

## **A Case of Kombucha Tea Toxicity**

Alison SungHee Kole, Heather D. Jones, Russell Christensen and Jay Gladstein

*J Intensive Care Med* 2009 24: 205

DOI: 10.1177/0885066609332963

The online version of this article can be found at:

<http://jic.sagepub.com/content/24/3/205>

---

Published by:



<http://www.sagepublications.com>

**Additional services and information for *Journal of Intensive Care Medicine* can be found at:**

**Email Alerts:** <http://jic.sagepub.com/cgi/alerts>

**Subscriptions:** <http://jic.sagepub.com/subscriptions>

**Reprints:** <http://www.sagepub.com/journalsReprints.nav>

**Permissions:** <http://www.sagepub.com/journalsPermissions.nav>

**Citations:** <http://jic.sagepub.com/content/24/3/205.refs.html>

>> [Version of Record](#) - May 21, 2009

[What is This?](#)

# A Case of Kombucha Tea Toxicity

Alison SungHee Kole, MD, MPH, Heather D. Jones, MD,  
Russell Christensen, PharmD, and Jay Gladstein, MD

**Introduction:** Kombucha “mushroom” tea is touted to have medicinal properties. Here, we present a case of hyperthermia, lactic acidosis, and acute renal failure within 15 hours of Kombucha tea ingestion. **Case Presentation:** A 22 year old male, newly diagnosed with HIV, became short of breath and febrile to 103.0F, within twelve hours of Kombucha tea ingestion. He subsequently became combative and confused, requiring sedation and intubation for airway control. Laboratories revealed a lactate of 12.9 mmol/L, and serum creatinine of 2.1 mg/dL. **Discussion:** Kombucha tea is black tea fermented in a

yeast-bacteria medium. Several case reports exist of serious, and sometimes fatal, hepatic dysfunction and lactic acidosis within close proximity to ingestion. **Conclusion:** While Kombucha tea is considered a healthy elixir, the limited evidence currently available raises considerable concern that it may pose serious health risks. Consumption of this tea should be discouraged, as it may be associated with life-threatening lactic acidosis.

**Keywords:** Kombucha; Kombucha tea; toxicity; HIV; lactic acidosis

## Introduction

Kombucha “mushroom” tea, sold in popular health food stores, is touted to have healing properties, including the ability to boost immunity in human immunodeficiency virus (HIV).<sup>1,2</sup> In this study, we present a case of severe hyperthermia, lactic acidosis, and acute renal failure in a 22-year-old male within 15 hours of Kombucha tea ingestion.

## Case Presentation

A 22-year-old Filipino American gay male college student, diagnosed with HIV 1 month prior to presentation, was seen in the emergency department

after developing acute onset of shaking fevers and chills.

The night before admission, the patient consumed a 1-L bottle of unpasteurized Kombucha tea while studying for an examination. He reported sharing the bottle of tea with a male friend, who remained in good health. The patient’s partner reported that the patient subsequently developed a tactile fever approximately 4 hours after ingestion, though by the following morning, he appeared and felt well. Eight hours later in the day, the patient began shaking uncontrollably, became short of breath, and was febrile to 103.0°F. He was subsequently brought to the hospital by emergency medical services.

The patient’s CD4 count 2 weeks prior to admission was 414. Highly active antiretroviral therapy (HAART) had not been initiated. His other medical history included anaphylaxis to peanuts. He denied alcohol, tobacco, or illicit drug use.

From the Division of Pulmonary/Critical Care Medicine (ASK, HDJ); and Department of Pharmacy Services (RC), Cedars-Sinai Medical Center; and Comprehensive Care Infectious Disease Medical Group (JG), Los Angeles California .

Received 06 August 2008; revised 20 October 2008; accepted 22 October 2008.

Address correspondence to: Alison SungHee Kole, MD, MPH, Division of Pulmonary/Critical Care Medicine, Cedars-Sinai Medical Center, 8700 Beverly Blvd, South Tower, Room 6732, Los Angeles, CA 90048; e-mail: [alison.kole@cshs.org](mailto:alison.kole@cshs.org).

## Physical Examination

In the emergency department, the patient was febrile to 104.1°F, with a heart rate of 180, and a blood

pressure (BP) of 192/105. The patient became combative and confused, requiring sedation and intubation for airway control. Pupils were dilated but reactive. Neurological assessment was unremarkable. The remainder of his physical examination was also unremarkable.

### Laboratory Data

Laboratory studies revealed a lactate of 12.9 mmol/L, ammonia level of 214  $\mu\text{mol/L}$ , and a mildly elevated aspartate aminotransferase (AST) of 57 U/L. Liver function tests, including albumin, bilirubin, alanine aminotransferase (ALT), and alkaline phosphatase, were otherwise normal. Arterial blood gas showed a pH of 7.32,  $\text{Pco}_2$  31 mm Hg, and  $\text{Po}_2$  446 mm Hg on 100%  $\text{FiO}_2$  following intubation. The serum bicarbonate of 16 mmol/L, revealing an anion gap of 25. The serum creatinine was 2.1 mg/dL. Compared with data from the time of initial HIV diagnosis, the patient's AST elevation, acidosis, and acute renal failure were new.

Urine toxicology and ethanol screens were negative. Salicylate and acetaminophen levels were undetectable. Chest radiography and urinalysis were unremarkable. Workup done to evaluate the patient's altered mental status including head computed tomography (CT) and cerebral spinal fluid testing for infectious etiologies was normal. Blood cultures, urine cultures, and sputum cultures were negative. A sample of Kombucha tea was obtained and sent for fungal cultures.

Complete blood count (CBC) results on admission were initially within normal limits. Prior to discharge, the patient's white blood cell (WBC) count had decreased to  $3.9 \times 10^9/\text{L}$  with the following differential: 69% PMNs, polymorphonuclear leukocytes, 18% lymphocytes, 8% monocytes, and 4% eosinophils. The hemoglobin was 12.7 g/dL and the platelet count was  $78 \times 10^3/\mu\text{L}$ . The CD4 count was 70 on admission.

### Clinical Course

Empiric antibiotic therapy for bacterial meningitis, including vancomycin, ampicillin, and cefotaxime, was initiated in the emergency department. Encephalitis coverage with acyclovir was then added on transfer to the intensive care unit. Antifungal therapy was not initiated. Within 24 hours of admission, all antibiotics were discontinued, as the patient

quickly defervesced and remained without evidence of infection. Within 36 hours of Kombucha tea ingestion, the patient dramatically improved with supportive care. The lactic acidosis and renal failure resolved, and the patient was extubated within 24 hours. He was discharged home on hospital day 3. The patient had follow-up 1 week after discharge, at which time his CBC and CD4 count had normalized to his preadmission baseline. Fungal cultures sent on the Kombucha tea sample eventually grew out *Candida krusei* and *Candida glabrata* at 33 days.

### Discussion

Kombucha "mushroom" tea, synonymous with Manchurian or Kargasok tea, is made by fermenting sugared black tea with a round, flat, gray fungus for a minimum of 7 days. The Kombucha fungus, which looks like a mushroom, is actually a symbiotic aggregate of various yeasts and bacteria,<sup>3</sup> usually including various *Saccharomyces* sp. Although there are currently no case reports directly linking Kombucha tea to the acquisition of clinically significant bacterial or fungal infections, the Food and Drug Administration (FDA) has noted concern about the possibility of contamination by fungi, such as *Aspergillus* and *Candida* sp., known to cause disease in susceptible individuals.<sup>4</sup> Our patient showed no evidence of a fungal or bacterial infection to account for his symptomatology, though lack of positive cultures cannot entirely exclude an infectious origin as a causal factor for his clinical presentation.

In the HIV-positive community, Kombucha tea is popular for its alleged ability to improve T cell counts.<sup>1,2</sup> There are small pilot studies in the literature supporting the claim that mice that ingest Kombucha tea live longer.<sup>5</sup> Additionally, this tea is purported to cure cancer, decrease blood pressure, increase vitality, fight acne, and relieve arthritis pain as well as eliminate wrinkles and return gray hair to its original color.<sup>3</sup> None of these additional claims has ever been confirmed via objective scientific investigation.

There exists limited data on the medicinal effects, side effects, and potential toxicity of Kombucha tea. In 1995, the Center for Disease Control and Prevention (CDC) published 2 case reports of suspected Kombucha tea toxicity in 2 middle-aged women from Iowa. Both women presented with severe lactic acidosis and respiratory failure. One woman subsequently developed DIC, disseminated intravascular

coagulation, and died. Both women had consumed 4 oz of home-fermented tea daily for 2 months prior to presentation. Both patients had obtained their Kombucha “mushroom” from the same source. Of note, 115 other individuals consumed tea brewed from that source as well and did not become ill.<sup>6</sup> In 1997, Srinivasan and colleagues reported a case of jaundice and transaminitis in a 55-year-old woman with a history of alcohol abuse, who began consuming 2 glasses of Kombucha tea daily for 2 months prior to presentation, in lieu of alcohol.<sup>7</sup> Workup for other causes of liver failure was negative, and the patient’s laboratory data normalized 7 weeks after cessation of Kombucha tea consumption.<sup>7</sup> Transaminitis has also been reported in a 53-year-old male and a 83-year-old male following daily ingestion of one-half cup serving of Kombucha tea for 2 to 3 weeks. Liver enzymes returned to normal following cessation of tea consumption in both patients.<sup>4</sup> More recently, Kombucha tea was implicated in the case of a patient with new onset anti-Jo1 antibody-positive myositis.<sup>8</sup>

The products of fermentation include alcohol, acetic acid, and lactate, which create an acidic environment and are responsible for the sour taste of Kombucha tea. Such high acidity may cause leaching of toxic material into the tea, particularly with homemade brews. Phan and colleagues reported 2 cases of symptomatic lead poisoning requiring chelation therapy in a married couple who had been homebrewing Kombucha tea using a ceramic pot covered in a lead-based glaze.<sup>9</sup>

## Conclusion

Kombucha tea is touted as a healthy elixir and folk remedy for a variety of ailments, including the T cell lymphopenia seen in HIV/AIDS (acquired immunodeficiency virus). However, there currently are no scientific data to support this claim. Kombucha tea is readily available at popular health food stores and is widely consumed. The limited evidence on toxicity raises considerable concern that Kombucha tea may pose serious health risks, particularly in the immunodeficient population. Although a majority of people consuming Kombucha tolerate it well, and

without symptomatic side effects, our young HIV patient’s experience demonstrates the potentially dangerous consequences of consuming this tea. The pathophysiology behind such severe hepatotoxicity and lactic acidosis has yet to be elucidated. Consumption of Kombucha tea should be discouraged, as it may be associated with life-threatening lactic acidosis. Furthermore, Kombucha tea ingestion should be considered in patients presenting with severe lactic acidosis of unclear etiology.

## References

1. Weaver JT. “Heath corner: Kombucha.” Keep the Change Web site. Available at: <http://www.drizzle.com/~newroots/kombucha.html>. Accessed May 7, 2008.
2. Kasper, Ed LAC. “The 3rd. Congress of Alternative Medicine and Acupuncture, Kombucha and AIDS Guadalajara Jalisco, México (11/98).” Happy Herbalist Web site. Available at: <http://www.happyherbalist.com/kombucha.htm>. Accessed May 7, 2008.
3. Perron A, Patterson J, Yanofsky N. To the editor: Kombucha “mushroom” hepatotoxicity. *Ann Emerg Med*. 1995;26:660.
4. “Poisindex<sup>®</sup> Managements: Kombucha Mushroom Tea.” MICROMEDEX<sup>®</sup> Healthcare Series Web site. <http://www.thomsonhc.com/mlprox.csmc.edu/hcs/librarian>. Accessed April 17, 2008.
5. Hartmann AM, Burleson LE, Holmes AK, Geist CR. Effects of chronic Kombucha ingestion on open-field behaviors, longevity, appetitive behaviors, and organs in c57-bl/6 mice: a pilot study. *Nutrition*. 2000;16:755-761.
6. Center for Disease Control and Prevention (CDC). Unexplained severe illness possibly associated with consumption of Kombucha tea—Iowa, 1995. *MMWR Morb Mortal Wkly Rep*. 1995;44:892-893899-900.
7. Srinivasan R, Smolinkske S, Greenbaum D. Probable gastrointestinal toxicity of Kombucha tea. *J Gen Intern Med*. 1997;12:643-644.
8. Derk CT, Sandorfi N, Curtis MT. A case of anti-Jo1 myositis with pleural effusions and pericardial tamponade developing after exposure to a fermented Kombucha beverage. *Clin Rheumatol*. 2004;23:355-357.
9. Phan T, Estell J, Duggin G, Beer I, Smith D, Ferson MJ. Lead poisoning from drinking Kombucha tea brewed in a ceramic pot. *Med J Aust*. 1998;169:644-646.