August 6, 2021

Oncolytics Biotech® Reports 2021 Second Quarter Development Highlights and Financial Results

- Clinical AWARE-1 trial achieves primary endpoint and confirms that pelareorep is an immunotherapeutic agent which synergizes with checkpoint inhibitors: Validation of clinical development strategy in breast cancer

- Phase 2 BRACELET-1 (breast cancer) trial remains on track for full enrollment in Q4 2021

- Highly encouraging clinical proof-of-concept data in metastatic pancreatic cancer demonstrate pelareorep's broad applicability to a number of different tumor types

- Strong financial foundation with approximately $50.8 million in cash on hand and cash runway into 2023

- Management hosting conference call and webcast today at 8:00 a.m. ET

SAN DIEGO and CALGARY, AB, Aug. 6, 2021 /PRNewswire/ -- Oncolytics Biotech® Inc. (NASDAQ: ONCY) (TSX: ONC) today announced its financial results and development highlights for the quarter ended June 30, 2021. All dollar amounts are expressed in Canadian currency unless otherwise noted.

"Our second quarter accomplishments have advanced our lead clinical breast cancer program down a clear path towards a registrational study and substantially de-risked our broader clinical pipeline," said Dr. Matt Coffey, President and Chief Executive Officer of Oncolytics Biotech Inc. "Clinical AWARE-1 data show that pelareorep is an immunotherapeutic agent that synergistically combines with checkpoint inhibitors. These findings support the statistically significant overall survival benefit observed in our prior phase 2 breast cancer trial, achieving a key regulatory objective. They also suggest that pelareorep's efficacy can be further enhanced by combining it with checkpoint inhibition. We are currently working to confirm this hypothesis in the BRACELET-1 breast cancer trial,

which will support pelareorep's advancement to a registrational study."

Dr. Coffey continued, "Beyond our lead program, we also presented clinical proof-of-concept data in pancreatic cancer that further demonstrate pelareorep's immunologic mechanism of action and potential to address unmet needs across multiple indications. Together with AWARE-1 data, these results support our ongoing trials evaluating pelareorep-checkpoint inhibitor combinations and highlight pelareorep's potential as an enabling technology for multiple classes of immunotherapeutic agents. Looking forward, our strong financial foundation leaves us well-positioned to build on this momentum and advance pelareorep's clinical development. As we work towards this goal, we will remain primarily focused on breast cancer and our stated clinical milestones while pursuing a partnership strategy to further broaden pelareorep's potential impact."

Second Quarter and Subsequent Highlights

Breast Cancer Program

Achieved primary endpoint in AWARE-1 study

Data from the twenty HR+/HER2- early-stage breast cancer patients included in AWARE-1's first two cohorts were presented in an electronic poster at the American Association for Cancer Research (AACR) Annual Meeting 2021 (link to PR; link to poster). Results from these patients, who were treated with pelareorep and letrozole without (cohort 1) or with (cohort 2) the PD-L1 inhibitor atezolizumab (Tecentriq®), showed that that pelareorep and letrozole treatment upregulated tumor PD-L1 expression, induced the generation and expansion of T cell clones, promoted tumor infiltration of CD8+ T cells, and increased CelTIL score, a measure of tumor cellularity and inflammation that is significantly correlated with event-free and overall survival. These desirable effects were further enhanced in patients receiving atezolizumab, demonstrating that pelareorep and atezolizumab synergistically combine to generate an anti-cancer immune response in the tumor and peripheral blood. Notably, cohort 2 met the pre-specified success criteria for the study's primary endpoint, with six of ten patients achieving at least a 30% increase in CelTIL score following treatment. Together, these data support the results of a prior successful phase 2 trial (IND-213) that showed a statistically significant near doubling of overall survival with pelareorep treatment. This supports the clinical rationale behind the phase 2 BRACELET-1 trial: Evaluating the safety and efficacy of pelareorep and chemotherapy alone, and in combination with a PD-L1 inhibitor, in HR+/HER2- breast cancer patients.

Gastrointestinal Cancers Program

Phase 2 data demonstrating clinical proof-of-concept for pelareorep-checkpoint inhibitor combination therapy in pancreatic cancer

Data from a phase 2 trial evaluating pelareorep in combination with the PD-1 inhibitor pembrolizumab (KEYTRUDA®) in pancreatic adenocarcinoma patients who progressed after first-line treatment were featured in an electronic poster presentation at the 2021 American Society of Clinical Oncology (ASCO) Annual Meeting (link to PR; link to poster). Findings from the trial indicate that pelareorep and pembrolizumab synergize and show anti-cancer activity in these difficult-to-treat patients, with a 42% disease control rate achieved and durations of control ranging from approximately 2.5 months to approximately 7 months

despite the absence of chemotherapy in the treatment regimen. Biomarker data showed that patients achieving disease control had increased activation of anti-cancer CD8+ T cells in the peripheral blood, and reduced levels of pro-tumor Treg cells in the peripheral blood and tumor compared to those with progressive disease. These results, which are consistent with what has been seen in clinical trials in other indications, such as breast cancer, highlight the broad applicability of pelareorep's immunotherapeutic mechanism of action. They also bode well for a successful outcome in the phase 1/2 GOBLET trial, which includes a cohort evaluating pelareorep and the PD-L1 inhibitor atezolizumab in combination with chemotherapy as a first-line treatment in metastatic pancreatic cancer patients (link to PR).

Additional Immunotherapeutic Combinations and Opportunities

Preclinical data highlighting pelareorep's ability to synergize with multiple classes of anti-cancer agents

Data presented in two electronic poster presentations at the AACR Annual Meeting 2021 showed that pelareorep enhanced the anti-tumor efficacy of the poly(ADP)-ribose polymerase 1 (PARP-1) inhibitor talazoparib and the cyclin-dependent kinase (CDK) 4/6 inhibitor palbociclib, which are both FDA approved for the treatment of breast cancer. The observed synergistic effects were notably mediated through immunologic mechanisms rather than through the molecular pathways typically associated with PARP-1 and CDK4/6 inhibition (link to PR; link to CDK4/6 poster; link to PARP-1 poster). Together, these results suggest that pelareorep may enhance the therapeutic potential of PARP-1 and CDK4/6 inhibitors by expanding the mechanisms by which they exert anti-tumor effects.

Changes to the Board of Directors

William G. Rice, Ph.D. has stepped down from Oncolytics Biotech's Board of Directors to avoid any potential conflicts that might arise from the development of pelareorep with molecules being developed by Aptose Biosciences Inc., the company for which Dr. Rice serves as Chairman of the Board, President & Chief Executive Officer. "I'm a staunch supporter of Oncolytics and wish to express my sincere gratitude for the time serving the Board and working with a wonderful group of directors and officers," stated Dr. Rice. Oncolytics would like to thank Dr. Rice for his guidance during his tenure as a member of the Board.

Financial Highlights

- As of June 30, 2021, the Company reported $50.8 million in cash and cash equivalents. The Company raised $8.1 million during the second quarter through issuing of common stock through its ATM facility.
- Operating expense for the second quarter of 2021 was $3.5 million, compared to $3.0 million in the second quarter of 2020.
- R&D expense for the second quarter of 2021 was $3.2 million, compared to $2.5 million in the second quarter of 2020.
- Net cash used in operating activities for the second quarter of 2021 was $6.8 million, compared to $6.3 million for the second quarter of 2020.
- The net loss for the second quarter of 2021 was $7.2 million, compared to a net loss of $6.8 million in the second quarter of 2020. The basic and diluted loss per share was $0.13 in the second quarter of 2021, compared to a basic and diluted loss per share of

$0.17 in the second quarter of 2020.

Anticipated Milestones and Catalysts

- Dosing of the first patient in phase 1/2 GOBLET study in gastrointestinal cancer: H2 2021
- Final biomarker data for AWARE-1 breast cancer study in the intended target population for a registrational study: H2 2021
- Completion of enrollment in phase 2 BRACELET-1 metastatic breast cancer study: Q4 2021
- Interim safety update from phase 2 IRENE study in triple-negative breast cancer: Q4 2021*
- Interim safety data from phase 1 WINSHIP 4398-18 multiple myeloma study: Q4 2021*

**Guidance provided by clinical investigators*

Oncolytics expects to provide updates on the timing of the following milestones:

- Interim safety update from BRACELET-1 metastatic breast cancer study
- Phase 2 BRACELET-1 metastatic breast cancer study: final data

Webcast and Conference Call

Management will host a conference call for analysts and institutional investors at 8:00 a.m. ET today, August 6, 2021. To access the call, please dial (888) 664-6383 (North America) or (416) 764-8650 (International) and, if needed, provide confirmation number 5114-8191. A live webcast of the call will also be available by clicking here or on the Investor Relations page of Oncolytics' website (LINK) and will be archived for three months. A dial-in replay will be available for one week and can be accessed by dialing (888) 390-0541 (North America) or (416) 764-8677 (International) and using reference code: 148-191#.

ONCOLYTICS BIOTECH INC.
INTERIM CONSOLIDATED STATEMENTS OF FINANCIAL POSITION
(unaudited)
(in Canadian dollars, except share amounts)

As at	June 30, 2021 $	December 31, 2020 $
Assets		
Current assets		
Cash and cash equivalents	**50,799,432**	31,219,574
Other receivables	**135,857**	89,661
Prepaid expenses	**4,503,776**	2,427,200
Total current assets	**55,439,065**	33,736,435
Non-current assets		
Property and equipment	**146,216**	236,664
Right-of-use assets	**724,164**	372,468
Total non-current assets	**870,380**	609,132
Total assets	**56,309,445**	34,345,567
Liabilities And Shareholders' Equity		
Current Liabilities		
Accounts payable and accrued liabilities	**2,193,979**	1,805,015
Other liabilities	**—**	123,985
Lease liabilities	**234,139**	248,885
Warrant derivative	**153,968**	531,228
Total current liabilities	**2,582,086**	2,709,113
Non-current liabilities		
Contract liability	**6,730,287**	6,730,287
Lease liabilities	**510,369**	153,174
Total non-current liabilities	**7,240,656**	6,883,461
Total liabilities	**9,822,742**	9,592,574
Commitments and contingencies		
Shareholders' equity		
Share capital Authorized: unlimited Issued: June 30, 2021 – 54,959,672 December 31, 2020 – 46,166,980	**391,124,995**	356,824,172
Warrants	**3,617,570**	3,617,570
Contributed surplus	**32,224,806**	31,022,356
Accumulated other comprehensive income	**311,543**	400,225
Accumulated deficit	**(380,792,211)**	(367,111,330)
Total shareholders' equity	**46,486,703**	24,752,993
Total liabilities and shareholder's equity	**56,309,445**	34,345,567

ONCOLYTICS BIOTECH INC.
INTERIM CONSOLIDATED STATEMENTS OF LOSS AND COMPREHENSIVE LOSS
(unaudited)
(in Canadian dollars, except share amounts)

	Three Months Ended June 30, 2021 $	Three Months Ended June 30, 2020 $	Six Months Ended June 30, 2021 $	Six Months Ended June 30, 2020 $
Expenses				
Research and development	**3,203,181**	2,499,128	**5,962,195**	5,028,774
Operating	**3,520,986**	3,048,572	**6,662,876**	6,041,960
Loss before the following	**(6,724,167)**	(5,547,700)	**(12,625,071)**	(11,070,734)
Change in fair value of warrant derivative	**80,159**	(507,150)	**(84,621)**	3,644,832
Foreign exchange (loss) gain	**(631,352)**	(805,098)	**(1,021,906)**	899,707
Interest income, net	**29,224**	32,533	**50,717**	98,442
Loss before income taxes	**(7,246,136)**	(6,827,415)	**(13,680,881)**	(6,427,753)
Income tax expense	**—**	—	**—**	—
Net loss	**(7,246,136)**	(6,827,415)	**(13,680,881)**	(6,427,753)
Other comprehensive (loss) income items that may be reclassified to net loss				
Translation adjustment	**(48,370)**	(146,443)	**(88,682)**	148,769
Net comprehensive loss	**(7,294,506)**	(6,973,858)	**(13,769,563)**	(6,278,984)
Basic and diluted loss per common share	**(0.13)**	(0.17)	**(0.26)**	(0.17)
Weighted average number of shares (basic and diluted)	**54,325,212**	39,603,671	**52,008,768**	37,734,689

ONCOLYTICS BIOTECH INC.
INTERIM CONSOLIDATED STATEMENTS OF CHANGES IN EQUITY
(unaudited)
(in Canadian dollars)

	Share Capital $	Warrants $	Contributed Surplus $	Accumulated Other Comprehensive Income $	Accumulated Deficit $	Total $
As at December 31, 2019	311,077,859	3,617,570	29,338,849	464,101	(344,606,273)	(107,894)
Net loss and other comprehensive loss	—	—	—	148,769	(6,427,753)	(6,278,984)
Issued pursuant to stock option plan	162,812	—	(60,024)	—	—	102,788
Issued pursuant to incentive share award plan	289,686	—	(289,686)	—	—	—
Issued pursuant to "At the Market" Agreement	24,359,150	—	—	—	—	24,359,150
Issued pursuant to warrant derivative exercised	6,332,778	—	—	—	—	6,332,778
Share-based compensation	—	—	653,445	—	—	653,445
Share issue costs	(1,072,119)	—	—	—	—	(1,072,119)
As at June 30, 2020	341,150,166	3,617,570	29,642,584	612,870	(351,034,026)	23,989,164
As at December 31, 2020	356,824,172	3,617,570	31,022,356	400,225	(367,111,330)	24,752,993
Net loss and other comprehensive income	—	—	—	(88,682)	(13,680,881)	(13,769,563)
Issued pursuant to stock option plan	313,867	—	(117,751)	—	—	196,116
Issued pursuant to incentive share award plan	370,117	—	(370,117)	—	—	—
Issued pursuant to "At the Market" Agreement	34,168,071	—	—	—	—	34,168,071
Issued pursuant to warrant derivative exercised	686,616	—	—	—	—	686,616
Share-based compensation	—	—	1,690,318	—	—	1,690,318
Share issue costs	(1,237,848)	—	—	—	—	(1,237,848)
As at June 30, 2021	**391,124,995**	**3,617,570**	**32,224,806**	**311,543**	**(380,792,211)**	**46,486,703**

ONCOLYTICS BIOTECH INC.
INTERIM CONSOLIDATED STATEMENTS OF CASH FLOWS
(unaudited)
(in Canadian dollars)

	Three Months Ended June 30, 2021 $	Three Months Ended June 30, 2020 $	Six Months Ended June 30, 2021 $	Six Months Ended June 30, 2020 $
Operating Activities				
Net loss for the period	**(7,246,136)**	(6,827,415)	**(13,680,881)**	(6,427,753)
Depreciation - property and equipment	**75,340**	22,584	**95,890**	45,629
Depreciation - right-of-use-assets	**88,493**	92,133	**174,677**	183,156
Share-based compensation	**1,032,242**	260,640	**1,690,318**	653,445
Interest expense on lease liabilities	**24,450**	14,885	**38,259**	33,094
Unrealized foreign exchange loss (gain)	**713,763**	699,079	**1,233,131**	(728,677)
Change in fair value of warrant derivative	**(80,159)**	507,150	**84,621**	(3,644,832)
Net change in non-cash working capital	**(1,404,875)**	(1,027,687)	**(2,001,354)**	(327,950)
Cash used in operating activities	**(6,796,882)**	(6,258,631)	**(12,365,339)**	(10,213,888)
Investing Activities				
Acquisition of property and equipment	**(6,598)**	(3,034)	**(6,598)**	(13,749)
Cash used in investing activities	**(6,598)**	(3,034)	**(6,598)**	(13,749)
Financing Activities				
Proceeds from exercise of stock options	**6,766**	17,638	**196,116**	102,788
Proceeds from exercise of warrant derivative	**—**	263,318	**230,946**	1,696,460
Proceeds from "At the Market" equity distribution agreement	**8,072,561**	6,449,218	**32,930,223**	23,287,031
Payment of lease liabilities	**(98,555)**	(119,634)	**(210,228)**	(233,108)
Cash provided by financing activities	**7,980,772**	6,610,540	**33,147,057**	24,853,171
Increase in cash	**1,177,292**	348,875	**20,775,120**	14,625,534
Cash and cash equivalents, beginning of period	**50,362,162**	30,567,480	**31,219,574**	14,148,021
Impact of foreign exchange on cash and cash equivalents	**(740,022)**	(1,005,004)	**(1,195,262)**	1,137,796
Cash and cash equivalents, end of period	**50,799,432**	29,911,351	**50,799,432**	29,911,351

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, without or with atezolizumab, and the standard of care therapy according to breast cancer subtype. Tumor tissue is collected from patients as part of their initial breast cancer diagnosis, again on day three following initial treatment, and finally at three weeks following treatment, on the day of their mastectomy. Data generated from this study are intended to confirm that pelareorep is acting as a novel immunotherapy, to evaluate potential synergy between pelareorep and checkpoint blockade, and to provide comprehensive biomarker data by breast cancer subtype. The primary endpoint of the study is overall CelTIL score (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.

For more information about the AWARE-1 study, refer to https://clinicaltrials.gov/ct2/show/NCT04102618.

Tecentriq® (atezolizumab) is a registered trademark of Genentech, a member of the Roche Group.

About BRACELET-1

The BRACELET-1(**BR**east c**A**n**CE**r with the Oncolytic Reovirus Pe**L**areor**E**p in Combina**T**ion with anti- PD-L1 and Paclitaxel) study is an open-label, phase 2, randomized study in patients with HR+/HER2-, endocrine-refractory metastatic breast cancer being conducted under a co-development agreement with Merck KGaA, Darmstadt, Germany and Pfizer. PrECOG LLC, a leading cancer research network, is managing the study. The study will take place at 20 trial sites and is expected to enroll 45 patients randomized into three cohorts. A three-patient safety run-in was conducted with patients receiving pelareorep, paclitaxel, and avelumab prior to randomization. The three cohorts being treated are as follows:

- Cohort 1 (n=15): paclitaxel
- Cohort 2 (n=15): paclitaxel + pelareorep
- Cohort 3 (n=18): paclitaxel + pelareorep + avelumab (Bavencio®)

Patients in cohort 1 will receive paclitaxel on days 1, 8, and 15 of a 28-day cycle. Patients in cohort 2 will receive the same paclitaxel regimen as cohort 1, plus pelareorep on days 1, 2, 8, 9, 15 and 16 of the 28-day cycle. Patients in cohort 3 will receive the same combination and dosing regimen as cohort 2, plus avelumab on days 3 and 17 of the 28-day cycle. The primary endpoint of the study is overall response rate. Exploratory endpoints include peripheral and tumor T cell clonality, inflammatory markers, and safety and tolerability assessments.

For more information about the BRACELET-1 study, refer to https://clinicaltrials.gov/ct2/show/NCT04215146.

About GOBLET

The GOBLET (**G**astrointestinal tum**O**rs exploring the treatment com**B**inations with the oncolytic reovirus pe**L**ar**E**orep and an**T**i-PD-L1) study is a phase 1/2 multiple indication biomarker, safety, and efficacy study in advanced or metastatic gastrointestinal tumors. The study will be conducted at 15 centers in Germany. The primary endpoint of the study is safety, with overall response rate and biomarker evaluation (T cell clonality and CEACAM6) as exploratory endpoints. Approximately 55 patients are planned to be enrolled in four independent cohorts:

1. Pelareorep in combination with atezolizumab, gemcitabine, and nab-paclitaxel in 1st line metastatic pancreatic cancer patients (n=12);
2. Pelareorep in combination with atezolizumab in 1st line MSI (microsatellite instability)-high metastatic colorectal cancer patients(n=19);
3. Pelareorep in combination with atezolizumab and TAS-102 in 3rd line metastatic colorectal cancer patients (n=14); and

4. Pelareorep in combination with atezolizumab in 2nd line advanced and unresectable anal cancer patients (n=10).

About Oncolytics Biotech Inc.

Oncolytics is a biotechnology company developing pelareorep, an intravenously delivered immunotherapeutic agent. This compound induces anti-cancer immune responses 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 oncology treatments. Oncolytics is currently conducting and planning clinical trials evaluating pelareorep in combination with checkpoint inhibitors and targeted therapies in solid and hematological malignancies as it advances towards a 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 contained in this press release include statements regarding Oncolytics' belief as to the potential and benefits of pelareorep as a cancer therapeutic; Oncolytics' expectations as to the purpose, design, outcomes and benefits of its current or pending clinical trials involving pelareorep; our goals, objectives and strategies; our plans to further develop pelareorep through collaborations; our financial foundation; our anticipated catalysts and milestones; and other statements related to anticipated developments in Oncolytics' business and technologies. In any forward-looking statement in which Oncolytics expresses an expectation or belief as to future results, such expectations or beliefs are expressed in good faith and are believed to have a reasonable basis, but there can be no assurance that the statement or expectation or belief will be achieved. Such forward-looking statements involve known and unknown risks and uncertainties, which could cause Oncolytics' 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, Oncolytics' 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 Oncolytics 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 Oncolytics' 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 any obligation to update these forward-looking statements, except as required by applicable laws.

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