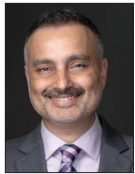


# ADVANCES IN HEPATOLOGY

Current Developments in the Treatment of Hepatitis and Hepatobiliary Disease

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## Can One Plant-Based Meal a Day Help Patients With Hepatic Encephalopathy?



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### **G&H** What are the nutritional needs of patients with hepatic encephalopathy?

**JB** The nutritional needs of patients with hepatic encephalopathy (HE) are very complicated because these patients are in a catabolic state. Providers need to make sure that patients with HE not only have adequate nutrition, but good-quality nutrition and at multiple times of the day. Patients with HE need a high-protein diet as well as a diet that is full of micro- and macronutrients with adequate protein, carbohydrates, fats, minerals, and vitamins. Moreover, these patients need to make sure their diet includes a late-night snack to avoid starvation physiology. Therefore, the timing, quality, and quantity of meals are very different in patients with HE compared with individuals who do not have this disease.

### **G&H** Could you expand on why protein is so important in these patients?

**JB** Patients with HE need high amounts of good-quality protein to ensure that they do not develop sarcopenia, which occurs when the patients' muscles start degrading in quantity and quality. The more sarcopenic a person is, the more encephalopathic they are likely to become. This is a vicious circle that can only be broken by either adequate treatment, liver transplant, or good nutrition, or by all of these at the same time.

### **G&H** Is there a rationale for following a plant-based diet in HE?

**JB** The focus should be to ensure that HE patients receive a diet that is rich in protein content that can improve nutrition with low generation of ammonia. Ammonia is neurotoxic and can promote the development of HE. Most meat sources have more aromatic amino acids, whereas branched-chain amino acids that are less ammoniagenic are sometimes found in non-meat-containing diets, including a plant- or dairy-based diet.

### **G&H** What research has looked at the effects of a plant-based diet in HE patients?

**JB** Prior smaller studies have looked at what is called a complete change, in which patients receive only a plant-based or vegetarian diet compared with patients who receive only a meat-based diet. Such research has shown that there is lowered ammonia in the patients who are

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receiving a nonmeat diet. However, that is unsustainable in real life because, typically, patients with HE are in their fifth or sixth decade of life and have generally been following their diet for all of that time. It is very difficult to convince someone to change their lifelong dietary habits.

My colleagues and I recently conducted a study in which one meat-based meal a day in HE patients was replaced with a vegetarian or vegan meal to see whether that made a difference related to ammonia generation. The same amount of protein was included in each of these meals. We followed patients for 3 hours afterward and found that ammonia generation was much lower in the group that received a vegan or vegetarian meal than in the group that received a meat-based meal. These effects lasted up to 3 hours. This was a proof-of-concept study where only one meal was substituted. The hope was that instead of doing an unsustainable, complete switch from a meat-based diet to a plant-based diet, having occasional meals that are dairy- or plant-based may be a little better for HE patients in terms of reducing ammonia generation.

In addition to the reduction in ammonia generation after the non-meat-based meal, we found that serum metabolites changed over the same time frame. These included branched-chain amino acids and acylcarnitine metabolites that contribute toward ammonia generation, other metabolites (sphingomyelins and lysophospholipids) that contribute toward liver health, and those that were directly related to the protein type ingested. Thus, these findings show that in addition to the effect involving ammonia, several other effects related to biochemical reactions in the body can change by modifying just one meal. Moreover, we found that the impact was similar regardless of whether patients had prior HE.

### **G&H** What were the limitations of this study and drawbacks of this potential therapeutic approach?

**JB** This was the first study that looked at replacing a meal in patients with HE, and it was only a small, proof-of-concept study with 10 patients in each group. Such a change needs to be examined over a long period of time in a larger study of more patients across multiple centers. We are planning a follow-up study. Another drawback is that some people might confuse a plant-based diet with a low-protein diet. However, it is important to understand that just because patients have reduced ammonia generation does not mean they skimped on the actual protein content.

### **G&H** Overall, are there any other benefits to following a plant-based diet?

**Gastroenterology providers should refer HE patients to a nutritionist who will sit with them and design a diet plan that works for them.**

**JB** In general, looking at the literature, people who follow regular plant-based diets, not occasional meal changes, have better longevity. That is not something my colleagues and I examined in our study, though, as we followed patients for only 3 hours. That being said, it is not like vegetarians are immune to dying from liver disease, so everything has to be placed in proper context. Some studies have shown that people who are more likely to follow a plant-based diet have better longevity regardless of cirrhosis. This likely could be because of the beneficial impact of plant-based diets on inflammatory or cardiovascular diseases. Cirrhosis has not been studied much because it is a very rare condition in the overall population. Essentially, I do not want to imply that switching to a plant-based meal each day will solve all of the problems that HE patients face. However, occasional substitution could help.

### **G&H** Should providers encourage HE patients to try to follow a plant-based diet?

**JB** What providers should do is ask patients about their comfort level with a plant-based diet and see if they can replace a meat-based meal with a plant-based one. That is probably the best that can be done at this stage. Or, if patients can replace more than one meal a day, that is fine as well. Again, I do not want to position this as a panacea. Our study was very small, and we just wanted proof of the concept that HE patients do not need to make radical dietary changes to reduce ammonia generation. We also wanted to make sure people realize that plant-based meals may help. However, if eating such food makes patients miserable, they do not need to do so; they just need to make sure they do not stop eating protein.

### **G&H** Are any resources available for the average American HE patient who is interested in following a plant-based diet?

**JB** Gastroenterology providers should refer HE patients to a nutritionist who will sit with them and design a diet

plan that works for them. There are a number of resources that are available. The website CirrhosisCare.ca has a lot of information about diet as a whole, not necessarily just about plant-based diets, and has a separate section for patients and families. Some plant-based diets can be quite expensive, so it is important to see what foods are available and what patients can afford. Cirrhosis and HE care is a team science, and the more gastroenterology providers involve colleagues, such as those in the nutrition field, the better off things will be for their patients.

### G&H What further research is needed?

**JB** We need further research across a long time to see how many plant-based meals are needed to affect clinical outcomes because our study did not look at any clinical outcomes. That is why we want to go into more depth as to how many people eating plant-based meals develop HE, whether they have certain outcomes such as hospital admissions, and so on. A longer-term study should be based on not just one but multiple plant-based meals a day. Additionally, our study compared consumption of a bean-based burger, a vegan burger, and a beef/pork burger. We should find out if our findings would vary among people with different dietary practices, such as people who are more likely to be vegan, and whether these effects actually help HE patients and whether the effects are sustainable in the long term.

### G&H What are the main points that you would like to emphasize on this topic?

**JB** First of all, providers need to make sure that HE

patients do not avoid protein by any means. HE patients need not just normal amounts of protein, but high amounts. Second, providers need to make sure that HE patients receive an adequate diet that includes a late-night snack. Third, plant-based diets could work in moderation, but providers need to make sure such diets do not come at the expense of protein restriction for HE patients. Such diets have to be implemented in the proper context of not only affordability but acceptability by the patient. Therefore, involving a nutritionist or a dietitian, if patients do not have one, is important because those are the health care professionals who can design specific, personalized diets that patients are more likely to adhere to. Last but not least, it is important to find out who does the shopping and cooking for the HE patient. That person, if it is not the patient themselves, needs to be involved as well.

### Disclosures

*Dr Bajaj has no relevant conflicts of interest to disclose.*

### Suggested Reading

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