Taking a Precision Cancer Medicine™ Approach to Develop Targeted Drugs for Cancer Indications with Significant Need for New Treatment Options

NASDAQ: TROV
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These forward-looking statements are based on Trovagene's current expectations and actual results could differ materially. There are a number of factors that could cause actual events to differ materially from those indicated by such forward-looking statements. While the list of factors presented in the 10-K is considered representative, no such list should be considered to be a complete statement of all potential risks and uncertainties. Unlisted factors may present significant additional obstacles to the realization of forward-looking statements. Forward-looking statements included herein are made as of the date hereof, and Trovagene does not undertake any obligation to update publicly such statements to reflect subsequent events or circumstances.
Robust, diversified pipeline with single molecule, onvansertib, addressing multiple cancer indications, each with significant medical need for new treatment options

Preclinical data demonstrating efficacy of onvansertib in combination with standard-of-care drugs, expanding therapeutic and partnership opportunities

Encouraging initial efficacy data from ongoing clinical trials with additional data readouts in 2019-2020

Precision Cancer Medicine™ approach and integration of biomarkers to target treatment for patients most likely to respond

Experienced team with proven oncology drug development track record
Experienced Management Team
Drug Development Expertise + Biomarker Technology

Thomas Adams, PhD
Chief Executive Officer and Chairman

Mark Erlander, PhD
Chief Scientific Officer

Vicki Kelemen
Vice President Clinical Development
Our Vision
Rapidly Advancing Clinical Development Programs

2H 2019

- 3 clinical-stage programs
- Safety and efficacy data readouts

1H/2H 2020

- Clinical data readouts from all 3 programs
- Phase 2 trials completed
- Registrational trials initiated

Vision 2022

- Commercialization partner(s)
- FDA approval of onvansertib in at least 1 indication
- Second compound licensed and in the clinic
### Demonstrated Operational Stability
Cost-Effective and Efficient Model

- **Raised Capital & Clinical Research Commitment Q1-2, 2019**
  - $8.0 million

- **Cash and Cash Equivalents as of March 31, 2019**
  - $11.3 million

- **Projected Cash Ending Q2, 2019**
  - ~$10.8 million

- **Estimated Quarterly Cash Burn**
  - ~$4.0 million
Exclusive Global Rights to Onvansertib Licensed from Nerviano Medical Sciences (NMS) in 2017

- Largest oncology research and development company in Italy; highly regarded throughout Europe and the U.S.

- Experts in Protein Kinase Drug Development
- Established CMC (chemistry, manufacturing, controls)
- GMP / FDA Validated Manufacturing
- Excellent R&D Reputation and Track Record
- Completed Phase 1 Solid Tumor Trial and IND
- Completed Preclinical Data, Including Synergy
- PLK1 Proven Effective Cancer Therapeutic Target
- Licensed Drugs to Genentech, Array/Pfizer, Ignyta/Roche
Optimized Operations and Clinical Development
Leveraging Internal Expertise and External Resources

- Licensed drug with established safety and recommended Phase 2 dose
- Extensive in-vitro and in-vivo data package providing rationale for combination therapy across multiple cancers
- Outsourced clinical trial management to CRO, including regulatory, medical/safety monitoring, data management
- Readily available supply of API and finished drug for clinical trials
- 3 INDs in place (1 in each oncology division of the FDA); Orphan Drug Designation in AML
We Have the Perfect Target
Onvansertib – Polo Like Kinase 1 (PLK1) Inhibitor

- Over-expressed in most cancers
- Only oral, first-in-class, third-generation PLK1 in clinical trials
- Proven target for cancer therapeutics
- Preclinical data to support clinical development across multiple tumor types
Onvansertib Targets the PLK1 Enzyme
A Proven Drug Target and Overexpressed in Most Cancers

<table>
<thead>
<tr>
<th>PLK Member</th>
<th>Onvansertib IC50* (μM)</th>
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</thead>
<tbody>
<tr>
<td>PLK1</td>
<td>0.002</td>
</tr>
<tr>
<td>PLK2</td>
<td>&gt; 10</td>
</tr>
<tr>
<td>PLK3</td>
<td>&gt; 10</td>
</tr>
</tbody>
</table>

- High selectivity for PLK1, only
- Tested against >260 kinases; PLK1 only active target (IC50 of 2nM)

- Small molecule (MW 648.60 Daltons)
- Selectivity driven by stable interaction with carboxyl side chain of amino acid glutamate of PLK1 within PLK1’s ATP binding pocket

Onvansertib Blocks Tumor Cell Division

Onvansertib blocks cells from dividing by arresting them before they divide
Onvansertib
Benefiting from Class Experience

1<sup>st</sup> and 2<sup>nd</sup> generation PLK inhibitors demonstrated clinical activity, but were non-specific for PLK1 and had toxicity issues

<table>
<thead>
<tr>
<th>Product Attributes</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; and 2&lt;sup&gt;nd&lt;/sup&gt; Generation PLK Inhibitors</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Generation Onvansertib</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selectivity for PLK1</td>
<td>• panPLK inhibition of PLK1,2,3*</td>
<td>• Highly-selective only for PLK1</td>
</tr>
<tr>
<td>Antileukemic Activity</td>
<td>• Phase 2 &amp; 3 trial results indicate activity</td>
<td>• Clinical response in patients</td>
</tr>
<tr>
<td></td>
<td>• Improved response rates</td>
<td>• Biomarker strategy identifies patients most likely to respond</td>
</tr>
<tr>
<td>Administration</td>
<td>• Intravenous (IV)</td>
<td>• Oral</td>
</tr>
<tr>
<td>Half-Life</td>
<td>• ~135 hours (5.5 days)</td>
<td>• ~24 hours</td>
</tr>
<tr>
<td>Dosing and Schedule</td>
<td>• Fixed treatment schedule</td>
<td>• Treatment schedule flexibility</td>
</tr>
<tr>
<td></td>
<td>• Fixed dose for all patients</td>
<td>• Dose determined based on BSA</td>
</tr>
<tr>
<td>Tolerability</td>
<td>• Insufficient time between treatment cycles negatively impacted tolerability/survival</td>
<td>• Time allotted between cycles for patient recovery from on-target hematologic toxicities</td>
</tr>
<tr>
<td>Infection Prophylaxis</td>
<td>• Increased rate of fatal infections</td>
<td>• Antibiotics to proactively mitigate infections</td>
</tr>
</tbody>
</table>
Onvansertib
First-in-Class, Third-Generation PLK1 with Best-in-Class Attributes
## Diversified Pipeline with 3 Clinical-Stage Programs

### Opportunities in Leukemias/Lymphomas and Solid Tumors

- **3 Investigational New Drug (INDs) in place with the FDA**

<table>
<thead>
<tr>
<th>Preclinical</th>
<th>Phase 1</th>
<th>Phase 2</th>
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<tbody>
<tr>
<td>Metastatic Castration-Resistant Prostate (CRPC)</td>
<td><em>Phase 2 trial in combination with Zytiga® (abiraterone acetate)/prednisone - Ongoing</em></td>
<td></td>
</tr>
<tr>
<td>Colorectal (CRC)</td>
<td><em>Phase 1b/2 trial in combination with FOLFIRI + Avastin® - Ongoing</em></td>
<td></td>
</tr>
<tr>
<td>Acute Myeloid Leukemia – Orphan Drug Designation in the U.S. and Europe</td>
<td><em>Phase 1b/2 trial in combination with low-dose cytarabine (LDAC) or Decitabine - Ongoing</em></td>
<td></td>
</tr>
<tr>
<td>Myelodysplastic Syndrome</td>
<td><em>Phase 1b/2 Investigator Initiated Trial (commencing Q4’19 / Q1’20)</em></td>
<td></td>
</tr>
<tr>
<td>Ovarian, Breast, Pancreatic, Small-Cell Lung</td>
<td><em>Phase 1b/2 trial ready (Preclinical Data Available)</em></td>
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</tbody>
</table>

### Leukemias and Lymphomas

- Metastatic Castration-Resistant Prostate (CRPC)
- Colorectal (CRC)
- Acute Myeloid Leukemia
- Myelodysplastic Syndrome

### Solid Tumors

- Ovarian
- Breast
- Pancreatic
- Small-Cell Lung
Encouraging Initial Data and Near-Term Readouts

- **TROV-052 AML Phase 1b/2**
  - Completion of 6 dose escalation cohorts with no dose-limiting toxicities
  - Initial data demonstrating efficacy – complete response (CR)
  - Determine recommended Phase 2 dose (Q4 2019)
  - Enroll patients in Phase 2 (Q1-2 2020)

- **TROV-054 mCRC Phase 1b/2**
  - Activate clinical trial sites
  - Enroll 3 patients in initial dose level cohort
  - Provide data on biomarker assessment of tumor burden change (Q3 2019)
  - Provide initial data from first cohort of 3 patients in dose escalation study (Q4 2019)
  - Initiate second dose level cohort to enroll 3 patients (Q4 2019)

- **TROV-053 mCRPC Phase 2**
  - Initial safety and efficacy data
  - Enroll 3 patients in Arm B safety lead-in
    - Identify patients with ARv7 and correlate with treatment response (Q2-3 2019)
    - Provide data from patients completing 3-months of treatment (Q4 2019)

mCRPC = metastatic castration-resistant prostate cancer; mCRC = metastatic colorectal cancer; AML = acute myeloid leukemia
Combination Therapy for Cancer Treatment
Two Drugs are Better Than One (1+1 = 5)

Onvansertib is uniquely synergistic (1 +1 = 5) with many FDA-approved drugs; it selectively targets the enzymatic activity of PLK1 that is fundamental for tumor growth.

Increases efficacy of the therapeutic effect, particularly when the two drugs differ in their mechanism of action and both deliver anti-tumor activity.

Decreases required dose of each drug and associated toxicity, potentially reducing side effects.

Minimizes the development of drug resistance because the two drugs block different tumor-promoting pathways for cancer growth.

Combination Therapy
The Cornerstone of
Precision Cancer Medicine™
Onvansertib
Synergy May Enhance Efficacy of Standard-of-Care Therapies

Onvansertib Synergistic in Combination with SOC Therapies

Zytiga® (abiraterone)
Avastin® (bevacizumab)
Taxol® (paclitaxel)

Camptosar® (Irinotecan)
Venclexta® (venetoclax)

Beleodaq (belinostat)

Quizartinib

Velcade® (bortezomib)

Doxorubicin

Cisplatin

Doxorubicin

Cytarabine

Pancreatic Breast Ovarian Non-Small Cell Lung

Acute Myeloid Leukemia Chronic Lymphocytic Leukemia

Colorectal

T-Cell Lymphoma

Acute Myeloid Leukemia

Colorectal Breast Ovarian Non-Small Cell Lung

Prostate

Leukemias (Acute Myeloid Leukemia)

Ovarian Breast Bladder Non-Small Cell Lung Small Cell Lung

Multiple Myeloma

Onvansertib current clinical trials

1 Data on File, Trovagene, Inc.
Phase 2 Trial: metastatic Castration-Resistant Prostate Cancer
## Onvansertib Market Opportunity in mCRPC

### Significant Disease Burden - Need for More Effective Treatment Options

<table>
<thead>
<tr>
<th>Disease Burden</th>
<th>Treatment</th>
<th>Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 of 6 men</strong> will be diagnosed with prostate cancer&lt;sup&gt;2&lt;/sup&gt;</td>
<td><strong>Standard-of-care is Zytiga® and Xtandi®; resistance develops within 9-15 months&lt;sup&gt;4&lt;/sup&gt;</strong>&lt;br&gt; <strong>25,000 men</strong> die from metastatic prostate cancer annually&lt;sup&gt;2&lt;/sup&gt;&lt;br&gt; <strong>5-year</strong> survival rate is 37%&lt;sup&gt;2&lt;/sup&gt;</td>
<td><strong>PLK1 inhibition improves Zytiga® efficacy,</strong> repressing androgen signaling pathway&lt;sup&gt;3,4&lt;/sup&gt;**&lt;br&gt; <strong>PLK1 inhibition destabilizes AR and ARv7&lt;sup&gt;6&lt;/sup&gt;</strong>&lt;br&gt; <strong>Inhibiting PLK1 blocks expression of ARv7; stopping this resistance pathway&lt;sup&gt;6&lt;/sup&gt;</strong>&lt;br&gt; $7.9 billion global market; $12.0 billion by 2025&lt;sup&gt;7&lt;/sup&gt;</td>
</tr>
</tbody>
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Phase 2 Clinical Trial in mCRPC
Disease Control Assessed by PSA Stabilization or Decline

**Dosing Schedule**

**Dosing Regimen Arm A**
- Onvansertib – 24 mg/m² Days 1-5 (21-Day Cycle) + Abiraterone daily

**Dosing Regimen Arm B**
- Onvansertib – 24 mg/m² Days 1-5 (14-Day Cycle) + Abiraterone daily

**Duration**
- 4 Cycles = 12 Weeks
- 6 Cycles = 12 Weeks

**Efficacy Endpoint**
- Disease Control
- PSA Stabilization or Decline

**Efficacy Endpoints:** Effect of onvansertib in combination with Zytiga®/prednisone on disease control assessed by prostate-specific antigen (PSA) decline or stabilization pre- and post-treatment

**Safety Endpoint:** Safety and tolerability of onvansertib in combination with Zytiga®/prednisone

**Exploratory Endpoints:** Target inhibition of PLK1, evaluation of relevant biomarkers and correlation with patient response and genomic profile
Early PSA Response Observed
Addition of Onvansertib to Daily Zytiga®

- 6 patients have completed 4 cycles (3 months) of treatment with onvansertib + abiraterone
- 2 of 6 patients had observed declines in PSA levels after dosing with onvansertib
- To-date, 1 patient in Arm A has achieved the efficacy endpoint of disease stabilization based on PSA levels (primary endpoint)

- PSA trajectory in patient achieving primary efficacy endpoint changed from 100% increase (16.05 ng/ml to 34.23 ng/ml) in the 60 days prior to adding onvansertib to only an 8.4% increase during 84 days on treatment
- Tumor assessed at Cycle1 Day 1 as a variant known as AR-V7, considered an aggressive tumor that is resistant to anti-androgen therapy

CT scan at end of 12 weeks (efficacy endpoint) indicates ~30% tumor shrinkage
Phase 1b/2 Trial: metastatic Colorectal Cancer
Onvansertib Market Opportunity in mCRC
Only 5% Response to Current Second-Line Therapies

**Disease Burden**

- **140,000 new cases of CRC** in 2018\(^1\)
- **65% 5-year survival**\(^1\)
- **~51,000 deaths** per year from **mCRC**\(^1\)

**Treatment**

- Tumor **biomarkers drive therapy decisions** for 1st-line mCRC therapy\(^2\)
  - **~50% mCRC** has RAS (KRAS) mutation\(^2\)
    - **Standard-of-care** is chemotherapy (FOLFOX/FOLFIRI)\(^2\)
  - 2nd-line therapies have **~5% response rate** in mCRC\(^2\)

**Opportunity**

- **Onvansertib + irinotecan** (FOLFIRI) significantly **reduces tumor growth**\(^3\)
- KRAS mutation is **biomarker** for onvansertib sensitivity
- **Research partnership** with **Nektar Therapeutics**
- **$9.0 billion** global market, expected to grow to **$11.0 billion** by 2025\(^4\)

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Synergy in Combination with Irinotecan
Preclinical Data Demonstrates Reduced Tumor Growth

- Combination of onvansertib with irinotecan (FOLFIRI) significantly reduces tumor growth compared to either drug alone
- In 3 independent models tested, onvansertib induced maximal tumor regression of ~84% compared to vehicle

- Kras mutation is a biomarker for onvansertib sensitivity
- KRAS mutated NIH3T3 cells showed higher sensitivity to onvansertib compared with KRAS wild-type cells

1Investigator Brochure, Data-on-file, Trovagene
Phase 1b/2 Clinical Trial in mCRC
Objective Response Rate (ORR) in Second-Line Treatment

**Phase 1b:** Dose escalation to assess safety and identify recommended Phase 2 dose

- 12 mg/m²
- 15 mg/m²
- 18 mg/m²

► Administered orally, once-daily on Days 1-5 every 14-days (2 courses per 28-day cycle)

**Phase 2:** Assess safety and preliminary antitumor activity

► **Efficacy Primary Endpoint:** Objective response rate (ORR) in patients who receive at least 1 cycle (2 courses) of onvansertib in combination with FOLFIRI and bevacizumab

► **Efficacy Secondary Endpoint:** Preliminary efficacy defined as complete response (CR) plus partial response (PR) plus stable disease (SD)
Phase 1b/2 Trial: Acute Myeloid Leukemia
# Onvansertib Market Opportunity in AML

## Providing a New Treatment for Relapsed/Refractory Patients

### Disease Burden

<table>
<thead>
<tr>
<th>20,000 new cases annually</th>
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</thead>
<tbody>
<tr>
<td>5-year survival rate of only 25%¹</td>
</tr>
</tbody>
</table>

**Aggressive blood cancer** that usually **occurs in the elderly**¹

### Treatment

**Today’s standard-of-care** for elderly AML patients is *Venclexta*® plus azacytidine or decitabine

Patients **develop resistance** to *Venclexta*® in **~11 months** with no viable treatment options²

### Opportunity

**Onvansertib + chemotherapy** has **significant activity in AML models**³

**Onvansertib induces cell death** in AML model **insensitive to Venclexta**®⁴

**Onvansertib + decitabine** will be evaluated as treatment in *Venclexta*® **resistant patients**

**$1.0 billion** global market by 2023⁵

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Phase 1b/2 Clinical Trial in AML
Onvansertib + Low-Dose Cytarabine or Decitabine

**Phase 1b:** Dose escalation to assess safety and identify recommended Phase 2 dose

- Administered orally, once-daily on Days 1-5 of each cycle (21-28 days)
- Dose escalation:
  - Completed 12 mg/m²
  - Completed 18 mg/m²
  - Completed 27 mg/m²
  - Completed 40 mg/m²
  - Completed 60 mg/m²

**Phase 2:** Assess safety and preliminary antitumor activity

- **Efficacy Endpoints:** Rate of complete response (CR + CRi) defined as morphologic leukemia-free state (MLF)
- **Exploratory Endpoints:** Evaluation of pharmacodynamic and correlative biomarkers
Patients Achieving Complete Response
Onvansertib is Safe and Well Tolerated

- Of the 26 patients evaluable for safety, 19 had an evaluable bone marrow biopsy to assess efficacy
- Preliminary efficacy in the evaluable population includes 3 patients achieving complete response (CR) and 1 patient achieving complete response with incomplete hematologic recovery (CRi)

**Onvansertib + Decitabine**

- [Graph showing % change from baseline for Onvansertib + Decitabine]

**Onvansertib + LDAC**

- [Graph showing % change from baseline for Onvansertib + LDAC]

**Data Labels**
- **Stable disease (SD)**
- **Complete response (CR)**
- **Complete response with incomplete hematological recovery (CRi)**

Data Labels represent onvansertib dose (mg/m²)
Biomarker Evaluates Inhibition of PLK1
Identifies Patients Most Likely to Respond to Treatment

Blood test examines the extent that onvansertib inhibits PLK1 enzymatic activity (target engagement) by assessing the phosphorylated status of TCTP within circulating leukemic blast cells.

- Pre-dose sample
- Patient receives a single dose of onvansertib
- 3h post-dose sample
- Assess target engagement

**Current method: Western-Blot**

<table>
<thead>
<tr>
<th>Onvansertib</th>
<th>pTCTP</th>
<th>TCTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>+</td>
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</tr>
</tbody>
</table>

**No Target Engagement**

**Target Engagement**

**Method in development: immuno-PCR based technology**

- TCTP antibody (capture)
- pTCTP antibody (reporter)
- 59-mer dsDNA
- PCR x 30 cycles
- QUANTIFY DNA LABEL
Biomarker to Assess Inhibition of PLK1
Correlation of Biomarker+ Patients with Treatment Response

PLK1 inhibition can be monitored in patients through pTCTP status to determine target engagement of onvansertib with PLK1

► pTCTP as a marker of PLK1 activity:
  – PLK1 phosphorylates the translational control tumor protein (TCTP) on serine 46
  – pTCTP was identified as a specific marker for PLK1 activity in vivo in preclinical models

► The comparative change in pTCTP status between pre-dose and 3 hours post-dose is being assessed
Biomarker-Positive Patients Significantly Correlated with Treatment Response

- PLK1 inhibition by onvansertib (target engagement) is correlated with higher response to treatment
  - Patients with target-engagement had a significantly greater decrease in BM blasts compared to patients with no target-engagement
  - 6 out of the 9 patients with target-engagement had a decrease in BM blasts ≥ 50%
  - Among the 4 patients with objective responses, 3 had target engagement (≥ 50% decrease in pTCTP) and 1 had a 40% decrease in pTCTP

% Bone marrow blast change relative to baseline

% Bone Marrow Blast Reduction from Baseline

- Target Engagement
- No Target Engagement

* Patient sample showed a 40% reduction in pTCTP

p = 0.0033
Robust, diversified pipeline with single molecule, onvansertib, addressing multiple cancer indications, each with significant medical need for new treatment options

Preclinical data demonstrating efficacy of onvansertib in combination with standard-of-care drugs, expanding therapeutic and partnership opportunities

Encouraging initial efficacy data from ongoing clinical trials with additional data readouts in 2019-2020

Precision Cancer Medicine™ approach and integration of biomarkers to target treatment for patients most likely to respond

Experienced team with proven oncology drug development track record
Thank You

For additional information please contact: ir@trovagene.com