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OncoSec Announces Publication of Data in Nature Gene Therapy Demonstrating the Ability of its Newly Optimized Intratumoral IL-12 Immunotherapy Platform to Increase Systemic Anti-tumor Responses in both Treated and Untreated Lesions

- Data demonstrates increased abscopal effect and transgene expression / efficacy in preclinical tumor models

SAN DIEGO and PENNINGTON, N.J., Oct. 24, 2018 /PRNewswire/ -- OncoSec Medical Incorporated (OncoSec) (NASDAQ:ONCS), a company developing intratumoral cancer immunotherapies, today announced the publication of a study in the peer-reviewed journal, Nature Gene Therapy (an open access article; https://www.nature.com/articles/s41434-018-0044-5), demonstrating that the newly optimized intratumoral IL-12 immunotherapy platform (electroporation-mediated intratumoral IL-12 gene therapy) induces immunological changes in both locally-treated and distant, untreated tumors. The publication provides new mechanistic insights into this systemic anti-tumor immunity including the observation that IL-12 primed effector T cells diminished expression of PD-1, which is particularly relevant to Oncosec's ongoing KEYNOTE-695 clinical study.

The paper, titled "*Characterization of abscopal effects of intratumoral electroporation-mediated IL-12 gene therapy*," by Mukhopadhyay *et al.*, reported results from a pre-clinical study of OncoSec's optimized plasmid IL-12 (TAVO) therapeutic platform on both locally-treated and distant, untreated lesions, with a particular emphasis on understanding "abscopal" effects in distant non-electroporated tumors. Results from the study indicated that intratumoral IL-12 treatment led to an induction of IL-12-regulated genes, other cytokines and chemokines pathways, as well as genes for enhanced antigen processing and presentation in the treated tumor. These localized IL-12-mediated effects then led to the generation of systemic anti-tumor immune responses, including a surge of $CD8^+$ T cells in the spleen and in non-treated tumors and when coupled with PD-1 modulation, suggests an orchestrated "armoring" of these effector T cells against T-cell checkpoints when primed in the presence of IL-12 *in situ*.

"Data from previously completed clinical and pre-clinical studies of our TAVO platform in multiple cancer settings has clearly demonstrated that our intratumoral electroporation-mediated IL-12 gene therapy is safe and produces systemic anti-tumor effects from a local delivery of this potent cytokine," said Christopher G. Twitty, PhD, Chief Scientific Officer of OncoSec. "Based on these outcomes, OncoSec is advancing an optimized version of TAVO that is designed to increase transgene expression and efficacy. The study published in *Gene*

Therapy indicates that tumors treated directly with the optimized TAVO therapy rapidly engage IL-12/IFN-g regulated pathways, altering the tumor microenvironment's immunogenicity and effectively creating an *in situ* vaccine that ultimately drives an increase of tumor infiltrating lymphocytes and immune-specific gene expression in both treated and distant untreated tumors, indicative of a *de novo* immune response. These results confirm that OncoSec's TAVO platform may represent a mechanism by which local intratumoral IL-12 gene therapy can deliver a safe and effective abscopal response."

About OncoSec Immunotherapies

OncoSec is a clinical-stage biotechnology company focused on developing cytokine-based intratumoral immunotherapies to stimulate the body's immune system to target and attack cancer. OncoSec's lead immunotherapy platform – TAVO (tavokinogene telseplasmid) – enables the intratumoral delivery of DNA-based interleukin-12 (IL-12), a naturally occurring protein with immune-stimulating functions. The technology, which employs electroporation, is designed to produce a controlled, localized expression of IL-12 in the tumor microenvironment, enabling the immune system to target and attack tumors throughout the body. OncoSec has built a deep and diverse clinical pipeline utilizing TAVO as a potential treatment for multiple cancer indications either as a monotherapy or in combination with leading checkpoint inhibitors; with the latter potentially enabling OncoSec to address a great unmet medical need in oncology: anti-PD-1 non-responders. Results from recently completed clinical studies of TAVO have demonstrated a local immune response, and subsequently, a systemic effect as either a monotherapy or combination treatment approach. In addition to TAVO, OncoSec is identifying and developing new DNA-encoded therapeutic candidates and tumor indications for use with its ImmunoPulse® platform. For more information, please visit www.oncosec.com.

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