Absorption through the skin, inhalation through the lungs, consumption and distribution through the gut, and so forth are described (Yutok Yönten Gönpö 2006, 279). However, the *Four Treatises* makes clear that blood is a primary medium for such conditions to develop (Yutok Yönten Gönpö 2006, 305), particularly as various bodily constituents are successively affected (Yutok Yönten Gönpö 2006, 592).

102 For example, the thyroid is enumerated as *menbu* in the gynecology chapter (*mo nad gso ba spyi bcos pa*).

103 *tshil gyi snyigs ma* (Troru Tsénam 2003, 3: 188).

104 Yutok Yönten Gönpö 2006, 542.

muscle, and fat constituents to support its functions.¹⁰⁵ Since *chuser* derives from *tripa*, it cannot comprise lymph fluid but provides precursor constituents to lymph.¹⁰⁶ *Chuser* arises from blood vis-à-vis the gallbladder. Muscle and fat also arise from blood, from its nutrient essences. *Menbu* fluid¹⁰⁷ develops from the waste products of fat, which are generated downstream from blood nutrient essences.

In biomedicine, fat is endocrinologically active.¹⁰⁸ Such endocrine tissue, as well as the major endocrine glands, has been characterized as secreting hormones directly into blood vessels, yet new research on interstitial spaces around blood vessels shows the role of these pre-lymphatic fluids in facilitating endocrine pathways.¹⁰⁹ Physician-scholar Troru Tsénam describes lymph as *sherkhu* (*gsher khu*), a term derived from *sherma* (*gsher ma*, *gsher rmen*), or “pancreas,” a main endocrine organ in biomedicine—and the fluids (*khu ba*) of the lymph. Thus, we see the intersections of *chuser*, *sherkhu*, and *menbu* with related conceptual frameworks in the Euroamerican tradition.

Like blood, *chuser* is a substrate in which the *nyépa* propagate their activities, specifically that of *tripa*. Like blood, *chuser* originates from the water dynamic of fluidity, with moistening functions as well as heat delivery. Ideally, it has a balanced hot-cold nature, yet an imbalance producing either hot or cold conditions can occur, unlike blood, which retains heat qualities and is susceptible to only hot conditions. Despite this difference, both blood and *chuser* are primary mediators of *tripa* activity.

Chuser Production

The *Four Treatises* describes the formation of *chuser* as follows:

The nutritional essence of that which one consumes becomes blood in the gallbladder through the activities producing the red constituents. The waste product of blood is stored in the gallbladder. The nutrient essence produced by the gallbladder is *chuser*.¹¹⁰

Troru Tsénam clarifies that “radiance-transforming *tripa*” (*mdangs ’gyur mkhris pa*), a *tripa* subtype, provides the functional activity to produce blood

105 Troru Tsénam 2003, 3: 188.

106 Gen Jamyang, personal communication, 2 January 2019.

107 Lymph is *sherkhu* (*gsher khu*).

108 Benias et al. 2018, 4.

109 Culiner 1944; Benias et al. 2018.

110 Yutok Yönten Gönpö 2006, 387.

and distribute it through blood vessels to the respective target body regions.¹¹¹ He says, “*Chuser* permeates the exterior and interior spaces of muscle, bone, and the vital and vessel organs. It specifically provides radiance to muscle and resides in joint spaces.”¹¹² Troru Tsénam clarifies that *chuser* infuses regions between the external layers of skin (*skyi pags*) and muscle (*sha*),¹¹³ as well as underneath skin-like layers covering organs within the body, and between bones and joints. In health, each person has four of their own cupped hands’ measure of *chuser*.¹¹⁴ In illness, disturbances to normal *chuser* amounts, qualities, pathways, and contents occur from trauma to dermal layers, muscle proliferation, penetration into neural, blood, and lymph channels, and impact to vital and vessel organs.

Until recently, biomedicine and modern biology did not have a term or proper conceptual construct that could easily relate to that of *chuser*.¹¹⁵ However, recent discovery of the “additional organ” called “interstitium”¹¹⁶ and

111 Troru Tsénam 2003, 1: 108.

112 Troru Tsénam 2003, 1: 108.

113 I choose the term “muscle” rather than “flesh” as a translation for the Tibetan term *sha* because of the function and compositional distinction between *sha* and *tsil* (*tshil*), or fat, as described in the *Four Treatises*: “Muscle covers; fat lubricates” (*sha yis g.yogs/ tshil gyis snum*; Yutok Yönten Gönpö 2006, 54). The term “flesh” in English is defined as a “soft substance consisting of muscle and fat that is found between the skin and bones of an animal or a human” (*Oxford Dictionary Online*). This hybrid fat-muscle soft substance is not *sha*. In the *Four Treatises*, fat is described as arising from muscle in the development of the bodily constituents: “From blood, muscle develops; from muscle, fat develops; from fat, bone develops; from bone, bone marrow develops” (*khrag las sha/ sha las tshil gyur tshil las rus par gyur/ rus las rkang gyur*); Yutok Yönten Gönpö 2006, 56). As a corollary, in biomedicine, fat cells (i.e., adipocytes) arise from the precursor cells for muscle cells (i.e., myocytes) called mesenchymal cells (T. Ryan and Curri 1989). Likewise, bone cells (osteoblasts) and cartilage cells (chondrocytes) also derive from mesenchymal cells (Phinney and Prockop 2007).

114 Troru Tsénam 2003, 1: 108.

115 For example, during our retrospective cancer study with Men-Tsee-Khang physicians (Bauer-Wu et al. 2014), conversations regarding the treatment role of several medicines targeting pathways and metabolism of *chuser* in the body for several of the case studies had to be simplified by using analogies of lymphatic fluid, immune functioning, and so forth. The discussions focused on which classes of cells related to which fluid, instead of referring to the fluid as a distinct and complex system itself. In this example, the explanatory model applied to understand the Tibetan perspective came from the cell paradigm. Descriptions of how *chuser* also plays important roles in etiologies of dermal conditions, fascia, and various ulcerative lesions confounded our Euroamerican biomedical study partners instead of illuminating a Tibetan medical perspective on cancer treatment. Biomedical collaborators’ understanding of the interstitium can help them make conceptual links to *chuser* as a conceptual framework in the Tibetan medical tradition, and vice versa.

116 Benias et al. 2018.

related work in physiology on fascia¹¹⁷ and complex sinus networks throughout the body that function more like a fluid than a collection of cells¹¹⁸ provide an excellent link to the concept of *chuser* in Sowa Rigpa. Likewise, for cancer, the interstitium, together with angiogenesis and blood supply, plays a key role in metastasis of malignancies, just as *chuser*, compounded by abnormal blood proliferation, does so for the Sowa Rigpa conditions onto which biomedical cancer maps.

The Carr-Locke and Theise team who provided the first characterization and “novel expansion and specification of the concept of the human interstitium” describe it as follows: “A previously unrecognized, though widespread, macroscopic, fluid-filled space within and between tissues ... including the submucosae of the entire gastrointestinal tract and urinary bladder, the dermis, the peri-bronchial and peri-arterial soft tissues, and fascia.”¹¹⁹ Such fluids had been only vaguely described previously,¹²⁰ with little known about the related “structure of inter- and intra-tissue spaces.”¹²¹ The team describes the interstitium as a pre-lymphatic space and the primary source for lymph as a major fluid compartment in the body. Malignant cancer cells enter the interstitial space before transport into lymphatic and circulatory pathways.¹²² Theise describes the interstitium as a nanoscopic dynamic fluid space that behaves as connective tissue at times and as a fluid at others.¹²³ It exists around all capillaries and tissues except the kidneys and heart and lubricates and nourishes tissues and cells. Along with a recent finding of lymphatic vessels in the brain,¹²⁴ such depictions provide an important corollary to *chuser* in Sowa Rigpa. *Chuser* drives conditions of lymph, skin, and fluid abnormalities like edema, similar to recent findings on the interstitium. *Chuser* is also implicated in the conditions onto which biomedical cancer maps: namely, *dréné*, channel *tren*, *méwel*, *surya*, and related¹²⁵ nutrient essence metabolic conditions. *Chuser* metabolism, or how *chuser* moves across spaces and maintains its respective constituent qualities, is a key process for health maintenance as well as disease etiologies in Sowa Rigpa. Although beyond the scope of this article, the activities and populations of *srin* (*srin*), or microorganisms in the body, which are closely related to the

117 See, e.g., Garfin et al. 1981; Stauber 1989; Purslow 2010; Schleip, Findley, and Huijing 2012.

118 See, e.g., Day 1952; Auckland and Reed 1993; Heldin et al. 2004; and Abbott 2004.

119 Benias et al. 2018, 1.

120 Auckland 1984.

121 Benias et al. 2018, 1.

122 Benias et al. 2018, 4–6.

123 Theise 2018.

124 Louveau et al. 2015.

125 Those conditions involving the spreading (*byer ba*) and twisting (*dril ba*) dynamics as subtypes of nutritional essence metabolic conditions (Yutok Yönten Gönpo 2006, 169).

activities and populations of *chuser*, also play a key role in maintaining health in balance and driving disease when in imbalance, including for conditions related to cancer in Sowa Rigpa. *Srin* provides an important corollary to recent findings of the microbiome in biomedicine.¹²⁶

Blood and *Chuser* in the Metabolic Disorders Related to Cancer

In the *Four Treatises*, heat illnesses in which blood is dominant are called “proliferating heat” (*tsha ba byer gyur*). Heat illnesses dominated by *chuser* are called “dirty heat” (*rnyogs par gyur*),¹²⁷ or dirty fevers (*rnyogs tshad*), when an aggravation of *rlung* disturbs *chuser* as well as the quality and movement of blood.¹²⁸ Among the conditions onto which biomedical cancer maps—namely, *dréné*, channel *tren*, *méwel*, *surya*, and related nutrient essence metabolic disorders, or *dangma mazhuwa* (*dwangs ma ma zhu ba*) conditions¹²⁹—blood and *chuser*, along with the aggravating force of *rlung*, play key roles. *Srin* is

126 Although the *nyépa* are classically the primary drivers of disease, the *Four Treatises* often presents blood and *chuser*, as well as *srin*, as contributing to disease formation and classification. Blood, *chuser*, and *srin* are normal constituents of the body and have important functions, as has been described (*nyes pa'i rigs kyi dbye*; Yutok Yönten Gönpö 2006, 400). *Srin* are characterized as microbiota that live throughout the body and contribute to the functional activities of each region. However, disturbance and imbalance can lead to the formation of disease, whereby the main causal condition of the disease would be seen as a *srin* disturbance. For example, Jampa Trinlé (2006, 955) comments: “The 84,000 *sinbu* reside as coemergent in the body and, in a balanced state, provide strength and radiance to the body and one's longevity as well as protect one's vitality and sensory organs. They accompany one's projection of dexterity. In imbalance, they produce diseases of various types” (*lus la lhan skyes su gnas pa'i srin bu bryad khri bzhi stong la bya ste / de dag mam par ma gyur pa'i tshe lus kyi stobs mdangs bskyed cing/ tshe srog dbang po srung ba dang/ yang rtsal dod pa sogs kyi grogs byed pa dang/ nam par gyur na nad rigs nam pa sna tshogs skyed par byed pa'i las can no*). Biomedicine is beginning to understand a similar context from findings in the microbiome. Like the role of *srin* in Sowa Rigpa, the microorganisms in our gut, skin, eyes, teeth, genital regions, and so forth play critical functional roles in digestion, enzyme activation, neuroendocrine signaling, fluid processes, and so forth (see, e.g., Arumugam et al. 2011). Yet the imbalance of microbiota in a given region can have harmful consequences. The development of antibiotics arose from this early finding that acute and chronic bacterial and viral overpopulations are pathogenic (Schulz et al. 2015), described as infections despite the presence of these bacteria and viruses in healthy bodies (Talebi Bezman Abadi 2014). Many such pathogens have been implicated in the formation of cancer, as well as other serious and chronic life-limiting illnesses.

127 Yutok Yönten Gönpö 2006, 235.

128 Yutok Yönten Gönpö 2006, 259.

129 See Tidwell 2019 for detailed analysis.

described as an additional influence, though not elucidated here.¹³⁰ The conditions recognized to affect both the external and the internal body, as well as most likely to become systemic,¹³¹ are those related to blood, *chuser*, *srin*, and *tripa* activities.¹³² Of the four major *tripa* disorders,¹³³ blood disorders arise in two predominantly: (1) heat-producing *tripa* and (2) generalized *tripa* imbalances,¹³⁴ where the latter are caused by injury, disturbance, and infectious pathogens.¹³⁵

The *Four Treatises* describes the root of all chronic illness as “metabolic disruption” (*ma zhu ba*), from which many conditions arise, including those just enumerated. Not only is the proper development of life-sustaining blood critical for generating the subsequent bodily constituents, but improper blood development also consequently leads to systemic malformation and malfunction of subsequent bodily constituents and comprises the primary mechanism for developing chronic disorders. Nutritional essence metabolic disruptions—*dangma mazhuwa*—occur when waste product infiltrates nutrient stream pathways, causing liver dysfunction and improper blood production. Conditions associated with biomedical cancer result from two subtypes of aggravating influences: wrapping or condensing (*'dril ba*) and dispersing or spreading (*byer ba*). Abnormalities in proper formation of the bodily constituents produce abnormalities at subsequent levels, creating adhesions, aggregations, and masses.

In the *Four Treatises*, the category of *tren* characterizes any abnormal mass in the body, whether formed of bodily constituents or excrements. Although I have detailed elsewhere how *tren* link to the biomedical concept of neoplasms,¹³⁶ I will highlight a few key details that elaborate on its relationship to blood and *chuser* here. Neoplasms, which form a mass, correlate to *tren* types formed from bodily constituents. However, kidney stones, gallstones,

130 See related descriptions and analysis from Desi Sangyé Gyatso's *Oral Instructions Supplement* (2005, xi–xii).

131 *phyi nang kun tu khyab pa'i nad rigs* (Desi Sangyé Gyatso 2005, xi–xii).

132 The listed conditions are as follows: *tripa*, *béken mugpo*, *muchu*, *ohr*, *kyabab*, chronic pulmonary conditions (of which tuberculosis is the most common contemporary type recognized), the six hot disorders, smallpox, shingles, muscle inflammatory conditions, all types of poisons and toxins, pathogenic microorganisms and related imbalances, disorders caused by external influences (*gdon*), leprosy, *dréné*, *méwel*, and wounds (Yutok Yönten Gönpö 1999, 90).

133 (1) Excess *tripa* proliferation, (2) heat-producing *tripa* imbalance, (3) gallbladder *tripa* disorders, and (4) general *tripa* imbalances through all channels (Yutok Yönten Gönpö 2006, 133).

134 Yutok Yönten Gönpö 2006, 133.

135 Yutok Yönten Gönpö 2006, 135.

136 Tidwell 2019.

bezoars, and the like, which are classified in Sowa Rigpa as *tren*, do not overlap with the neoplasm concept. Malignant neoplasms are abnormal, unregulated growths of cell populations that have attained the six characteristics of cancer outlined earlier. The only *tren* related to these characteristics are channel *tren*, a subset of conditions in nutrient essence metabolic disruptions that arise from spreading (*byer ba*) types—that is, those which form when blood is affected by metabolic disruption. Likewise, channel *tren* require an additional twisting dynamic from *rlung* and a compounding injury to bodily constituents, indicating *chuser*.¹³⁷ Channel *tren* affect any region with blood, neural, or lymphatic supply; most organs, particularly lungs, kidneys, the gastrointestinal system; and spaces between the skin and muscle. *Rlung tren* arise from the twisting subset of nutrient essence metabolic disruptions¹³⁸ and particularly affect the stomach, colon, and uterus. Their mobility, variable growth, and remission response rates relate them to malignant cancer.

Dréné, along with *méwel* and *surya*, belong to the overarching category of coemergent wounds.¹³⁹ As with *tren*, I elaborate only on its relationship to blood and *chuser* since I discuss its etiological link to biomedical cancer elsewhere.¹⁴⁰ *Dréné* arise from trauma, *nyépa* disturbance, improper dietary input, metabolic disturbances and related improper ripening of the bodily constituents, and the proliferation of blood and *chuser* with the aggravating condition of excess *rlung*.¹⁴¹ *Dréné* can arise in all regions of the body—external and internal—and are characterized by a hard mass, like a gnarl on an oak tree, most often composed of several bodily constituents, and minimal pain.¹⁴² Internal *dré*, often obscured from detection, insatiably devour body nutrients and manifest “pus-like” rotting constituents in anterior and posterior spaces of the mass that gather *chuser*.¹⁴³ *Dréné* require treatments that tame the growth, eliminate the abnormal mass, and protect *menbu*.¹⁴⁴ Though not every *dréné* case achieves the ability to spread (or “metastasize” in biomedical

137 *dangs ma ma zhu ngan khrag rgyas pa de/ mchin dri glo mkhal rgyu grog pho ba'i rtsar/ 'grims pa sa gcig 'dril ba rtsa yi skran/ mtshon lam mtshon khrag 'khyims pa'ang de bzhin no/* (Yutok Yönten Gönpö 2006, 176).

138 *pho long mngal du skran gang rlung gis bskyod / 'phyo lding 'phel 'bri byed pa rlung gi skran/* (Yutok Yönten Gönpö 2006, 176).

139 *lhan skeyes rma* (Yutok Yönten Gönpö 2006, 400–413).

140 Tidwell. 2019.

141 Troru Tsénam 2003, 3: 180.

142 Yutok Yönten Gönpö 2006, 400; Troru Tsénam 2003, 3: 180. In the *Four Treatises*, what makes *dréné* distinct from *tren* is the coincident causal factor that ultimately forms a *dré*, which is the excess production of poor-quality (or impure) blood and the intensity of a coalescing force of aggravated *rlung*.

143 Yutok Yönten Gönpö 2006, 401.

144 Yutok Yönten Gönpö 2006, 401–3.

terms), as is more common for *méwel* and *surya*, *dréné* provide an important corollary to many biomedical carcinomas and sarcomas and achieve transport capacity when additional *rlung* influence contributes, such as with *rlung dré*.¹⁴⁵ *Dré* of the *menbu* (*rmen 'bras*), or growths in the lymph and some endocrine glands, link to many lymphomas and some endocrine tumors, respectively.¹⁴⁶ However, because of the etiologial feature of a hard mass, *dréné* is an unsuitable disease category framework for leukemia and other non-solid tumor hematological cancers. For example, blood *dré* in this category present as masses primarily in the breasts and uterus.¹⁴⁷

In the *Four Treatises*, the term “skin,” *pakpa* (*pags pa*), refers to external skin as well as superficial layers on organs (such as epithelial cellular layers of organs and internal body passages, as well as endothelial cellular layers lining interior surfaces of vessels in biomedicine): “Sites where *méwel* manifest include the skin and vital organs, specifically the heart.”¹⁴⁸ The *Four Treatises* describes *méwel* etiology as follows: “By means of diet, behavior, and nonhuman external influences [*gdon*], blood and *tripa* proliferate, and *chuser* and heat are aggravated by *rlung* [to produce *méwel*].”¹⁴⁹ *Méwel* is characterized by burn-like sores on superficial regions of the external and internal body (e.g., epithelial layers of organs) and has the proclivity to spread. As such, it has a strong connection to *chuser* and a convincing link to many biomedical skin cancer types.

Surya forms irregularly shaped external and internal sores with extended, narrow, heterogeneous edges that fan out like sun rays, from which the Sanskrit term originates.¹⁵⁰ It affects the lungs, liver, stomach, colon, and kidneys and particularly manifests in skin and muscle constituents,¹⁵¹ which means that it can be related mostly to biomedical dermal and epithelial cancers.¹⁵² Etiologically, *surya* results from various disturbances of the blood: excess blood proliferation, poor blood quality, remnant blood from external invasive injury¹⁵³ that propagates contaminated blood in the body, as well as internal blood from trauma.¹⁵⁴ *Surya* resultant from internal trauma-derived blood affects regional bodily constituents and manifests with systemic

145 *rlung 'gras sbo 'khrög mi brtan mgo bor 'khor/* (Yutok Yönten Gönpö 2006, 401).

146 That is, for *menbu* as a hybrid lymph/endocrine gland category.

147 *khrag las gyur pa nu ma mngal du 'byung/* (Yutok Yönten Gönpö 2006, 401).

148 *gnas ni pags pa don snying rnam la gnas/* (Yutok Yönten Gönpö 2006, 401).

149 *rgyu rkyen zas spyod gdon gyis khrag mkhris 'phel/ chu ser tsha ba rlung gis bus pa'o* (Yutok Yönten Gönpö 2006, 407).

150 Yutok Yönten Gönpö 2006, 408; Troru Tsénam 2003, 3: 178.

151 Yutok Yönten Gönpö 2006, 407.

152 Weinberg 2006, 30.

153 That is, injury resulting from breaking the skin, as with a weapon (*mtshon khrag lus*; Troru Tsénam 2003, 3: 185).

154 *'grams khrag*.

effects. Contagious disease (*rims nad*), toxins, and excess channel heat that has not been properly released by venesection are also causal conditions.¹⁵⁵ These causal conditions give rise to bad blood and *chuser* imbalances that disperse (*byer ba*) through channels and affect all organs, bodily constituents, and systems.¹⁵⁶ *Rlung* aggravation leads to swelling, pus formation, and the development of *dré*-like growths.¹⁵⁷ Unlike *dréné* and *tren*, *méwel* and *surya* have a tendency to spread throughout the body along channels and because of their stronger *chuser* etiology. *Surya*'s ability to enter and affect channels links it to cancers of the lymph glands (such as lymphomas), blood vessels, and neural tissues. Since endothelium is a specialized form of epithelium lining various blood and lymphatic vessels, *surya* links to more carcinomas and adenocarcinomas than many *dréné*.

As mentioned above, muscle, bone, and channel *dré*, which are internal *dré*, along with some channel *surya*, provide correlating conditions to sarcomas. Though only 1 percent of all tumors, sarcomas are cancerous growths in non-epithelial cells of connective tissues such as internal spongy tissues of bone, cartilage, fat, or muscle and vascular and hematopoietic tissues.¹⁵⁸ In mapping sarcomas into the Tibetan nosology and paradigm of bodily constituents, such growths correlate well with these internal *dréné* and channel *surya*. Sarcomas also have degrees of malignant behavior, for which they are graded similar to the mild-to-aggressive behaviors each *nyépa* confers on the related *dréné* type. Leukemia maps onto Sowa Rigpa etiology as a particular case of nutrient essence metabolic disorder.¹⁵⁹

The relationship between differential managing of nutrients and waste products specific to blood production and metabolism, and pathogenic relationships to these processes involving *chuser* and *srin*, characterize the common etiological processes underlying channel and *rlung tren*, *dré*, *méwel*, *surya*, and other nutrient essence metabolic disorders resulting in blood imbalances. The proliferation of abnormal blood, *chuser* disturbance, and aggravation of *rlung* play central roles in each of these disorders. Cellular hyperplasia—disturbed, pathological growth of cells—originates through a complex and coemergent array of causal conditions deriving from genetic, environmental,

155 Yutok Yönten Gönpo 2006, 408.

156 As explained in the case of *surya* (Troru Tsénam 2003, 3: 185).

157 *khrag ngan chu ser don snod rtsa mig 'dus/ skrang shing brnags na 'bras ltar 'gyur ba yin/* (Yutok Yönten Gönpo 2006, 408).

158 Weinberg 2006, 29–30.

159 Khenrab Gyamtso, personal communication, 2015. See Tidwell 2019 for further analysis.

social, psychological, dietary, and related factors.¹⁶⁰ The conditions identified in the *Four Treatises* that relate to biomedical neoplasms and malignancies also rely on compounding conditions of inciting or diffusing imbalances in the bodily constituents, particularly that of blood and *chuser*, and the *nyépa*, with particular emphasis on the aggravation of *rlung* and *tripa* functions related to blood production.¹⁶¹

As emerging research on cancer metastasis assesses the role of the interstitium, the etiological nuances of understanding these disorders in Sowa Rigpa will likely demonstrate the critical linking concepts of *chuser*, blood, and *rlung*.¹⁶²

Comparing Frameworks of Comorbid Fluid Accumulation Conditions

In biomedicine, edema is excessive accumulation of fluid in the interstitium,¹⁶³ characterized by abnormal filtration, pressure, and flow in a region due to injury, inflammation, or other pathologies leading to fluid outflow from vessels.¹⁶⁴ In the *Four Treatises*, conditions where an abnormal amount of fluid collects are described as *chuser* accumulation and termed *kyabab* (*skya rbab*), *ohr* (*'or*),¹⁶⁵ and *muchu* (*dmu chu*), differentiated by severity. These conditions develop in association with any disorder resulting from abnormal blood proliferation, *chuser* disturbance, and *rlung* aggravation, such as *dréné*, channel *tren*, *méwel*, *surya*, and other *dangma mazhuwa* conditions¹⁶⁶ related to serious chronic illness.

160 Further oncogenesis and malignant cell proliferation also arise in multistep, coemergent processes with specific genetic alterations and mutations, with multiple rate-limiting steps producing incremental growth and immortality advantages (Hanahan and Weinberg 2000).

161 Hanahan and Weinberg 2000, 57.

162 Linking understandings of the interstitium in biomedicine to these related concepts in Sowa Rigpa can illuminate how functional pathways and interrelationships across organs, fluids, body systems, and mental patterns in the latter tradition may provide useful alternative paradigms to the cellular model in the former.

163 Heldin et al. 2004, 807.

164 Lund, Wiig, and Reed 1988; Heldin et al. 2004.

165 Although the standard phonetic conversion as provided by Germano and Tournadre (2010) for this term is *or*, I choose to use the variant spelling *ohr* to distinguish the term and prevent confusion with the English conjunction.

166 Yutok Yönten Gönpö 2006, 187, 189.

Kyabab, like a first-stage edema among these disorders, develops from improper diet and lifestyle, nutrient essence metabolic disorders, and aggravated *rlung* dispersion.¹⁶⁷ As such, it relates to a concurrent etiology for channel *tren*, *dréné*, *méwel*, *surya*, and the other *dangma mazhuwa* conditions, but with further disruption to *chuser* processes along with the production of poor-quality, or diseased, blood. *Kyabab* forms primarily in lungs, liver, and spleen, as well as in muscle and skin constituents, known as *chuser kyabab*, and in the heart and central channel,¹⁶⁸ known as *rlung chuser*, which also affects the brain and central nervous system.¹⁶⁹ Here we see the link to biomedical conceptualizations of edema.¹⁷⁰ In Sowa Rigpa, early damage to these organs and regions produces initial fluid accumulation that provokes a more extensive *chuser* condition or additional aggravated *rlung* influence, which then progresses into advanced states.¹⁷¹

Over time, *kyabab* can develop into *ohr*,¹⁷² which can be likened to a second-stage edema. *Ohr* can subsequently progress into *muchu*,¹⁷³ similar to a third- (or final) stage edema. Likewise, any improperly treated condition can progressively develop into *kyabab*, *ohr*, or *muchu*,¹⁷⁴ depending on how blood production and *chuser* metabolism are affected. Thus, *ohr* and *muchu* have identical root etiologies to *kyabab* with the addition of increased severity, lack of early diagnosis/treatment, more extensive impact to skin and muscle

167 Yutok Yönten Gönpö 2006, 184.

168 *srog rtsa*.

169 Yutok Yönten Gönpö 2006, 184.

170 In the Euroamerican tradition, the primary areas where edema is observed are legs, around the eyes, face, pleural cavity, and specific organs. Cerebral edema, lymphedema, and cutaneous edema from irritation or an increased tendency of the tissue to accumulate fluid also occur in specific cases. Some of the specific contexts for edema to occur include fluid regulatory dysfunction during pregnancy, heart conditions, varicose veins, exposure to toxins and irritants such as insect bites, and various forms of dermatitis. Improper management of fluids from the lymph system, fatty tissues, and endocrine glands such as the thyroid gland can also lead to various edemas. Environmental changes that shift interstitial fluid pressure in the body, such as high altitude, can cause pulmonary and cerebral edemas. Structural damage and biochemical changes in kidney glomeruli can cause edema related to kidneys. Various inflammations of the pancreas, spleen, and kidneys—as well as connective tissues such as with tendonitis—can form edema via specific fluid spaces around those tissues. Improper lymphatic or venous vessel draining often forms edema in the legs and feet. Lower-extremity edemas can also result from malfunction in the lungs, heart, and kidneys as well. Toxic chemicals and irritants cause internal and external edemas on dermal and epidermal surfaces.

171 Yutok Yönten Gönpö 2006, 187.

172 Yutok Yönten Gönpö 2006, 187.

173 Yutok Yönten Gönpö 2006, 187.

174 *'on rkyang nad kun bcos nyes skya rbab dang / 'or du 'gyur la 'or rmying dmu chur 'gyur* (Yutok Yönten Gönpö 2006, 191).

constituents, and more *chuser* buildup and accumulation in spaces around organs and other fluid compartments. *Ohr* also results from increased *rlung* aggravation, additional external/internal injury, and toxin load.¹⁷⁵ It characteristically affects limbs, face, shins, chest, stomach, genital regions, and muscle and skin layers, reducing overall body heat and metabolic strength.¹⁷⁶ Reactions to poisons/toxins can develop into *ohr*.¹⁷⁷

In addition to sharing coincident causes with *kyabab* and *ohr* as its preceding conditions and inciting other illnesses into further chronic development, *muchu* develops from specific additional arousing conditions—*nyépa* exacerbation of metabolic disruptions, external harmful influences (e.g., pathogen load, toxins), improper management of fluids after extreme fatigue, poor thermoregulation, organ fluid dysregulation, improper dietary and lifestyle routines after purgatives or other cleansing treatments, and excessive cooling after fevers and hot conditions.¹⁷⁸ *Muchu*, primarily characterized by dominant imbalances in *rlung*, *tripa*, *béken*, blood, or *chuser*, also has various subtypes differentiated by specific effects on *chuser*; particular organ(s) affected, upstream damage resulting in downstream accumulation; and relationship to conditions like *tren*, specifically blood, channel, and fluid-filled *tren*.¹⁷⁹ Spreading *muchu* (*byer chu*) affects all vessels, with subtypes classed by blood formation and transport disturbance effects.¹⁸⁰

In the initial stages of *muchu*, *chuser* accumulates in the legs, forearms, joint spaces, abdomen, face—especially eyes and mouth¹⁸¹—as outlined for biomedical edema and Sowa Rigpa *kyabab* and *ohr* above. As *muchu* develops, the heart and breastbone begin experiencing strain, and breathing is taxed.¹⁸² As *muchu* further progresses, fluid fills the upper and lower abdomen around the gut, and the kidney region swells. Accumulated *chuser* limits body movement,

175 Yutok Yönten Gönpö 2006, 187.

176 Yutok Yönten Gönpö 2006, 187.

177 Such as polyps. Jamyang Gyatso, personal communication, 2018.

178 In biomedicine, certain interventions like fluid therapy will also aggravate edema generation and fluid imbalances (Lund, Onarheim, and Reed 1992).

179 For example, any damage to vessel structure or function results in *khyimchu muchu* ('*khyims chu dmu chu*), which is characterized by effects that radiate outward, like the concentric circles formed by a drop of water in a pool or the nestled colored rays of a rainbow.

180 Spreading *muchu* along with the described *tren* subtypes related to liver, lungs, and heart are identified as the greatest life threats.

181 The regions in which *chuser* accumulates in the initial stages of *muchu* conditions are called the eight fortresses (*chu yi mkhar brygad*). They are the following: the femur and large joints of the legs (*bol gong*); the forepart of the arms and legs (*ngar gdong*); the urethra (*chu so*); sixteen major joint spaces (*bcu drug mdo*); the abdomen (*pho ba*); the lower abdomen (*brang zhol*); around the mouth and nearby facial regions (*kha gdong*); and the eyelids (*miq lcibs*) (Troru Tsénam 2003, 2: 254).

182 Troru Tsénam 2003, 2: 254.

especially the limbs. Percussion across the abdomen produces characteristic sounds of underlying fluid.¹⁸³ When *muchu* fully manifests, hot-natured *muchu* can present as jaundiced eyes, sensitive sternum, enlarged abdomen, prominent superficial abdominal veins, and loss of mass on limbs presenting as emaciated arms and legs. Cold-natured *muchu* conditions present with greater bloating from internal gas, as well as frequent diarrhea. Head, body, and limbs swell from fluid accumulation, have a thick, coarse appearance, and can easily be indented by finger pressure. Cold-natured *muchu* takes longer to develop than hot-natured *muchu* and presents more chronically. For both, fluid occlusion of lungs, heart, or liver threatens life.

Ascites is defined as fluid accumulation in the peritoneal cavity,¹⁸⁴ the space between the abdominal wall and the internal organs within the abdomen. It is an example of a biomedical condition that correlates with advanced *muchu*, including a similar diagnostic indication of prominent superficial epigastric veins known in biomedicine as *caput medusae*, or “Medusa’s head,” where the engorged veins appear like Medusa’s hair of writhing snakes.¹⁸⁵ Like Sowa Rigpa, biomedicine indicates therapeutic intervention of paracentesis for fluid sampling and drainage.¹⁸⁶ Ascites in biomedicine is defined more narrowly than the scope of conditions related to fluid imbalances in *muchu*. Unlike many advanced *muchu* conditions, it does not include the pleural cavities or the pericardial cavity. Ascites results from a variety of conditions, most commonly liver damage, cancer, heart failure, tuberculosis, kidney damage, dialysis, and pancreatic disease.¹⁸⁷ Cirrhosis, in which normal liver tissue is replaced by scar tissue owing to long-term chronic illness and damage, is the primary condition associated with ascites in biomedicine,¹⁸⁸ unlike the myriad conditions that contribute to advanced *muchu* conditions in Sowa Rigpa as described above.

Conclusion

Linking biomedical understandings of six cellular capabilities of cancer to Tibetan medical etiologies and assessing related understandings of blood, fluid metabolisms, and fluid accumulation dynamics in each tradition, we see

183 *thol thol phrig phrig 'ong* (Yutok Yönten Gönpo 2006, 192).

184 Runyon 1994.

185 Biomedicine similarly recognizes *caput medusae* as a diagnostic sign of liver damage, specifically portal hypertension (Sherlock and Dooley 2002; Schuppan and Afdhal 2008).

186 Yutok Yönten Gönpo 2006, 198.

187 Runyon and Reynolds 1991.

188 Runyon 1994; Schuppan and Afdhal 2008.

a distinction in two correlated analytical units. The biomedical cellular model correlates to the Sowa Rigpa material support, or structural basis (*rten*) of the bodily constituents, yet the former is defined more by morphology and the latter more by function. The three *nyépa*, or dependents (*brten pa*), do not clearly correlate to the biomedical model beyond the functions, material properties, and activities of the tissues and fluids of the body. Yet they allow for intersections with the respective body systems and their interrelationships that biomedicine delineates physiologically.

This article draws from a paradigm framework for each of the respective medical traditions' analytical units to propose an expansion¹⁸⁹ of an etiological and diagnostic mapping of biomedical cancer onto its most proximate Tibetan medical categories¹⁹⁰ by developing the etiological role of blood and *chuser* and the comorbid fluid accumulation conditions of *kyabab*, *ohr*, and *muchu* on the Sowa Rigpa side. The comorbid conditions highlight a parallel recognition in Sowa Rigpa and in biomedicine of the common occurrence of edema and ascites with cancer. Likewise, the characterization of the etiological role of blood and *chuser* in conditions related to biomedical cancer coincides with an important finding in modern biology and biomedicine: the existence of the interstitium. As an organ, and coincident fluid-cum-connective tissue space, interstitium provides an important link between Tibetan medical and biomedical etiological understandings of these life-limiting illnesses. Mutual understanding is facilitated via, for example, shared concepts of how these conditions progress to advanced states such as metastasis and more aggressive forms of growth.

As a Sowa Rigpa concept without a parallel notion in the biomedical paradigm previously, *chuser* provides a critical context in which many conditions are understood in the *Four Treatises* and its most prominent commentaries. The new interstitium finding provides a key linking concept in biomedicine for Euroamerican physicians and biological scientists to understand *chuser* and its vast and nuanced influences on disease formation as well as healthy functions and states. The recent characterization of the intersitium¹⁹¹ and brain lymphatics¹⁹² will likely lead to better understanding of the role of these fluid spaces, processes, and metabolisms in many diseases as research and analytic instrumentation develop.

189 Expanded from an earlier publication by the current author (Tidwell 2019).

190 Namely, channel *tren*, *dréné*, *méwel*, *surya*, and other proliferating nutrient metabolic disorders of the blood.

191 Benias et al. 2018.

192 Louveau et al. 2015.

Since blood is easily taken for granted as an identical concept in Euroamerican biomedical and Tibetan medical traditions, it provides a key to understanding ontological and etiological similarities and distinctions between the two medical traditions. Highlighting such distinctions helps practitioners and researchers from both systems to communicate more explicitly about diagnostic and treatment differences in each paradigm as well as about normal physiological functions and body-mind relationships.

The relationship between the substrate of bodily constituents, which include blood and *chuser*, and the substrate of the three default systems provides a unique paradigm and epistemology in which to understand integral aspects of mind and body in their functioning and malfunctioning, as well as the attendant epistemologies, etiologies, and nosologies. Such an approach is critical for facilitating productive collaborative research between Euroamerican and Tibetan medical traditions whereby such an intellectual exchange of paradigms can forge new understandings of biologies and promise novel perspectives for diagnosis and treatment of the most difficult illnesses of our time.

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