March 24, 2020

Oncolytics Biotech® Announces Favourable AWARE-1 Safety Update

Study continues enrollment in patients receiving Tecentriq combination

Clinical data to be presented at ESMO Breast in May

SAN DIEGO, California and CALGARY, Alberta, March 24, 2020 /PRNewswire/ -- Oncolytics Biotech® Inc. (NASDAQ: ONCY) (TSX: ONC), currently developing pelareorep, an intravenously delivered immuno-oncolytic virus, today announced a favourable assessment from the Safety Committee following review of data from the window of opportunity study in early-stage breast cancer, known as AWARE-1. Consistent with the safety run-in with patients receiving pelareorep and Tecentriq®, Cohort 1 demonstrated widespread viral replication in the majority of tumors with the creation of a pro-inflammatory effect in the tumor microenvironment. No negative effects to healthy tissue were noted.

The Committee evaluated safety parameters from patients participating in the safety run-in phase of the trial, consisting of select patients from cohorts 2 and 3, along with the fully enrolled cohort 1, and determined there were no safety concerns. The Committee also approved an amendment of the study to reduce the dose of Tecentriq to be consistent with the currently approved breast cancer dose of 840mg. The study will continue to enroll patients and the Safety Committee will meet again for an additional pre-planned meeting. Cohorts 1 and 2 represent our target tumor type of HR+ / HER2- and data from these patients will inform the design of the planned phase 3.

"After reviewing the totality of safety data, including patients receiving pelareorep plus the standard of care and those also receiving Tecentriq, the Safety Committee for AWARE-1 confirmed no significant toxicity resulting from treatment," said Dr. Rita Laeufle, Chief Medical Officer at Oncolytics Biotech. "The study is continuing as planned, recruiting additional patients and examining the combination of pelareorep, plus the standard of care plus Tecentriq. We look forward to presenting updated data at the ESMO Breast Cancer conference in May, which will describe meaningful changes to the tumor microenvironment,

evidence of tumor infection, and of course, our biomarker correlated to immunogenic response and viral replication."

About AWARE-1

AWARE-1 is an open label window-of-opportunity study in early stage breast cancer enrolling 38 patients into five cohorts:

- Cohort 1 (n=10), HR+ / HER2- (pelareorep + letrozole)
- Cohort 2 (n=10), HR+ / HER2- (pelareorep + letrozole + atezolizumab)
- Cohort 3 (n=6), TNBC (pelareorep + atezolizumab)
- Cohort 4 (n=6), HR+ / HER2+ (pelareorep + trastuzumab + atezolizumab)
- Cohort 5 (n=6), HR- / HER2+ (pelareorep + trastuzumab + atezolizumab)

The study combines pelareorep with the standard of care according to breast cancer subtype and atezolizumab. Patients are biopsied on day one followed immediately by treatment, then again on day three, and a final biopsy after three weeks, on the day of their mastectomy. Data generated from this study is intended to confirm that the virus is acting as a novel immunotherapy and to provide comprehensive biomarker data by breast cancer subtype. The primary endpoint of the study is overall CelTIL (a measurement of cellularity and tumor-infiltrating lymphocytes). Secondary endpoints for the study include CelTIL by breast cancer subtype, safety and tumor, and blood-based biomarkers.

The study is being coordinated by Dr. Aleix Prat, Head of Medical Oncology at the Hospital Clínic of Barcelona, Associate Professor of the University of Barcelona and the Head of the Translational Genomics and Targeted Therapeutics in Solid Tumors Group at August Pi i Sunyer Biomedical Research Institute (IDIBAPS) and member of Oncolytics' Scientific Advisory Board.

About Breast Cancer

Breast cancer is the most common cancer in women worldwide, with over two million new cases diagnosed in 2018, representing about 25 percent of all cancers in women. Incidence rates vary widely across the world, from 27 per 100,000 in Middle Africa and Eastern Asia to 85 per 100,000 in Northern America. It is the fifth most common cause of death from cancer in women globally, with an estimated 522,000 deaths.

Breast cancer starts when cells in the breast begin to grow out of control. These cells usually form a tumor that can often be seen on an x-ray or felt as a lump. The malignant tumor (cancer) is getting worse when the cells grow into (invade) surrounding tissues or spread (metastasize) to distant areas of the body.

About Pelareorep

Pelareorep is a non-pathogenic, proprietary isolate of the unmodified reovirus: a first-in-class intravenously delivered immuno-oncolytic virus for the treatment of solid tumors and hematological malignancies. The compound induces selective tumor lysis and promotes an inflamed tumor phenotype through innate and adaptive immune responses to treat a variety of cancers and has been demonstrated to be able to escape neutralizing antibodies found in patients.

About Oncolytics Biotech Inc.

Oncolytics is a biotechnology company developing pelareorep, an intravenously delivered immuno-oncolytic virus. The compound induces selective tumor lysis and promotes an inflamed tumor phenotype -- turning "cold" tumors "hot" -- through innate and adaptive immune responses to treat a variety of cancers.

Pelareorep has demonstrated synergies with immune checkpoint inhibitors and may also be synergistic with other approved immuno-oncology agents. Oncolytics is currently conducting and planning additional studies in combination with checkpoint inhibitors and targeted therapies in solid and hematological malignancies, as it prepares for a phase 3 registration study in metastatic breast cancer. For further information, please visit: www.oncolyticsbiotech.com.

This press release contains forward-looking statements, within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended and forward-looking information under applicable Canadian securities laws (such forward-looking statements and forward-looking information are collectively referred to herein as "forward-looking statements"). Forward-looking statements, including the Company's belief as to the potential and mode of action of pelareorep as a cancer therapeutic; the planned continuation of the AWARE-1 study, including the recruitment of additional patients; the presentation of data at the ESMO Breast Cancer conference in May 2020, and other statements related to anticipated developments in the Company's business and technologies involve known and unknown risks and uncertainties, which could cause the Company's actual results to differ materially from those in the forward-looking statements. Such risks and uncertainties include, among others, the availability of funds and resources to pursue research and development projects, the efficacy of pelareorep as a cancer treatment, the success and timely completion of clinical studies and trials, the Company's ability to successfully commercialize pelareorep, uncertainties related to the research and development of pharmaceuticals, uncertainties related to the regulatory process and general changes to the economic environment. In particular, we may be impacted by business interruptions resulting from COVID-19 coronavirus, including operating, manufacturing supply chain, clinical trial and project development delays and disruptions, labour shortages, travel and shipping disruption and shutdowns (including as a result of government regulation and prevention measures). It is unknown whether and how the Company may be affected if the COVID-19 pandemic persists for an extended period of time. We may incur expenses or delays relating to such events outside of our control, which could have a material adverse impact on our business, operating results and financial condition. Investors should consult the Company's quarterly and annual filings with the Canadian and U.S. securities commissions for additional information on risks and uncertainties relating to the forward-looking statements. Investors are cautioned against placing undue reliance on forward-looking statements. The Company does not undertake to update these forward-looking statements, except as required by applicable laws.

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