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Use of CRISPR Cas9 Gene Editing Therapeutic Shown to Permanently Inactivate HIV-1 in Patient's Blood for First Time

PHILADELPHIA, March 21, 2016 /PRNewswire/ -- Researchers in the Lewis Katz School of Medicine at Temple University have published a ground breaking HIV genome eradication study using the CRISPR/Cas9 technology. The article, entitled "*Elimination of HIV-1 Genomes from Human T-lymphoid Cells by CRISPR/Cas9 Gene Editing*" was published in the Nature journal, Scientific Reports on March 4, 2016. Excision BioTherapeutics Inc., a gene editing company that holds exclusive rights to commercialize the technology is actively developing therapeutics for the eradication or disruption of viruses that cause human disease. The study, conducted using a variety of human $CD4^+$ T-cells including cells isolated from $HIV\text{-}1^+$ patient lymphocytes showed the introduction of mutations within the targeted viral genes by CRISPR/Cas9 with no off-target effects on the host genome. Further, bioinformatic studies on viral eradicated cells showed no re-integration effects when the correct HIV DNA sequences are targeted using Excision's stringent ViraSuite™ gRNA design platform. Excision BioTherapeutics' CEO and President, Dr. Thomas Malcolm, believes this is a critical step in progressing the technology towards human trials. "This is a major advance in safety and efficacy for the use of CRISPR/Cas9 gRNA HIV eradication for use in humans," says Dr. Malcolm. "These exciting results also reflect our ability to select viral gene targets for safe eradication of any viral genome in our current pipeline of gene editing therapeutics.

Dr. Kamel Khalili, Principal Scientific Advisor at Excision BioTherapeutics and Chair of Temple University's Department of Neuroscience and Director of the Center for Neurovirology at Temple University's Lewis Katz School of Medicine, reiterates the significance of these groundbreaking results: "Thus far, we see no off-target, (non-homologous end joining) NHEJ recombination or re-integration events among the HIV genes we are excising. Importantly, the excised (HIV) genome is degraded by the natural mechanisms of the cellular machinery. We have evidence of this because we cannot detect free viral genomes using very sensitive PCR methods." Dr. Khalili believes the team has

established a "game changing approach for the gene editing field." In combination with off-target-preventing mutations in the next class of Cas9 proteins, Khalili says the approach "will play a major role in expediting our therapies to the clinic."

Dr. Malcolm shares the optimism of Dr. Khalili, stating that "The flexibility of the Cas9 gRNA system will allow us to eradicate any HIV variant with minor, fast and cost effective adjustments. Compared to other rigid nucleases (only capable of targeting one sequence), we do not run the risk of selecting resistant viruses in the long run."

About Excision BioTherapeutics Inc.
Founded in 2015, Excision BioTherapeutics Inc. is a life science company focused on the development and commercialization of advanced gene editing therapeutics for the treatment of life-threatening disease caused by neurotropic viruses.

For information, visit **www.excisionbio.com**

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