

pared with bicarbonates may affirm potential application of HRW as an alkalinizing agent in individuals with exercise-induced metabolic acidosis. However, because this is a short-term trial and the adherence to the long-term use of the intervention may be poor, the estimation of adverse effect incidence should be carefully interpreted with a small number of young healthy individuals treated for only a short period. Another concern regarding HRW administration is the variation in the hydrogen content and/or fluid pH across suppliers. Most products have been standardized to a hydrogen concentration of 0.55 to 0.65 mM/L, whereas in research studies liquid hydrogen is usually administered at a dose of approximately 1.0 mM/L.

It would be premature to conclude that HRW has a blood-alkalinizing effect in all individuals because no other published studies exist on HRW in the field of biochemistry or nutrition. It seems that HRW may not be of much use for treatment of many conditions of organic metabolic acidosis but may have a role in exercise-induced metabolic acidosis, yet the use of base to improve exercise capacity is uncertain. Dosage and duration of ingestion, hydrogen content of the intervention, and the health status of individuals may affect the efficacy of HRW administration. Longer administration protocol, a higher dosage of the formulation, proof of bioavailability, and monitoring other buffering indicators may be necessary to determine whether HRW has a considerable alkalinizing effect. Although this study examined healthy individuals, the appropriate treatment of acute metabolic acidosis (in particular the organic form of acidosis, such as exercise-induced acidosis) has been controversial²; therefore, further studies are needed on the use of HRW as a potential antiacidic treatment strategy and its safe application in clinical patients.

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Cannabinoid and Hyperemesis

To the Editor: We read with interest the article by Simonetto et al¹ on cannabinoid hyperemesis (CH) that was published in the February 2012 issue of *Mayo Clinic Proceedings*. Indeed, this entity is underdiagnosed due to a lack of awareness. Marijuana users presenting to the emergency department with nausea, vomiting, and abdominal pain are a common occurrence; these patients typically undergo several futile investigations and present repeatedly to the hospital with similar symptoms. Many of them are branded as "drug

seekers," especially since they might have a history of using other recreational drugs along with marijuana.

We have encountered 2 patients who met the clinical criteria for CH postulated in the study by Simonetto et al, both of whom were misdiagnosed initially. Patient 1 was a 20-year-old man who presented with nausea, vomiting, and severe epigastric pain. He was initially diagnosed with pancreatitis because of a mildly elevated serum amylase level and a history of heavy alcohol use. He had been smoking marijuana daily for the preceding 2 years. After administration of intravenous hydration and opioids, his symptoms did not improve, even though his laboratory values normalized. Physical examination findings remained normal. He insisted on taking several hot showers throughout the day. The patient was deemed to be "drug seeking," and, in fact, a psychiatry consultation was requested in view of this unusual behavior. A literature review suggested cyclic vomiting syndrome, which is exacerbated by use of marijuana. The patient had symptomatic improvement with oral pantoprazole, and he was discharged with the advice to stop using marijuana.

Patient 2 was a 49-year-old man who was transferred to our hospital for evalua-

TABLE. Proposed Clinical Criteria for Diagnosis of Cannabinoid Hyperemesis in 2 Patients

Criterion	Patient 1	Patient 2
Essential for diagnosis		
Long-term cannabis use	Yes (2–3 y)	No (only 3 mo)
Major features		
Severe cyclic nausea and vomiting	Yes	Yes
Resolution with cannabis cessation	NA	NA
Relief of symptoms with hot showers or baths	Yes	Yes
Abdominal pain, epigastric or periumbilical	Yes	Yes
Weekly use of marijuana	Yes	Yes
Supportive features		
Age <50 y	Yes	Yes
Weight loss >5 kg	NA	Yes
Morning predominance of symptoms	NA	NA
Normal bowel habits	Yes	No (diarrhea)
Negative laboratory, radiographic, and endoscopic test results	Yes	No (pending)
NA = not available. Data from <i>Mayo Clinic Proceedings</i> . ¹		

1. Kellum JA. Disorders of acid-base balance. *Crit Care Med*. 2007;35(11):2630-2636.

tion of ST-segment elevation myocardial infarction. He had ST elevations in lateral electrocardiogram leads with severe epigastric pain, nausea, and diaphoresis; however, an emergent cardiac catheterization study showed normal coronary arteries. On further questioning, he reported using marijuana during the previous 3 months to increase his appetite. Since then, he had been having episodes of epigastric pain, vomiting, and diaphoresis, which usually lasted 1 to 2 days and resolved spontaneously. He had lost 5 kg over the preceding 3 months; taking a hot shower typically improved his symptoms. A prior electrocardiogram obtained at his primary care physician's office showed similar ST-segment elevation suggesting early repolarization. In view of the typical history, the patient was provisionally diagnosed with CH syndrome and was discharged with instructions to avoid marijuana. In the Table, we summarize the number of criteria proposed by Simonetto et al for the diagnosis of CH that were met by our patients.

We applaud the effort by Simonetto et al. Indeed, their set of proposed criteria are quite specific and will help make the diagnosis of CH easier to elucidate by enumerating its intriguing features. However, it should be clarified as to how many of these criteria need to be met before making a diagnosis of CH, especially since resolution of symptoms with marijuana cessation is difficult to establish because most patients choose not to undergo follow-up for various reasons.

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1. Simonetto DA, Oxentenko AS, Herman ML, Szostek JH. Cannabinoid hyperemesis: a case series of 98 patients. *Mayo Clin Proc.* 2012;87(2):114-119.

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In reply: We appreciate Dr Torka's thoughtful letter, which both highlighted his experience with patients with cannabinoid hyperemesis (CH) and posed the important question of how many criteria need to be met in order to establish a diagnosis of CH. Although an important question, validation of diagnostic criteria was beyond the scope of our article. The intent of our article was simply to refine the previously proposed criteria by identifying the characteristic symptoms, signs, and test results in a larger sample size of patients with CH.¹

Our study was not intended to be a validation study because of several factors. First, and a factor to which Dr Torka alluded, there is no criterion standard for the diagnosis of CH other than resolution of symptoms after cannabis abstinence. Time to resolution of symptoms is proportional to duration of cannabis use, and resolution may take as long as 3 months; for

this reason, as well as the fact that these patients were seen at our tertiary care center, follow-up was minimal and a noted limitation of the study. With the limited follow-up, and thus criterion standard for diagnosis, we could not confidently validate the criteria or establish a clinical prediction rule for the diagnosis of CH. Additionally, because this was a retrospective study, information was limited to what was documented in the electronic clinical record. Inconsistent documentation of symptoms, frequency of marijuana use, and other factors for each patient made calculations of sensitivity, specificity, likelihood ratios, and predictive values imprecise and unreliable.

We agree with Dr Torka that a follow-up validation study needs to be performed so that health care providers can confidently diagnose CH in patients presenting with a history of cyclic nausea and vomiting preceded by chronic cannabis use.

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1. Simonetto DA, Oxentenko AS, Herman ML, Szostek JH. Cannabinoid hyperemesis: a case series of 98 patients. *Mayo Clin Proc.* 2012;87(2):114-119.

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CORRECTION

In the article entitled "79-Year-Old Woman With Forgetfulness" published in the April 2012 issue of *Mayo Clinic Proceedings* (*Mayo Clin Proc.* 2012;87(4):408-411), the term electromyography should have been used in place of electromyelography.

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