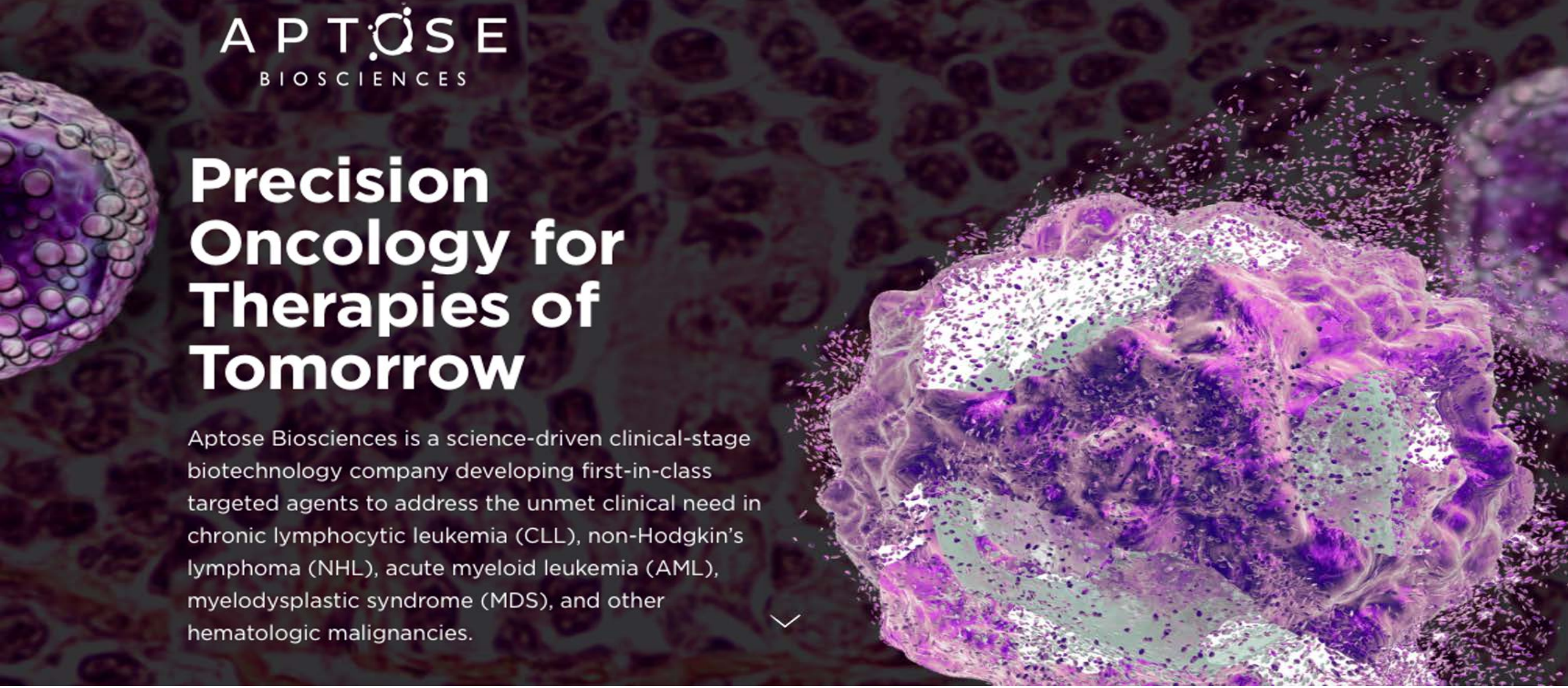
APTOSE BIOSCIENCES

Precision Oncology for Therapies of Tomorrow

Aptose Biosciences is a science-driven clinical-stage biotechnology company developing first-in-class targeted agents to address the unmet clinical need in chronic lymphocytic leukemia (CLL), non-Hodgkin's lymphoma (NHL), acute myeloid leukemia (AML), myelodysplastic syndrome (MDS), and other hematologic malignancies.

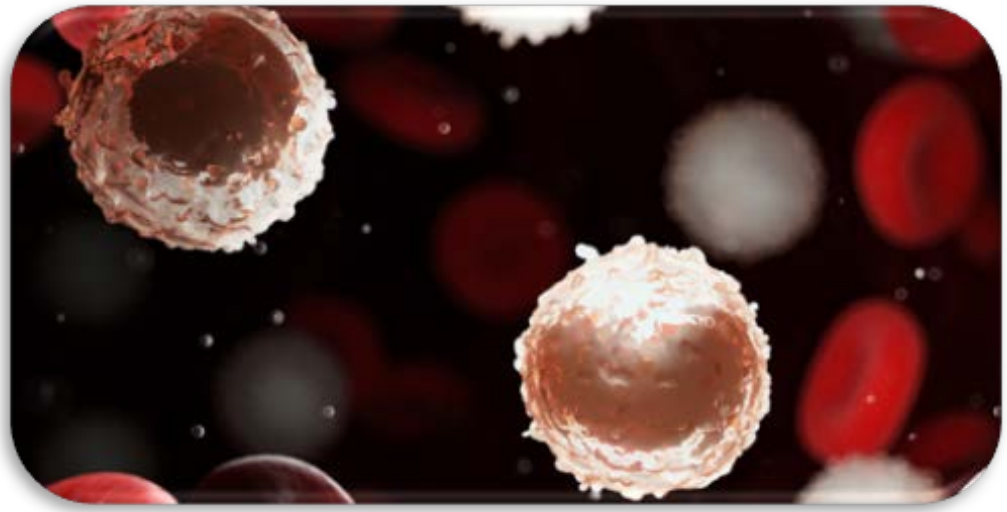


Aptose Annual Shareholders Meeting

NASDAQ: APTO
TSX: APS

June 02, 2020

APTOSE BIOSCIENCES



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This presentation contains forward-looking statements within the meaning of Canadian and U.S. securities laws, including but not limited to, statements regarding the clinical potential and favourable properties of APTO-253 and CG-806, the APTO-253 Phase 1b clinical trial and its progression and results, the CG-806 Phase 1a/b CLL clinical trial and the planned CG-806 Phase 1a/b AML clinical trial and statements related to the Company's plans, objectives, expectations and intentions. Aptose Biosciences Inc.'s (the "Company") current expectations, estimates and projections regarding future events, and are subject to risks and uncertainties and are necessarily based upon a number of estimates and assumptions that, while considered reasonable by us, are inherently subject to significant business, economic, competitive, political and social uncertainties and contingencies.

Although the Company believes that the views reflected in these forward-looking statements are reasonable, such statements involve significant risks and uncertainties, and undue reliance should not be placed on such statements. Certain material factors or assumptions are applied in making these forward-looking statements, and actual results may differ materially from those statements. Those factors and risks include, but are not limited to, our ability to raise the funds necessary to continue our operations, changing market conditions, the successful and timely completion of our clinical studies including delays, the demonstration of safety and efficacy of our drug candidates, our ability to recruit patients, the establishment and maintenance of corporate alliances, the market potential of our product candidates, the impact of competitive products and pricing, new product development, changes in laws and regulations, uncertainties related to the regulatory approval process and other risks detailed from time to time in the Company's ongoing quarterly filings and annual reports.

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During Past Year Aptose Expanded Leadership Team

…building best possible team at all levels

Dr. William G. Rice, PhD
Chairman, President &
Chief Executive Officer

Mr. Gregory Chow
Executive Vice President &
Chief Financial Officer

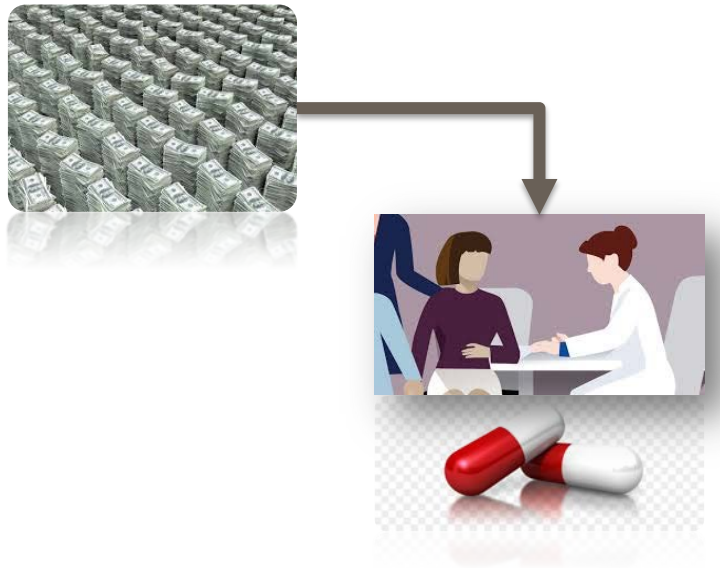
Dr. Jotin Marango, MD, PhD
Senior Vice President &
Chief Business Officer

Dr. Rafael Bejar, MD, PhD
Senior Vice President &
Chief Medical Officer

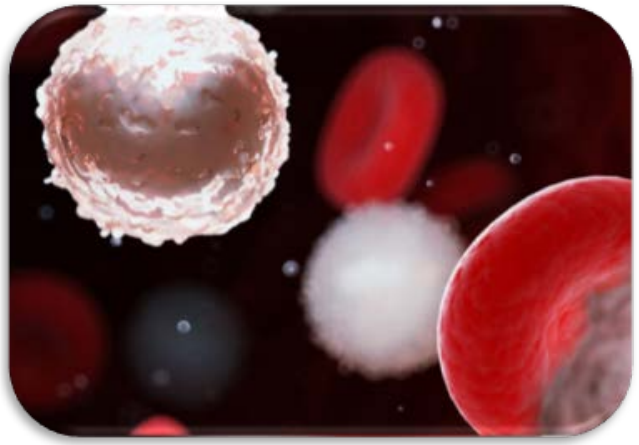
Mr. Victor Montalvo-Lugo, MS
Vice President of Clinical Operations

During Past Year Aptose Established Financial Stability to Support Development of Our Clinical Assets

- **Completed Two Major Financings During 2019**
  - Raised $21.275 million May 2019
  - Raised $74.175 million December 2019
  - Built Strong Institutional Participation



- **Established New $200 million Shelf Registration**
- **Established New $75 million At-the-Market (ATM) Facility (Q2-2020)**
- **Maintained and Strengthened Strong Banking Relationships**
- **Enhanced Research Analyst Coverage**



APTO-253

Advanced Clinical Development

Phase 1a/b Ongoing

Small Molecule MYC Inhibitor

For the Treatment of AML

1. MYC dysregulation is key driver of AML, certain B-cell cancers and solid tumors
2. MYC gene expression potently inhibited by APTO-253
3. Ph1a/b trial for AML/MDS ongoing with APTO-253
4. APTO-253 first agent to inhibit MYC expression and well tolerated in patients

APTO-253
Update for Ongoing Phase 1b Dose Escalating Clinical Trial

✓ • Dose Level 1 (20mg/m^2)	Completed	1 AML Patient
✓ • Dose Level 2 (40mg/m^2)	Completed	1 MDS Patient
✓ • Dose Level 3 (66mg/m^2)	Completed	3 AML Patients
• Dose Level 4 (100mg/m^2)	Ongoing	3 Patients Required
		○ 1 Completed 28d Cycle

- To date, well-tolerated & no drug-related SAEs
- Observed suppression of MYC expression in peripheral blood cells at all dose levels and with AML and MDS patients
- Plan to dose escalate to boost exposure between dosing (7 day period)

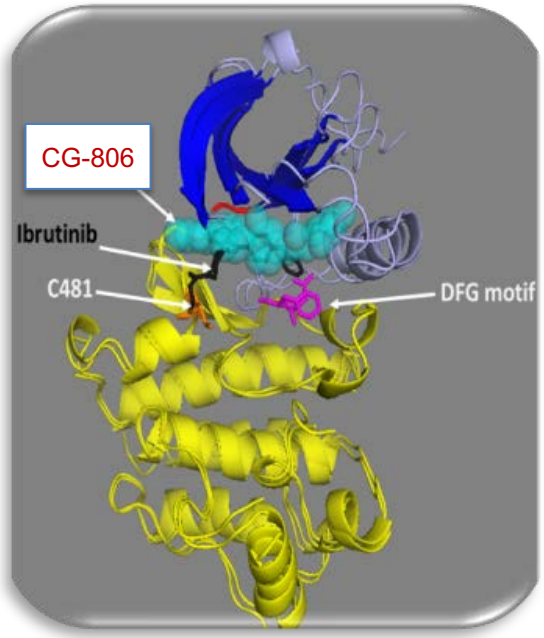
COVID-19 Creates Headwinds to Program: Risks to APTO-253 Clinical Trial

- **IV Infusion is Less Desired by Clinical Sites During the COVID-19 High Risk Period**
  - Clinical Sites reluctant to house immunocompromised AML/MDS patients in clinics for hospitalization or extended periods of time
- **COVID-19 May Result in Less Data Available at ASH 2020 Conference**
  - Efforts underway to boost enrollment

CG-806

1st-in-Class Oral Kinase Inhibitor

- Mutation Agnostic FLT3 Inhibitor
- Mutation Agnostic rBTK Inhibitor



- ❑ Oral, small molecule **"reversible" kinase inhibitor**
- ❑ Cluster-selective with **highly unique kinase inhibitory profile**
- ❑ Developing across ***spectrum of hematologic malignancies***
  - **lymphoid** malignancies (**CLL** & NHL)
  - **myeloid** malignancies (**AML** & MDS)
- ❑ Ongoing trial **Ph1a/b for CLL** and lymphoid malignancies as rBTKi
- ❑ Planning trial **Ph1a/b for AML** and myeloid malignancies as FLT3i

Properties & Trial Design Minimize the Potential Impact of COVID-19
Support Maintenance of Timelines for CG-806 Clinical Programs

- **"Essential" Treatment is Required for Critically Sick Cancer Patients**
  - CG-806 is being developed for **CLL**/NHL lymphoid cancers and **AML**/MDS myeloid cancers
- **Oral Administration Places Less Strain on Clinic / Hospital Staff / System / Patients**
  - *Oral* administration does not require hospital stays
  - Capsules can be shipped directly to patients and vital signs and blood samples can be collected remotely
- **Safety Profile Thus Far Reduces Risk to Patients**
  - Minimizes number of non-essential clinic visits for additional supportive care
- **Remote Monitoring Using eDiary for Data Collection Avoids Hospital Visits**
- **Study Design Supports Patient Accrual and Minimizes Risks**
  - Scans in B-cell cancer patients only every two cycles
  - Leveraging both Specialty Regional Cancer Clinics and Large Institutional Centers

CG-806 Phase 1 Clinical Development Plan for Patients with Lymphoid (CLL) and Myeloid (AML) Malignancies

CLL & NHL Lymphoid

1st : Phase 1a/b Ongoing in Patients with R/R CLL & NHL

- Seek to define safety, tolerability, PK and PD properties and RP2D in CLL/NHL patients
- Seek responses in CLL/NHL patients

R/R AML patients are acutely ill, and we did not wish to dose sub-therapeutically

During CLL trial, identified a dose likely to be "therapeutically active" for AML patients

Pending FDA Approval

AML Myeloid

2nd : Perform Phase 1a/b : R/R AML

- Selected starting dose for recommendation and submitted new IND for AML
- Plan to define safety, tolerance, PK, PD and RP2D
- Seek responses in AML patients

CG-806 Now in Dose Level 4 of Phase 1a/b Clinical Trial in CLL/NHL

Dose Escalation Phase

- **Administered oral capsules**
- **Twice daily** on a **28-day cycle**
- Plan to perform 6 dose levels
- **Accelerated titration** design
- Planned expansion cohorts

Dose Level 1 (150mg BID for 28d) Completed

Only One Patient Required in Dose Level 1

- **R/R-CLL/SLL** with TP53 mutation ; Heavily pretreated
- **Challenging Case with TP53 mutation – No DLTs and in Cycle 10 (now dose escalated)**

Dose Level 2 (300mg BID for 28d) Completed

Only One Patient Required in Dose Level 2

- **R/R-CLL** with unmutated IGHV ; Marrow involvement, neutropenia and thrombocytopenia
- **Highly complicated disease to manage – No DLTs and completed Cycle 4**

Dose Level 3 (450mg BID for 28d) Completed

Three Patients Required in Dose Level 3 – 3 Patients completed Cycle 1

- **Two Follicular Lymphoma and one SLL patients**

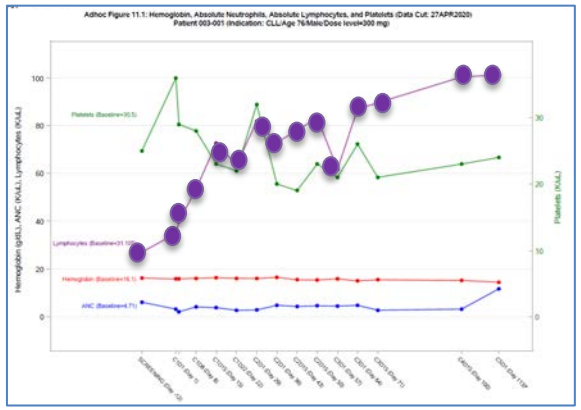
Dose Level 4 (600mg BID for 28d) Ongoing

Three Patients Required in Dose Level 3

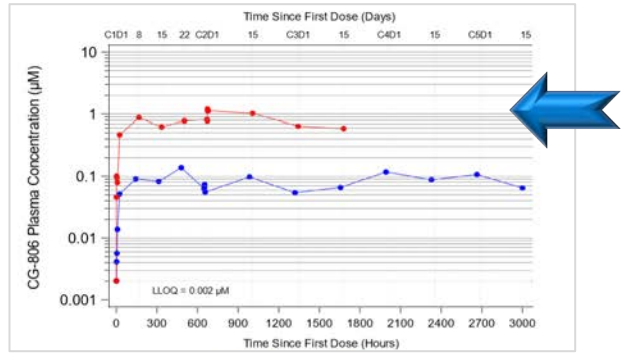
CG-806 Delivered Clinical Evidence of Safety, Pharmacologic Activity and Favorable Oral Pharmacokinetics

- **Patient Dose Escalation Advancing Efficiently**
  - Dose Levels 1, 2 and 3 completed
  - Dose Level 4 underway

- **Evidence of Safety and Tolerability *to Date***
  - No QTc or atrial fibrillation cardiovascular events to date



- **Evidence of Pharmacologic Activity as Early as Dose Level 2**
  - **Target Engagement**: Plasma inhibits P-BTK, P-SYK, P-ERK, P-PDGFRα in EOL1
  - **Lymphocytosis:** BTK inhibition in CLL promotes exfiltration

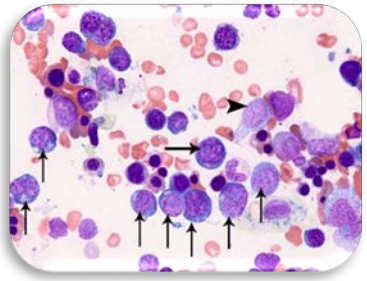


- **Favorable Steady-State Plasma Exposure Levels**
- **Plan to Continue Dose Escalation and Seek Clinical POC**

CG-806 : A New Class of Drugs

- Only BTK Inhibitor that also Inhibits FLT3
- Developing for CLL and AML

CG-806 for the Treatment of AML & Myeloid Malignancies

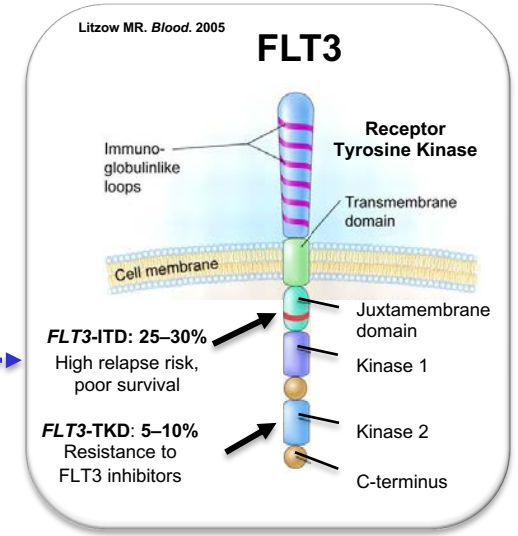


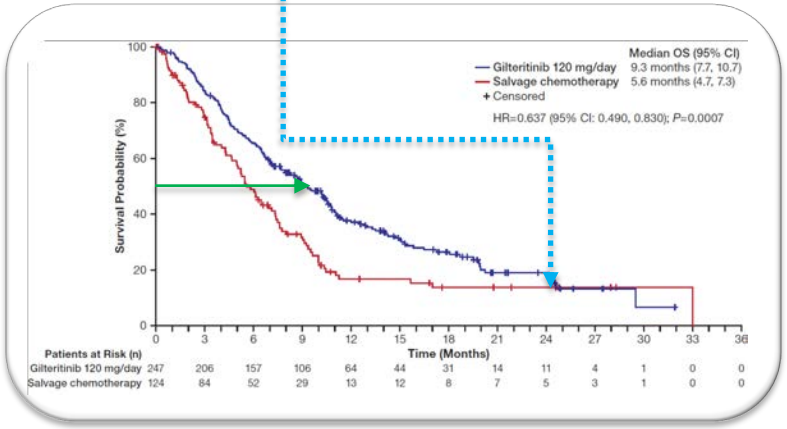
Deadly Cancer of Blood/Bone Marrow (Orphan Disease)

- ~21,450 diagnosed this year / ~10,920 deaths this year[1]
- The 5-year survival rate for patients with AML approximately 28.3%

Limitation of Current FLT3 Inhibitors and Other Agents

- **FLT3-ITD mutation** is key driver in **25-35% of AML patients**[2,3]
- Current "Dirty" agents (Midostaurin®, etc.) are limited ➔ **Toxicity**
- Current "Selective" (Gilteritinib®, Quizartinib®) agents not durable ➔ **Resistance**
- Current agents susceptible to mutations in TP53, Ras, FLT3 (ITD/TKD/GK)





Desperate Need for Improved AML Agents → CG-806

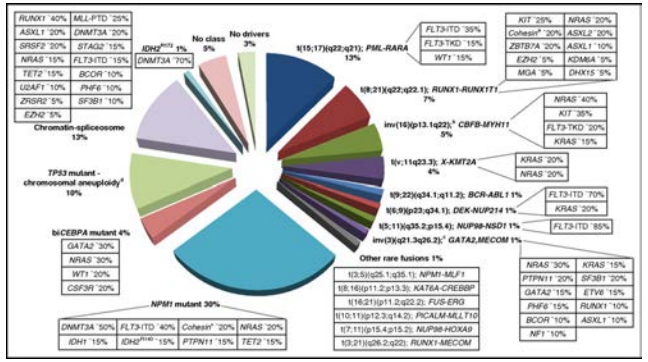
- CG-806 potently inhibits all WT and mutant forms of FLT3: ITD/TKD/GK/WT
- CG-806 suppresses multiple oncogenic signaling pathways to avoid resistance
- CG-806 retains activity in presence of diverse mutational background
- CG-806 combines effectively with other therapies, i.e. venetoclax/venclexta®

(1) American Cancer Society : [2] *Cancer*. 2014 July 15; 120(14): 2142-2149 : [3] *Blood* 2016;128(5);686-698.

Developing CG-806 for the Treatment of AML

- **Strong Rationale to Develop for AML with High Potential Value:**
  - Broadly potent against AML cells
    - Patients with mutated FLT3, TP53, IDH1, IDH2, SRF2, ASXL1 and RAS
    - Patients with WT-FLT3 (approximately 70% of R/R AML patients)
  - More potent than other FLT3 inhibitors on >200 AML patient samples
  - Delivers cures in xenograft models of human AML without toxicity

Cyto/Molecular Heterogeneity of AML



- **Phase 1 Planned : R/R AML Patients with Unmet Needs**
  - Patients who failed other FLT3 inhibitors
  - Patients who failed IDH-1 inhibitors
  - Patients who failed venetoclax
  - Patients with mutated p53, mutated RAS
  - Patients with wild type-FLT3
  - Patients unfit for intensive therapies

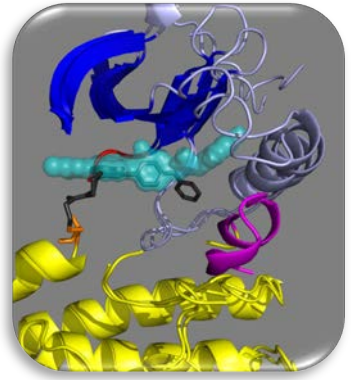
- Plan to initiate dosing with an active dose

&

- Rapidly differentiate CG-806 from other FLT3i's

Developing CG-806 Broadly Across Hematologic Malignancies

- **Uniquely and Selectively Inhibits Clusters of Kinases**
  - Targets kinases that are drivers of hematologic malignancies (lymphoid and myeloid)
  - Yet, avoids kinases generally associated with toxicity



- **Phase 1 Ongoing in R/R CLL & NHL Lymphoid Cancer Patients**
  - Targeting BTK and multiple survival pathways to treat patients failing other agents
  - Observed safety, pharmacologic activity and predictable PK characteristics
  - Continuing to dose escalate and seek safety, PD responses and efficacy responses
- **Phase 1 Planned in R/R AML Myeloid Cancer Patients**
  - Targeting FLT3 and multiple survival pathways to treat patients failing other agents
  - Plan to initiate dosing at active level; Potential for rapid development and value creation

Additional Accomplishments

- Website Upgraded
- Generic Naming of CG-806 Ongoing
- Scaled CG-806 API Manufacturing
- Scaled CG-806 Capsule Manufacturing
- Instituted Major Upgrades to Clinical Operations
- Aspire to Error-free Execution (Avoid Unforced Errors)
- Developing New Oral Formulations for CG-806 and APTO-253
- Maintaining Strong Financials – Allow Clinical Data to Emerge & Build Value
- Presented Data at Key Medical Conferences: EHA, ESH, ASH, AACR

DRUG	TARGET	RIGHTS	INDICATIONS	Preclinical Stage	Clinical Proof-of-Concept	Pivotal Stage
CG-806	Pan-BTK	Aptose: WW CG: Korea	CLL NHL	B-Cell Malignancies		
CG-806	Pan-FLT3	Aptose: WW CG: Korea	AML MDS	AML / MDS Planned		
APTO-253	MYC	Aptose: WW	AML MDS	AML / MDS Single Agent		
APL-581	BRD4/JAK	Aptose / Ohm	Hematologic Cancers	AML Single Agent		

2020 Anticipated Catalysts

CG-806	1H:	Seek FDA allowance for AML trial
	2H:	Seek clinical activity in AML patients
	2H:	Seek clinical activity in B-cell cancer patients
	1-2H:	Presentation of clinical data during EHA (B-cell) and ASH (B-cell & AML)
APTO-253	1-2H:	Continue dose escalation in AML/MDS patients
	2H:	Explore additional cancer indications
	2H:	Presentation of clinical data during ASH

Patients, Their Families, Care Givers

Dedicated Employees

Shareholders

We Thank You!

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