Humanigen Announces Two Lenzilumab Abstracts Accepted for Presentation at 2019 Annual Meeting of American Society of Hematology

- **Improved survival demonstrated with GM-CSF knockout CAR-T**
- **Study demonstrates that activated CAR-T cells upregulate and signal through GM-CSF receptors**
- **GM-CSF knockout CAR-T results in altered gene transcriptome with decreased expression of Fas**

**Burlingame, CA, November 6, 2019** – Humanigen, Inc., (HGEN) (“Humanigen”), a clinical stage biopharmaceutical company focused on the development of next generation chimeric antigen receptor T cell (CAR-T) and other cell therapies, today announced that two abstracts focused on granulocyte-macrophage colony-stimulating factor (GM-CSF) gene knockout (k/o) and GM-CSF neutralization with lenzilumab, the company’s proprietary Humaneered® anti-human-GM-CSF immunotherapy, have been accepted for presentation at the 2019 annual meeting of the American Society of Hematology (ASH).

Abstract #3868 (Cox MJ, et al.) entitled “Improved Anti-Tumor Response of Chimeric Antigen Receptor T Cell (CART) Therapy after GM-CSF Inhibition Is Mechanistically Supported By a Novel Direct Interaction of GM-CSF with Activated CARTs” will be presented on Monday, December 9, 2019 from 6:00pm – 8:00pm EST at the Orange County Convention Center Hall B in Orlando, Florida (https://ash.confex.com/ash/2019/webprogram/Paper129349.html)

Using a xenograft model for relapsed acute lymphoblastic leukemia (ALL), treatment with GM-CSF k/o CART19 resulted in improved overall survival compared to wildtype CART19. The lack of myeloid cells in this model point to an intrinsic effect of GM-CSF on CAR-T cells.

While resting CAR-T cells do not express GM-CSF receptors, the data demonstrate that activated CAR-T cells significantly upregulate both α and β subunits of the GM-CSF receptor and signal through this receptor resulting in phosphorylation of the signal transducer and activator 5 (STAT5) protein. There also appeared to be significant inhibition of the Fas death pathway receptor, a known critical pathway in inducing CAR-T cell death, or apoptosis with GM-CSF knockout CAR-T.

“These results strongly indicate that CAR-T cells increase expression of GM-CSF receptor subunits when activated, resulting in modulation of CAR-T function. Furthermore, GM-CSF knockout CAR-T revealed a distinct transcriptome signature compared to wildtype CAR-T, with reduced Fas expression. Collectively, these results illuminate a novel mechanism for a direct modulatory effect of GM-CSF on activated CAR-T cells that helps to explain the improved survival with GM-CSF neutralization or knockout”, stated Dr. Cameron Durrant, CEO of Humanigen.

Abstract #4234 (Patnaik M, et al.) entitled “A Phase 1 Study of Lenzilumab, a Humaneered® recombinant Anti-Human Granulocyte-Macrophage Colony-Stimulating Factor (anti-hGM-CSF) Antibody, for Chronic Myelomonocytic Leukemia (CMML)” will also be presented on Monday, December 9, 2019 from 6:00pm – 8:00pm EST at the Orange County Convention Center Hall B in Orlando, Florida (https://ash.confex.com/ash/2019/webprogram/Paper131181.html).

“The results of this company sponsored phase I study reinforce the favorable safety profile of lenzilumab even in patients with CMML who have undergone several prior cycles of immunosuppressive therapy”, stated Dr. Durrant. “As with all prior lenzilumab clinical trials, no serious treatment related adverse events were observed”, Dr. Durrant continued. Throughout the study there were no reported
instances of dose limiting toxicities or adverse events grade 3 or higher related to the study drug. Additionally, of four subjects with NRAS mutations at screening, three either achieved clinical benefit or had clinical meaningful bone marrow myeloblast reductions.

About Humanigen, Inc.

Humanigen, Inc. is developing its portfolio of next-generation cell and gene therapies for the treatment of cancers via its novel, cutting-edge GM-CSF neutralization and gene-knockout platforms. There is a direct correlation between the efficacy of CAR-T therapy and the incidence of life-threatening toxicities (referred to as the efficacy/toxicity linkage). We believe that our GM-CSF neutralization and gene-editing platform technologies have the potential to reduce the inflammatory cascade associated with serious and potentially life-threatening CAR-T therapy-related side effects while preserving and potentially improving the efficacy of the CAR-T therapy itself, thereby breaking the efficacy/toxicity linkage. The company's immediate focus is combining FDA-approved and development stage CAR-T therapies with lenzilumab, the company's proprietary Humaneered™ anti-human-GM-CSF immunotherapy, which is its lead product candidate. A clinical collaboration with Kite, a Gilead Company, was recently announced to evaluate the sequential use of lenzilumab with Yescarta®, axicabtagene ciloleucel, in a multicenter clinical trial in adults with relapsed or refractory large B-cell lymphoma. The company is also focused on creating next-generation combinatorial gene-edited CAR-T therapies using strategies to improve efficacy while employing GM-CSF gene knockout technologies to control toxicity. In addition, the company is developing its own portfolio of proprietary first-in-class EphA3-CAR-T for various solid cancers and EMR1-CAR-T for various eosinophilic disorders. The company is also exploring the effectiveness of its GM-CSF neutralization technologies (either through the use of lenzilumab as a neutralizing antibody or through GM-CSF gene knockout) in combination with other CAR-T, bispecific or natural killer (NK) T cell engaging immunotherapy treatments to break the efficacy/toxicity linkage, including to prevent and/or treat graft-versus-host disease (GvHD) in patients undergoing allogeneic hematopoietic stem cell transplantation (HSCT). The company has established several partnerships with leading institutions to advance its innovative cell and gene therapy pipeline. For more information, visit www.humanigen.com

Forward-Looking Statements

This release contains forward-looking statements. Forward-looking statements reflect management's current knowledge, assumptions, judgment and expectations regarding future performance or events. Although management believes that the expectations reflected in such statements are reasonable, they give no assurance that such expectations will prove to be correct and you should be aware that actual events or results may differ materially from those contained in the forward-looking statements. Words such as "will," "expect," "intend," "plan," "potential," "possible," "goals," "accelerate," "continue," and similar expressions identify forward-looking statements, including, without limitation, statements regarding our expectations for future development of lenzilumab to help CAR-T reach its full potential or to deliver benefit in preventing GvHD. Forward-looking statements are subject to a number of risks and uncertainties including, but not limited to, the risks inherent in Black Horse Capital and its affiliates owning more than 50% of our outstanding common stock, including their ability to control the company; our lack of profitability and need for additional capital to operate our business as a going concern; the uncertainties inherent in the development and launch of any new pharmaceutical product; the outcome of pending or future litigation; and the various risks and uncertainties described in the "Risk Factors" sections and elsewhere in the Company's periodic and other filings with the Securities and Exchange Commission.

All forward-looking statements are expressly qualified in their entirety by this cautionary notice. You should not place undue reliance on any forward-looking statements, which speak only as of the date of this release. We undertake no obligation to revise or update any forward-looking statements made in this press release to reflect events or circumstances after the date hereof or to reflect new information or the occurrence of unanticipated events, except as required by law.