

The antidiarrheal efficacy of a proprietary amino acid mixture (enterade) in neuroendocrine tumor (NET) patients.

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AMINO ACID ORAL REHYDRATION SOLUTION

Enterade is an amino acid-based, glucose-free medical food/beverage with electrolytes. It comprises of 5 amino acids (Valine, Aspartic Acid, Serine, Threonine, Tyrosine) selected to rebuild villi, protect the GI tract and promote hydration. It has been shown in studies with mice to mitigate radiation-induced acute gastrointestinal syndrome related to reduced electrolyte and nutrient absorption.

INTRODUCTION

- Based on SEER database, **gastroenteropancreatic neuroendocrine tumor (GEPNET) incidence has increased 6-fold** over past 3 decades.
- North American Neuroendocrine Tumor Society estimates that over 150,000 GEPNET patients are currently living in the United States.
- Diarrhea is a common symptom seen in GEPNET patients, usually caused by: excessive serotonin production, secondary to post-operative short gut syndrome, steatorrhea from somatostatin analogs, bile acid colitis or intestinal bacterial overgrowth.
- We conducted a retrospective study to evaluate antidiarrheal efficacy of enterade in neuroendocrine tumor patients with quality of life limiting diarrhea.**

METHODS

- Medical records of all the GEPNET patients treated with Enterade for symptomatic diarrhea were evaluated.
- Patients were treated at Markey Cancer Center between May 2017-January 2018.
- Enterade is classified as a medical food and is available over the counter.

Fig 1: Enterade stimulates intestinal stem cell and gut regeneration.
Fig 2: Amino Acid ORS improved mouse survival and improved body weight following irradiation.

Patient	Dx	SSA	Baseline BM	Post RX BM	Concurrent treatment at present
1	NET-Unknown Primary	Yes	9	4	Lanreotide; SSA Rescue
2	PNET-G1	No	6	4	No
3	Mid Gut-G1	Yes	9	6	Sandostatin
4	Gastric NET-G1	No	7	2	No
5	Gastrinoma-G1	Yes	10	10	Sandostatin/Octreotide
6	Lung- Typical Carcinoid	Yes	8	4	Sandostatin/Octreotide
7	Bronchial NET- Typical Carcinoid	Yes	7	3	Sandostatin/Octreotide
8	Midgut NET-G1	Yes	5	3	Sandostatin/Xermelo
9	NET unknown primary-G1	Yes	6	6	Sandostatin
10	PNET, VIPoma-G1	Yes	7	3	Sandostatin
11	Lung-Atypical carcinoid	Yes	5	0	Sandostatin
12	G-3 Prostatic NEC	No	3	0	Carbo/Irino, Pembrolizumab
13	Midgut- G1	Yes	6-8	6-8	Sandostatin
14	Colon NET-G1	Yes	7-9	7	Sandostatin, Xermelo
15	Midgut NET-G1	No	4	2	
16	Midgut NET-G1	Yes	6	10	Sandostatin/Octreotide
17	Midgut NET-G1	Yes	3	2	Sandostatin, Everolimus
18	Lung-LCNEC	No	20	0	Capecitabine/Temozolomide
19	Midgut NET G1	Yes	3	1	Lanreotide
20	MINEN-Colon	No	12	4	Capecitabine
21	Unknown primary, VIPoma-G2	Yes	7	7	Sandostatin, capecitabine, temozolomide
22	Gastric NET-G2	No	10	4	Not started SSA yet
23	Lung G-2 NET	No	4	4	Pembrolizumab

Table 1. Stool frequency pre and post treatment with enterade; diagnoses and concurrent treatment included. Data for 23 responders to enterade as of January 2018.

DEMOGRAPHICS/RESULTS

- A total of **35 patients** were treated with enterade.
- Enterade was administered as an 8oz bottle BID for 1 week.
- Antidiarrheal efficacy data was available on 23 patients.
- 7 patients had small bowel neuroendocrine tumors (NET), 5 had bronchial NETs, 2 had colorectal NETs, 3 had NETs of unknown primary, 3 had gastric NETs, 2 had pancreatic NETs and one was high grade neuroendocrine carcinoma of prostate.
- 14 patients had history of prior bowel resection either for primary neuroendocrine tumor resection or debulking.
- 15 patients were on somatostatin analogs at the time of initiation of enterade.
- 17 out of 23 (73.9%) patients reported subjective improvement in diarrheal symptoms (Table 1).**
- 12 out of these 17 responders reported at least 50 percent reduction in diarrhea frequency.

CONCLUSIONS

73.9% (17/23) neuroendocrine tumor patients reported improvement in diarrhea with enterade.

52.2% (12/23) reported more than 50% reduction in diarrhea frequency.

A prospective Phase II study of enterade in gastroenteropancreatic neuroendocrine tumor patients with quality of life limiting diarrhea is planned.

