Intravitreal Injection of Allogeneic Human Retinal Progenitor Cells for the Treatment of Retinitis Pigmentosa: A Prospective Randomized Controlled Phase 2b Trial

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Purpose:
Allogeneic human retinal progenitor cells (hRPC) secrete neurotrophic factors that promote retinal photoreceptor cell survival and function. This paracrine mechanism has shown promise as a therapeutic strategy for retinitis pigmentosa (RP), a hereditary blinding disease, and is agnostic to genetic subtype. A phase 2b trial was conducted to evaluate the intravitreal injection of allogeneic hRPC for treatment of RP.

Methods:
Patients with RP and best-corrected visual acuity (BCVA) between 20/80 and 20/800 were randomized to treatment vs sham. Treatment consisted of 3.0x10^6 or 6.0x10^6 hRPC via a single intravitreal injection. The primary efficacy endpoint was mean change in BCVA at month 12. Secondary endpoints included low light mobility, contrast sensitivity, kinetic visual fields, and a vision function questionnaire. In a post hoc exploratory analysis, the primary and secondary endpoints were assessed in a target subgroup of patients meeting all the following criteria: 1) study eye with baseline central fixation, 2) study eye without severely constricted field (≥12° diameter), and 3) study eye did not have significantly worse BCVA than their fellow eye (≤15 letters).

Results:
A total of 84 patients were randomized; 3 were lost to follow-up and 2 were excluded from efficacy analysis for protocol violations. Mean changes in BCVA from baseline to month 12 were +2.63, +1.27, and +5.95 letters in the sham arm (N=27), 3.0x10^6 hRPC (N=26), and 6.0x10^6 hRPC (N=26) treatment arms, respectively. In the post hoc exploratory analysis of the target subgroup, mean changes in BCVA from baseline to month 12 were +1.57, -0.15, and +13.05 letters in the sham arm (N=14), 3.0x10^6 hRPC (N=13), and 6.0x10^6 hRPC (N=13) treatment arms, respectively (p=0.012 for 6.0x10^6 hRPC vs sham). Improvements in the 6.0x10^6 hRPC group were also observed in the secondary endpoints. Adverse events were generally minor and transient; there was one serious adverse event in the 3.0x10^6 hRPC arm of grade-3 ocular hypertension that resolved with treatment.

Conclusions:
Intravitreal injection of hRPC is a novel approach for treatment of RP, and is independent of the genetic subtype. This phase 2b study demonstrates encouraging biological activity and a good safety profile, warranting progression to phase 3 trial.