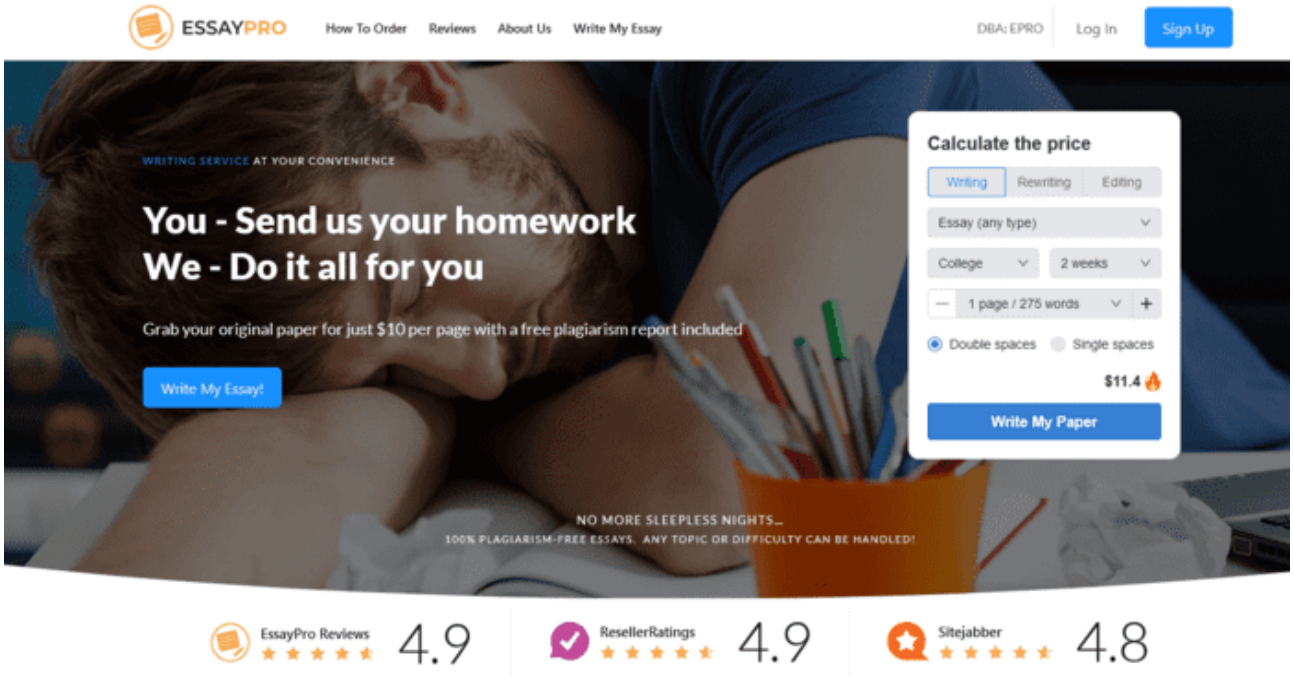
Genes and Cell Therapy Analysis



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The article selected for this assignment is “Targeted Gene Correction of ?1-antitrypsin Deficiency in Induced Pluripotent Stem Cells”, by Kosuke Yusa, et al., and was published as a Nature Letter on October 20th, 2011.1 This is a proof-of-principle study for a new technology developed by the authors for eventual application in cell replacement therapy. The authors used a novel combination of zinc finger nuclease and piggy-Bac methodology in human induced-pluripotent stem cells (iPSCs) to correct a single point mutation in the ?1-antitrypsin gene that is known to be responsible for ?1-antitrypsin deficiency in humans. After successfully correcting the point mutation in several patient iPSC lines, the authors were able to differentiate the lines into fully hepatocyte-like cells in both structure and function. After in vivo transplantation into mouse livers, the hepatocyte-like cells distributed throughout the lobes of the liver and appeared to be functioning normally. The authors assert that their work is the first proof of principle for combining a genetic correction and human iPSCs in a way that is clinically applicable for cell therapies in which a patient’s own cells are isolated, subjected to corrective gene therapy, and then returned to the patient.

I selected this article for the midterm assignment because I was interested in learning more about research with human induced pluripotent stem cells and cell replacement

therapy after the class session and paper discussion with Dr. Melissa Wong about intestinal stem cells. In addition to introducing a new method aimed at iPSC replacement therapy, the authors also test their method against several potential problems that could prevent it from being clinically applicable. Overall,...

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References

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