

Positioning Human Microbiome DTC Tests

On the search for health, data and alternatives amid
the financialisation of life

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Abstract

Early during my fieldwork on the social life of the microbiome in Toronto, I was asked ‘Do you believe in microbiome testing?’ This question invited me to evaluate the science of the direct-to-consumer (DTC) test. In this Position Piece, I consider this question in a more expansive manner so as to position the test in its social and economic context. The distribution and public uptake of such a DTC test require scientific expertise but also marketing, capital investments, and clinical labour. This test requires consumers to do the work of stool collection and the reproductive labour of diet changes in their domestic spaces. I have learned that the microbiome is part of the quest for alternative ways of living and being healthy. Broadening the question to consider more than just the science expands the frame from one of scientific efficacy and individual consumption to one that considers the financialisation of health and the politics and environments of post-Pasteurian and post-industrial contexts.

Keywords

Microbiome, Reproductive labour, Direct-to-consumer testing, Consumption, Holistic medicine, Precision medicine.

Introduction

‘Do you believe in microbiome testing?’ the event organiser asks me. Zoe,¹ a charismatic thirty-something white woman, is an influencer in what is called ‘holistic nutrition’. She has approximately 25,000 followers on Twitter, 43,200 on Facebook, and 98,600 on Instagram. As we talk, roughly 20 people filter into the yoga studio we occupy, located in Toronto’s east end, for her evening presentation about infants’ health and the microbiome that she has promoted online. I have explained that I am doing ethnographic research on everyday meanings and social practices associated with the emerging science of the human microbiome and am interested in how people use direct-to-consumer (DTC) gut microbiome tests. Zoe is addressing me in what feels like an expert-to-expert conversation. In response, I say something about the science being relatively new and explain that I am studying both what it means to people and the ways in which they use the tests. She engages me in a conversation about the efficacy of the science of the DTC test. ‘If the microbiome is always changing,’ she asks, ‘how could you even have an effective test?’ She is called away to talk with others, and I take a seat.

Her presentation is dynamic and personal, and the audience—mostly made up of white women like me—is drawn in. We listen to Zoe’s talk on the importance of ‘good microbes’ for our health and how much the microbes ‘like it’ when we exercise our bodies. Caring for microbes is important, she tells us, because the ones associated with obesity can be passed on to a foetus. During the question-and-answer session following the talk, someone gives a personal account of their as-yet unsuccessful search to deal with their child’s eczema.

‘Would a DTC microbiome test be advised?’ the audience member asks.

‘If you have the budget,’ the influencer says, ‘but it’s new science and there’s lots we still don’t know.’

DTC gut microbiome tests examine a tiny fraction of the trillions of cells in a human body that are microbial. The collection of these microbes is what is called the microbiome. People can purchase gut microbiome test kits online for between 125 and 250 USD. Companies then send out the test kits with standardised stool collection and preservation materials. The components of the test kits come in colourful packaging that make the objects pleasing to handle. With minor variations, the kits contain the following: a vial quarter-full of preservative liquid; a vial lid with a small scoop attached; and a plastic envelope labelled ‘biohazard’, to be placed inside a bubbled mail envelope with a sticker indicating ‘human specimen exception’. The kits’ instructions run something like this: ‘Bring your test

1 This is a pseudonym.

kit into your restroom for your next bowel movement. Collect a pea sized scoop, place it in the vial, and shake it for two minutes.’ Infographics sometimes stand in for the delicate language associated with collecting faeces in one’s own home. Test consumers then send their sample in the regular mail or using a courier service to the company for analysis.

For some companies, results will only be released after test users/research participants complete pages-long lifestyle questionnaires. There are user agreement documents to sign electronically (which cover terms of service, privacy, and informed consent) and these can be up to sixty pages long. Test results come with the companies’ suggestions for diet changes based on the presence or absence of particular microbes. People are encouraged to purchase multiple re-tests to see the impact of their changed habits on the microbes in their bodies. There are online communities, sometimes facilitated by the test companies themselves, where test users discuss their results and strategies to act on the recommendations (e.g., new recipes) and share methods to work out the different dietary requirements of household members.

The ostensible value of the DTC test for consumers therefore takes the form of precise and personalised advice on how to eat to best optimise the microbial ecologies associated with human health. In its current iteration, however, I argue that this microbiome DTC test is unlikely to accomplish widespread health benefits. Instead, this DTC test is part of wider systems pushing the commodification and financialisation of health practices in Canada. These are the very systems that often undermine wellbeing. When the health influencer and I discussed the test, our focus on the science eclipsed broader questions about the role of the microbiome in an emerging health and wellness economy. Since we only focused on the science, we circumvented the role the DTC test plays in venture capital and the financialisation of health. This Position Piece provides a rejoinder of sorts to my fieldworker self, providing a more critical response to the question ‘Do you believe in microbiome testing?’ by positioning the DTC test in the context of the financialisation of individual health and the generation of economic value for biotech investors, shareholders, and company executives. The influencer’s reply to the audience member in search of certainty from the test is instructive here: the test appeals to individuals who have the budget and can make the dietary changes. That we were in a yoga studio was also no accident; as I will show in the last section, the DTC test circulates with the meanings and care practices for the human microbiome that figure in people’s search for individual alternatives to capitalist and biomedical approaches to life. I begin by offering a contemporary social and economic context of DTC gut microbiome tests in post-Pasteurian and post-industrial worlds, and then present a discussion of the marketing of these

DTC tests in Canada. I end with a depiction of how these tests also circulate in fields of meaning within which people are searching for alternatives.

Microbiome microbiopolitics

Microbiome science, with its assertions that microbial material outnumbers human DNA in the body, potentially challenges Western notions of the discrete nature of self, body, and environment. More practically, if current promises materialise, this scientific framing of microbial life in a human host has transformative potential for biomedical treatments for a wide variety of illnesses, from digestive to autoimmune to mental. Indeed, the very categories of illness may need to be rethought: can a condition be categorised as ‘mental’ if it is affected by gut bacteria? For these reasons, Ironstone has argued that the microbiome has the potential to be a new actor (Ironstone 2019a) in microbiopolitics because it challenges biomedical models of health and instead heralds the arrival of ‘post-Pasteurian models’ (Paxson 2008). Post-Pasteurian models of health promise new ways of relating with bacteria because, for example, we must contend with the fact that public health, agricultural, and biomedical practices premised on eradicating bacteria have led to antimicrobial resistance and cannot continue to be effective (Ironstone 2019a). Post-Pasteurian approaches to food and wellbeing, Paxson shows, also emphasise the importance of tending to beneficial microbial–human relations through, for example, the consumption of artisanal foods, sometimes flying in the face of public health regulations based on the elimination of bacteria (Paxson 2008). Besides, social scientists are working to ensure that their approaches will ‘set the agenda’ (Greenhough et al. 2020) rather than be included at the end of the scientific research process on the microbiome.

And yet in their public-facing media, Ironstone demonstrates, microbiome researchers currently approach potential microbiome test users as both research participants and consumers in ways that highlight users’ individual empowerment and self-knowledge even as they provide biological materials to be prospected, often by for-profit companies. In short, the discourse emphasises the ‘self, self-help, and bioeconomic imperatives’ at the heart of the neoliberalisation of science (Ironstone 2019b, 16). Furthermore, though the radical transformation of the makeup and categorisation of human bodies is potentially at stake, microbiome research designs rely on and microbiologise long-standing social categories of difference, including race (Benezra 2020; Helmreich et al. 2015; Nuñez Casal 2019).

To see how knowledge and representations of the microbiome materialise in particular practices and politics of health and care, I have been following the DTC test online through discussion groups and various other channels on social media.

I have also begun ethnographic research so as to situate the test in face-to-face interactions in Toronto, where caring for the microbiome is central to the theme or activity that brought people together. The algorithms of social media have shaped my portal into this world: I look for possible research locales by entering 'microbiome' as a search term into the social media platform Eventbrite, for example. Thus far, this approach has led me to attend a scientific symposium called 'Go with your Gut', organised by the Laboratory Medicine & Pathobiology Student Union at a public research university; learn about DIY mushroom cultivation at a biohackers' workshop in an alternative café; participate in food fermentation workshops; attend a mixer for freelancers at a co-working space with kombucha on tap; and attend the aforementioned yoga studio event.

My positionality and interests feed the data economy of the microbiome and the DTC test. As my research has progressed, my social media feeds have changed. I began receiving invitations supposedly tailored to my interest in the microbiome named, for example, 'Aging your Brain Younger', 'Your Moon Cycle: How It Influences Your Business and Career', and 'Change Your Water and Change Your Life'. Interestingly, the descriptions of many suggested events do not mention the microbiome. As I write, I am being positioned in online worlds. I have clearly entered spaces where my interests have become data points to be sold. The microbiome is a marketing path and the DTC test is embedded in a context where data collection and mining form the dominant business model.

In following the microbiome and test users' discussions, I have learned that DTC gut microbiome tests are fundamentally part of the political economies of North American biotechnology and biomedicine (Lorimer 2017) and the financialisation of health in Canada (Blacker 2014). DTC microbiome testing works using similar techniques and principles to other sub-sectors of the biotechnology industry so as to harness the reproductive powers of biological materials in order to render them available for profit making (Helmreich 2008). The stakes of people's everyday investments in this medical test therefore hinge on whether the science 'works', but also on the social and political meanings of health, labour, and lives well-lived in a time of the financialization of health.

These DTC tests are part of the accelerating biologisation and computerisation of human relations associated with the 'postgenomic condition' (Reardon 2017), a collection of social, political, and economic processes that Reardon has associated with the meaning and value of genetic material after the sequencing of the human genome. The DTC test is part of current emphases on health optimisation, novel digital self-tracking technologies (Lupton 2016), and 'precision medicine' (Lee 2017). The test is thus embedded in the overall context of contemporary biomedicine in North America, which includes the decentring of physicians'

authority, a growing interest in alternative medicine, an aging population with chronic illnesses to be monitored, and individual domestic consumption practices (Childerhose and MacDonald 2013, 7). The DTC microbiome test therefore raises questions not only about the effective applications of science (just as Zoe and I discussed in the yoga studio) but also about health and profit making in relation to collective wellbeing. In short, it shares much with other medical tests, despite its apparent novelty.

In addition to being a means of contributing to others' post-industrial livelihoods, the search for wellness of DTC testers (many of whom are not formally diagnosed with a disease) helps transform them into both producers and consumers ('prosumers') as well as valuable data-points for the biotech industry. In the diverse spaces Eventbrite directed me to, the concept of the human microbiome has become part of how people care for their bodies, find work, but also—as I discuss in the last section of this Position Piece—search for alternative forms of post-industrial living. There is thus far more at stake than the question of whether I believe the DTC test is based on good science.

Testing (and marketing) post-Pasteurian worlds

When the microbiome is discussed in the health and nutrition articles and social media posts I have read, the human body is commonly conceived of as host to a community of diverse life forms. In such media, microbiome science is often associated with bodily perceptions of hosts 'learning to respect our microbes' and health as 'a communitarian achievement' between microbes and their human host (Lorimer 2017).

The DTC tests are marketed within this hopeful frame, inviting consumers to 'imagine living in a world where illness is optional' (Viome 2020a) while playing off the novel awareness that there are trillions of microbes within a human body and that most of the genetic material in 'us' belongs to 'them', not us. There is a twist, however, in this marketing material. For example, the company Viome, marketing their 'gut intelligence test', proclaims on its website:

You are host to a microbial world. Approximately 40 TRILLION different organisms are living in your gut. This galaxy of microbes holds sway over your mind and body, playing a critical role in your health, including most chronic diseases. We'd like to introduce you to this unique microbial world that lives inside of you, show you around a bit, and optimize them to start working for you (Viome 2020a).

Through this language, the human host is imagined as a manager who should, rather than play host to a community, harness microbes as a workforce.

Due to their *unique* collection of microbes, consumers are told that they need *individualised* information to be healthy. The promised optimisation through precision nutrition advice is crucial to DTC test marketing, as Viome CTO Guru Banavar makes clear: ‘Since any two humans share [more than] 99 percent the same DNA, but only about 5 percent of the same microbial DNA, each person’s microbiome is incredibly unique—what works for you may not work for me’ (quoted in Lamb 2020). Within the marketing world of the DTC test companies, people are unique individuals (and potential consumers) because of the microbial communities they host. It therefore follows that there are personalised lists of foods to avoid and enjoy.

The DTC test companies often provide nutritional supplements to test users at additional cost. Nutraceuticals to boost the health of the human microbiome are common: at the end of Zoe’s lecture, as we filed out of the yoga studio to reclaim our footwear at the entrance, we passed a pop-up display of nutritional powders containing fermented proteins to support a healthy microbiome that a well-known and -respected Toronto-based natural food supplement company had set up during the presentation. Such products are sold in drug stores and health food stores and do not require personalised advice to use and/or consume. This was not a hard sell; women lined up to speak to these scientific experts/entrepreneurs. I watched several buy the products. This company, as I knew from prior online research, has collaborated with the University of Toronto in the past. The nutraceutical products the company sold were different to the personalised probiotics recommended based on DTC test results. In the personalised probiotics, ‘the human microbiome’ used to promote the shelf nutritional powders, becomes ‘my gut microbiome’.

Buttressing the optimistic characterisations of human–microbial relations in the sizeable ‘healthscape’ (Clarke 2010) of the microbiome (which includes many holistic nutrition influencers just like the one I met in Toronto) is the reality that ‘the mining and translation of the microbiome for therapeutics is driven by both venture capital and the pharmaceutical industry, both of which are keen to see certain microbes (...) patented and made private’ (Lorimer 2017). Financialised language is also part of the marketing; for example, Viome posted on their Facebook group: ‘Think of your diet as a bank account. Every deposit and investment counts toward the future of your health’ (2020b). The tests are marketed as a means for improving overall health (through, for example, ‘improved energy’) and do not test for particular diseases.

The DTC test companies’ overall goal of collecting the genomic data of bacteria in the human gut is not only to sell individual health profiles to consumers, but also to assemble large sets of data that can be analysed and further monetised. The

emergence of profitable DTC tests thus relies on context-specific constellations of scientific expertise; capital investments; skilled clinical labour; and, significantly, test users' willingness to do work in their domestic spaces, such as stool collection and subsequent diet alteration. The economic model underpinning the development, manufacture, and distribution of the DTC test involves consumers doing labour to render their genomic data valuable for corporations (Waldby and Cooper 2014). But, as it is a DTC test rather than a clinical one, this reproductive labour (unpaid work such as meal planning, food shopping, and cooking according to the test results' recommendations) benefits the companies themselves, as customers' dietary changes and follow-up tests provide data that is then used to improve products, share prices, and profit margins.

DTC gut microbiome tests and the search for post-industrial alternatives

I arrive at a food fermentation workshop in the co-organiser's apartment. I am welcomed in by a childhood friend who advertised this workshop on her Facebook and Eventbrite pages. We attended the same alternative school, which still has a sizable community around it. Members of this community tend to be concerned with, among other things, holistic health and organic farming. The atmosphere is warm and animated. People have come to learn about how they might make kimchi and kombucha. We sit around a table and do a round of introductions. We say our names and explain what has brought us here. People's reasons extend far beyond simply gaining information about microbes in fizzy cabbage and tea; some are part of the community around the alternative school my friend and I attended, while other attendees include an organic farmer, a holistic nutritionist, engineers, and several people looking for a life change. I learn that many attendees are seeking alternative ways of being healthy—of slowing down and leading lives less driven by work and conventional achievements. When it is my turn, I talk about the direct-to-consumer (DTC) microbiome test research that has brought me here and also my connection with one of the organisers.

The co-organiser begins with a short presentation about the importance of microbes and explains that changing our relationship to them is crucial for the health of the microbiome. She has worked with several anthropologists before and mentions, with a laugh, some ambivalence about having an anthropologist present—she says she hopes that she got everything right. As a trained biomedical doctor and a holistic medical doctor, she is far more of an expert on the science of the microbiome than I am. I repeat I am no expert on microbiome science, but I suspect her concern about my scientific expertise is not the only reason for her ambivalence regarding anthropologists. She speaks eloquently and convincingly about the possibilities of fermentation to improve gut health, connecting damage

done to microbial and human health due to stressful working conditions, industrial agriculture, and polluted environments. She concludes by saying that health is related to politics and is also a response to personal questions and our openness to growth.

The workshop participants and I talk more as we cut cabbage, ginger, and carrots into bite-sized chunks and then pound the mixture in a large vat until the vegetables release their juices. Topics range from the lead in Toronto public school's drinking water due to the failure to update plumbing (a current story in the news) to the corporate profits of big pharma to an upcoming fundraiser at the farm of a prominent raw milk activist outside the city. Several people ask me to follow up on what I said in my introduction; they are curious to know my thoughts on the DTC test. They seem interested in the science, but also in whether corporations could be trusted to provide health advice. I tell them the same thing I told the influencer—that the science is emerging—but add my agreement that corporations do stand to profit from this test and that it is therefore worth being critical about the immediate applicability of test results.

The co-organiser brings out her copy of Sandor Katz's *The Art of Fermentation*, playfully referring to it as 'the Manifesto' as she hands us the weighty volume to pass around. Katz's books on fermentation are a touchstone of those North American counter-cultures that place food at the centre of their activism (Maroney 2018). I later order it, as well as several more of his books, from my local independent bookstore, avoiding Amazon and, by doing so, hoping to make at least one purchase outside of the algorithms from a store that actually contributes to my neighbourhood and city. Some months later, I watch Katz give a keynote at a two-weekend virtual conference, 'Ferment for Food Justice', a fundraiser for BIPOC-led organisations. Like the co-organiser of the fermentation workshop, I am drawn to the possibilities for social change that Katz associates with new relationships with microbes, food, tastes, and community, achieved through fermentive practices.

I leave the workshop feeling optimistic and inspired. My bubbling jars of kimchi and kombucha promise so much beyond nurturing the microbiome I host. Achieving health by caring for the microbiome through fermentive practice is very much part of a life well-lived and a critique of contemporary social and economic life. It is heartening to hear people's search for alternative lives amid the bioeconomies of the present, even if their values may become datapoints for marketing algorithms when they next search online for a product or service.

Positioning meanings

The social events and the digital worlds pertaining to caring for the microbiome that I have attended and explored have taught me that there is far more to understand about the direct-to-consumer (DTC) gut microbiome test than simply whether the science works. By situating the test in economies surrounding wellness, I have found that the DTC gut microbiome test promises health knowledge for relatively privileged people who are searching for optimal health by changing their diets. Some are sick and conventional medicine has failed to cure them. The microbiome (and, by extension, the ways of testing it) is also a path to making a living; students at the university symposium wanted jobs, influencers were organising workshops to sell products, and workshop organisers needed income. For venture capital, the DTC test is a way of applying the emerging science and seeing a return on investment. The test also circulates with particular meanings of the microbiome that offer space to critique the difficult and unhealthy conditions of contemporary capitalism. This DTC test, being part of both the politics and environments of post-Pasteurian and post-industrial contexts, offers interesting possibilities to study the bioeconomies of wellness tests, as well as the limits and elisions of such tests.

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References

- Benezra, Amber. 2020. 'Race in the Microbiome'. *Science, Technology, & Human Values* 45 (5): 877–902. <https://doi.org/10.1177/0162243920911998>.
- Blacker, Sarah. 2014. "'Your DNA Doesn't Need to Be Your Destiny': Colonialism, Public Health and the Financialization of Medicine'. *TOPIA: Canadian Journal of Cultural Studies* 30. <https://doi.org/10.3138/topia.30-31.123>.

- Childerhose, Janet, and Margaret Macdonald. 2013. 'Health Consumption as Work: The Home Pregnancy Test as a Domesticated Health Tool'. *Social Science & Medicine* 86: 1–8. <https://doi.org/10.1016/j.socscimed.2013.02.035>.
- Clarke, Adele. 2010. 'From the Rise of Medicalization to Biomedicalization: U.S. Healthscapes and Iconography Circa 1890 to Present'. Clarke, Adele E., Laura Mamo, Jennifer R. Fosket, Jennifer R. Fishman, and Janet K. Shim (eds). *Biomedicalization: Technoscience, Health, and Illness in the U.S.*. Durham, NC: Duke University Press. 104–146.
- Greenhough, Beth, Cressida Read, Jamie Lorimer, Javier Lezaun, Carmen McLeod, Amber Benezra, Sally Bloomfield, et al. 2020. 'Setting the Agenda for Social Science Research on the Human Microbiome'. *Palgrave Communications* 6 (18). <https://doi.org/10.1057/s41599-020-03888-5>.
- Helmreich, Stefan. 2008. 'Species of Biocapital'. *Science as Culture* 17 (4): 463–478. <https://doi.org/10.1080/09505430802519256>.
- Helmreich, Stefan, Sophia Roosth, and Michele Friedner. 2015. 'Homo Microbis: Species, Race, Sex, and the Human Microbiome'. Helmreich, Stefan (ed.). *Sounding the Limits of Life: Essays in the Anthropology of Biology and Beyond*. Princeton, NJ: Princeton University Press.
- Ironstone, Penelope. 2019a. 'Me, My Self, and the Multitude: Microbiopolitics of the Human Microbiome'. *European Journal of Social Theory* 22 (3): 325–341. <https://doi.org/10.1177/1368431018811330>.
- Ironstone, Penelope. 2019b. 'The Microbiome as TED Knows It: Popular Science Communication and the Neoliberal Subject'. *Canadian Journal of Communication* 44: 157–174. <https://doi.org/10.22230/cjc.2019v44n2a3339>.
- Lamb, Catherine. 2020. 'Viome's CTO on Why Gut Microbes Plus AI Can Reveal Perfect Diet'. *The Spoon*. Web. 19 February. <https://thespoon.tech/viomes-cto-on-why-gut-microbes-plus-ai-can-reveal-perfect-diet/>.
- Lee, Sandra. 2017. 'Consuming DNA: The Good Citizen in the Age of Precision Medicine'. *Annual Review of Anthropology* 46: 33–48. <https://doi.org/10.1146/annurev-anthro-102116-041547>.
- Lorimer, Jamie. 2017. 'Why Liberals Love the Microbiome'. *Medical Anthropology Quarterly*. Web. 10 June. <http://medanthroquarterly.org/2017/06/10/why-liberals-love-the-microbiome/>.
- Lupton, Deborah. 2016. *The Quantified Self: A Sociology of Self-Tracking*. Cambridge: Polity Press.
- Maroney, Stephanie. 2018. 'Sandor Katz and the Possibilities of a Queer Fermentive Praxis'. *Cuizine* 9 (2). <https://doi.org/10.7202/1055217ar>.
- Paxson, Heather. 2008. 'Post-Pasteurian Cultures: The Microbiopolitics of Raw-Milk Cheese in the United States'. *Cultural Anthropology* 23 (1): 15–47. <https://doi.org/10.1111/j.1548-1360.2008.00002.x>.

- Reardon, Jenny. 2017. *The Postgenomic Condition: Ethics, Knowledge and Justice after the Genome*. Chicago, IL: Chicago University Press.
- Viome. 2020a. 'Viome's Gut Intelligence Test'. Viome. Web. <https://www.viome.com/products/gut-intelligence>.
- Viome. 2020. 'Think of your Diet as a Bank Account'. Facebook post. 19 August.
- Waldby, Catherine, and Melinda Cooper. 2014. *Clinical Labor: Tissue Donors and Research Subjects in the Global Bioeconomy*. Durham, NC: Duke University Press.