Apraglutide Decreases Severity of Intestinal Damage from Gastrointestinal (GI) Acute Graft Versus Host Disease (GvHD) Following Allogeneic Transplantation Without Impacting Engraftment

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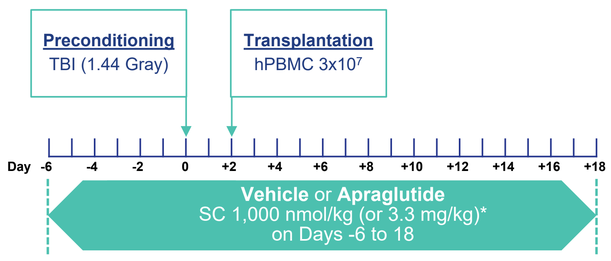
INTRODUCTION

- The GI tract is the key target tissue system damaged by acute GvHD resulting in the observed morbidity and mortality associated with acute GvHD.[1,2]
- Glucagon-like peptide-2 (GLP-2) is an essential endocrine hormone naturally secreted in the intestine to maintain GI integrity and nutrient/fluid absorption.[2]
- The physiological actions of GLP-2 include increase enterocyte proliferation, increase intestinal barrier function, increase intestinal blood profusion, decrease epithelial damage, and decrease GI motility.[2]
- The L cells in the intestine that secrete GLP-2 are the key cells directly impacted by conditioning regimens and acute GvHD.[3]
- Apraglutide, a novel, long-acting synthetic GLP-2 analog, represents a potential protective and regenerative approach to GI acute GvHD prevention and treatment.
- The objective of these studies are to assess the effects of apraglutide on engraftment and GI protection following total body irradiation (TBI) and allogeneic transplantation in murine models.

METHODS

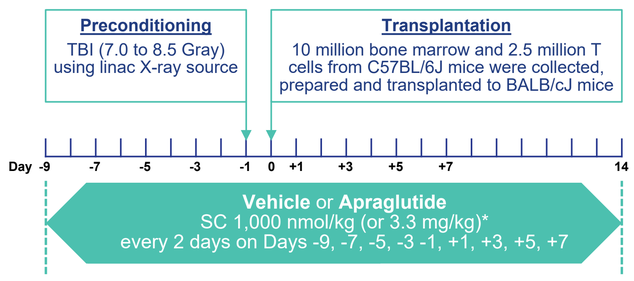
Engraftment model (study 1)

- Total-body-irradiated immunodeficient (NOG) mice (Day 0) were injected with human peripheral blood mononuclear cell (hPBMC; Day 2) and treated with apraglutide or vehicle (Days -6 to 18).
- Engraftment rate of hPBMCs was determined through CD45 expression (human vs. mouse) in blood, bone marrow, and spleen.



Irradiation / transplantation model (study 2)

- On Day-1, BALB/cJ mice underwent TBI followed by allogeneic transplantation from C57BL/6 strain (Day 0). Mice were treated with apraglutide or vehicle on Days -9, -7, -5, -3 -1, +1, +3, +5 and +7.
- Intestinal damage indicative of GvHD (histological changes, length, hemorrhage, inflammation), body weight, and survival were assessed.

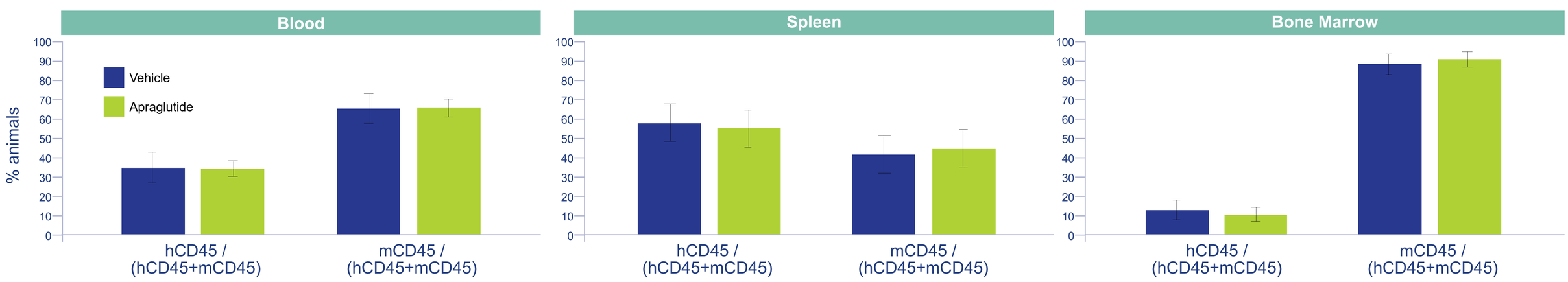


RESULTS

Study 1

- Apraglutide administered before and after TBI and hPBMC injection had no impact on successful engraftment of hPBMC in immunodeficient mice.
- This was demonstrated by the lack of difference between apraglutide vs. vehicle in hCD45+ cell infiltration in blood, spleen, and bone marrow.

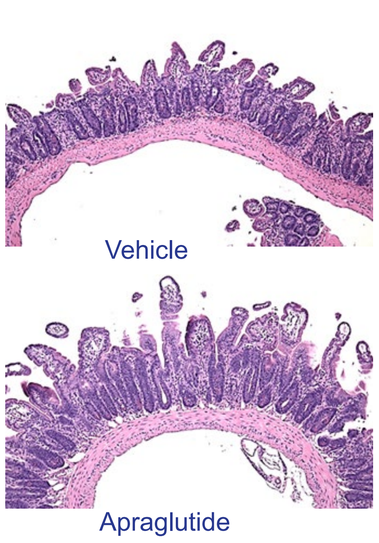
Engraftment Rate in Blood, Spleen, and Bone Marrow on Day 20 was Not Affected by Apraglutide

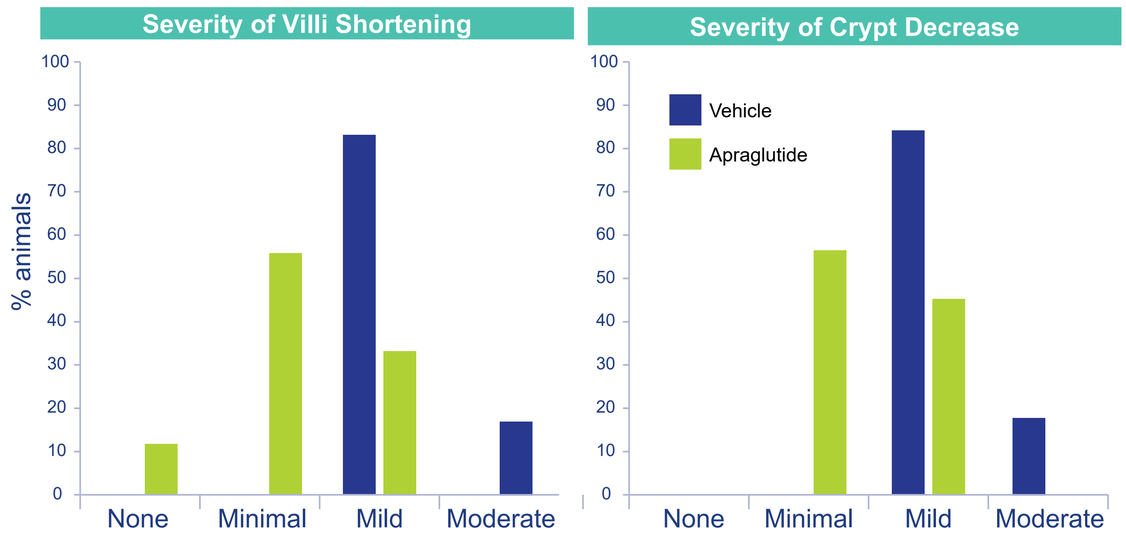


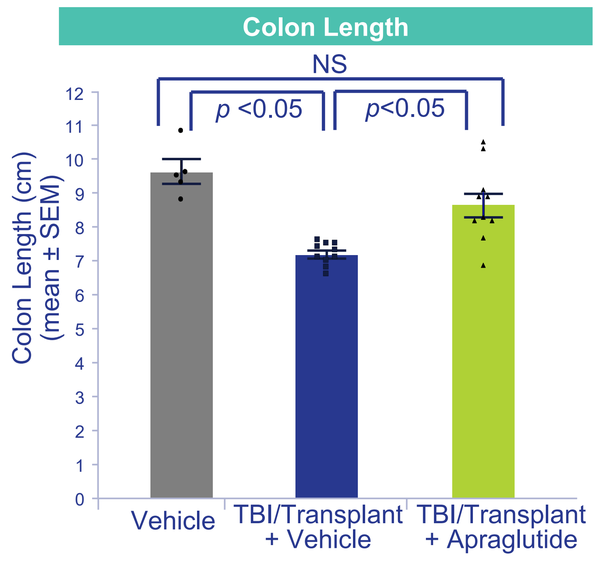
Study 2

- Apraglutide administered before and after TBI and allogeneic transplantation protected BALB/cJ mice from acute GvHD induced intestinal damage.
- Post-mortem histological examination revealed less mucosal degenerative/inflammatory changes (villous atrophy, mononuclear/neutrophilic cell infiltrate in the lamina propria/intra-cryptal epithelium, crypt necrosis) in apraglutide-treated mice vs. vehicle.
- Mean colon length in the apraglutide group (8.6±0.35 cm) was comparable to mice that did not undergo TBI or transplantation (9.6±0.33 cm), whereas a significant reduction was apparent in the vehicle group (7.19±0.10 cm; $p<0.05$, Brown-Forsythe and Welch Anova tests).
- Weight loss and median survival were similar in both treatment groups, but apraglutide-treated mice had significantly higher overall survival vs. vehicle on Day +9 (40% vs. 0%, respectively; $p=0.0134$).

Apraglutide Reduced Villi Atrophy and Decreased Colon Shortening from Total Body Irradiation







CONCLUSION

- Total body irradiation is often part of allogeneic HSCT conditioning regimen and is associated with mucosal barrier breakdown and mucositis.
- Apraglutide showed a significant protective effect in TBI- and allogeneic-transplant-induced acute GvHD with reduced villi atrophy, decreased colon shortening, and a survival advantage.
- These results demonstrated that apraglutide treatment before and after allogeneic transplantation in immunodeficient mice does not affect engraftment rate.
- These findings support further exploration of GLP-2 as a novel regenerative approach for the prevention and treatment of acute GvHD.

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DISCLOSURES

The study was sponsored by VectivBio and conducted in collaboration with Centre de recherche de l'Hôpital Maisonneuve-Rosemont Hospital, Montréal. V. Dimitriadou received fee for service as a consultant.