One Mission, Inspired by Patients: Defeat Cancer.™

January 2023

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Forward-Looking Statements

This presentation may contain forward-looking statements that are based on our current expectations, estimates and projections about our industry as well as management's beliefs and assumptions. Words such as "anticipates," "expects," "intends," "plans," "believes," "seeks," "estimates," "may," "will," and variations of these words or similar expressions are intended to identify forward-looking statements. These statements include, without limitation, the potential for our pre-clinical and/or clinical stage pipeline assets to be first-in-class and/or best-in-class treatments, plans to continue our geographic expansion of QINLOCK in Key European markets, our planned Phase 3 INSIGHT clinical study of QINLOCK versus sunitinib in second-line GIST patients with mutations in KIT exon 11 and 17/18 only, our expectations regarding the aggregate potential revenue opportunity for QINLOCK, plans to present results from the Phase 3 INTRIGUE ctDNA analysis, our ability to expand the market opportunity for QINLOCK in second-line GIST in our INSIGHT Phase 3 study; the vimseltinib enrollment and topline readout for the pivotal Phase 3 MOTION study and phase 1/2 study of vimseltinib, each in TGCT patients; updated data from the dose escalation phase and initial data from the combination dose escalation cohorts of the Phase 1 study of DCC-3116, plans to initiate one or more combination cohorts in the Phase 1/2 study of DCC-3116, plans to initiate a new dose escalation combination evaluating DCC-3116 in combination with encorafenib and cetuximab in patients with colorectal cancer, plans to present additional preclinical data for DCC-3116; submitting an IND for DCC-3084, presenting preclinical data for DCC-3084; nominating a development candidate from our proprietary discovery engine of novel switch control inhibitors; clinical studies including status, progress and results, timing for clinical data readouts, planning efforts for future clinical studies, NDA/MAA (and equivalent) filings and potential additional approvals, research and discovery efforts including the potential of our drug candidates, IND filings, regulatory designations and programs, timing and likelihood of success, plans and objectives of management for future operations, estimated patient populations, the market opportunity for our drug and drug candidates and business guidance, including discovery, clinical and regulatory milestones, cash guidance, expectation regarding our financial performance and business strategy, and the potential impact of the Inflation Reduction Act (the IRA), speak only at the time this presentation was prepared. Such statements are based upon the information available to us now and are subject to change. We will not necessarily inform you of such changes. These statements are not guarantees of future performance and are subject to certain risks, uncertainties and assumptions that are difficult to predict. Therefore, actual results could differ materially and adversely from those expressed in any forward-looking statements as a result of various factors, including, among others, the success of our commercialization efforts with respect to QINLOCK, including our launch in key European markets, our limited experience as a commercial company, our ability to obtain, or any delays in obtaining, required regulatory approvals for our drug and drug candidates, our reliance on sole source third-party suppliers, our exposure to criminal sanctions, civil penalties, contractual damages, reputational harm, and diminished profits and future earnings from our relationships with customers and third-party payors that are subject to applicable anti-kickback, fraud and abuse, and other healthcare laws and regulations, and health information privacy and security laws, our failure to obtain or maintain adequate coverage and reimbursement for new or current products, recently enacted and future legislation may increase the difficulty and cost for us to obtain marketing approval of and commercialize our drug candidates, the potential for QINLOCK or any current drug candidates, such as vimseltinib and DCC-3116, or future drug candidates, if successfully developed and approved, to cause undesirable side effects that limit the commercial profile or result in other significant negative consequences for approved products or delay or prevent further development or regulatory approval with respect to drug candidates or new indications, or cause regulatory authorities to require labeling statements, such as boxed warnings, our competition may discover, develop, or commercialize products before or more successfully than we do, our estimates for market opportunities for our approved drug and drug candidates, market acceptance by physicians, patients, third-party payors, and others in the medical community of QINLOCK, and of any future approved drugs, such as vimseltinib or DCC-3116, if approved, our failure to obtain additional marketing approvals in other foreign jurisdictions, the potential for ongoing enforcement of post-marketing requirements for QINLOCK and any drug candidate for which we obtain marketing approval to subject us to substantial penalties, including withdrawal of QINLOCK or any future approved product from the market, if we fail to comply with all regulatory requirements, our assumptions in connection with the market opportunity for the INSIGHT trial patient population including the aggregate potential revenue opportunity for QINLOCK, our ability to complete, and the costs and timing of completing, the development and commercialization of our drug and drug candidates, our success in enrolling patients in clinical trials, including in our clinical trials of vimseltinib or DCC-3116, the potential for serious adverse events or unacceptable side effects to be identified during the development of our drug or drug candidates, our ability to obtain or, if granted, retain orphan drug exclusivity for our drug or drug candidates; the ongoing effects of the COVID-19 pandemic, our incurrence of significant operating losses since our inception and our expectation that we will incur continued losses for the foreseeable future and may never achieve or maintain profitability, our ability to raise capital when needed, our reliance on third parties to conduct our clinical trials and preclinical studies, our reliance on third parties for the manufacture of our drug candidates for preclinical testing and clinical trials, and for the manufacture of QINLOCK for commercialization and clinical trials, and our ability to enforce our intellectual property rights throughout the world. New risk factors and uncertainties may emerge from time to time, and it is not possible to predict all risk factors and uncertainties. There can be no assurance that the opportunity will meet your investment objectives, that you will receive a return of all or part of such investment. Investment results may vary significantly over any given time period. The appropriateness of a particular investment or strategy will depend on an investor's individual circumstances and objectives. Investors should independently evaluate specific investments. For further information regarding these risks, uncertainties and other factors, you should read the "Risk Factors" section of Deciphera's Quarterly Report on Form 10-Q for the quarter ended September 30, 2022 filed with the Securities and Exchange Commission (the "SEC"), and Deciphera's other SEC filings.

DECIPHERA

ONE MISSION, INSPIRED BY PATIENTS: DEFEAT CANCER™

Executing on our mission to discover, develop, and commercialize important new medicines to **improve the lives of people with cancer.**

Over $1 Billion	**Peak Worldwide Sales** Potential for QINLOCK and Vimseltinib
Two Phase 3 Programs	**MOTION Topline Data** and INSIGHT Initiation Planned for 2023
Potential First-in-Class Autophagy Program	**Multi-billion Dollar Opportunity** Targeting Autophagy
Proven Discovery Engine	**High-Value Research Pipeline** of Switch-control Kinase Inhibitors

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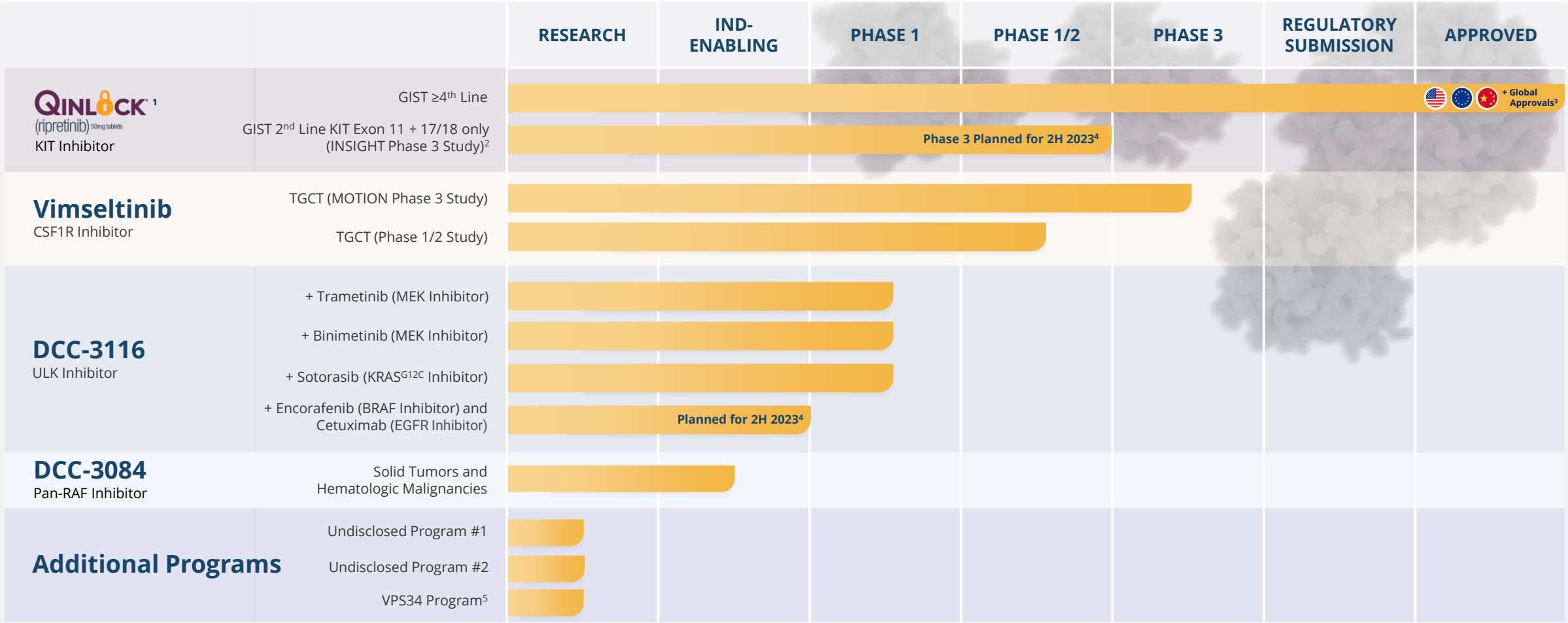
ROBUST PIPELINE OF SWITCH-CONTROL KINASE INHIBITORS



Notes: BRAF=proto-oncogene b-RAF; CSF1R=colony-stimulating factor 1 receptor; EGFR=epidermal growth factor receptor; GIST=gastrointestinal stromal tumor; KIT=KIT proto-oncogene receptor tyrosine kinase; MAPK=mitogen-activated protein kinase; RAF=rapidly accelerated fibrosarcoma; RAS=rat sarcoma gene; TGCT=tenosynovial giant cell tumor; ULK=unc-51-like autophagy-activating kinase; (1) Exclusive development and commercialization license with Zai Lab in Greater China for QINLOCK; (2) without an exon 9, 13, or 14 mutation; (3) QINLOCK is approved for 4th line GIST in the United States, Australia, Canada, China, European Union, Hong Kong, Switzerland, Taiwan, and the United Kingdom; (4) 2023 Corporate Goal; (5) Agreement with Sprint Bioscience for exclusive in-license worldwide rights to a research-stage program targeting VPS34.

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STRATEGIC PRIORITIES FOR 2023

QINLOCK®

- Initiate INSIGHT Phase 3 study in 2L KIT exon 11+17/18 only GIST patients
- Drive continued 4L adoption in US and expansion in key European markets

Vimseltinib

- Announce top-line results from the MOTION Phase 3 study
- Present longer-term follow up from Phase 1/2 study

DCC-3116

- Initiate one or more MEK/G12C expansion cohorts in the Phase 1/2 study
- Initiate new dose escalation combination with encorafenib/cetuximab

DCC-3084

- Submit IND to FDA

Proprietary Drug Discovery Platform

- Nominate a new development candidate

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Notes: 2L=second-line; 4L=fourth-line; FDA=U.S. Food and Drug Administration; G12C=single point mutation with a glycine-to-cysteine substitution at codon 12; GIST=gastrointestinal stromal tumor; IND=Investigational New Drug Application; KIT=KIT proto-oncogene receptor tyrosine kinase; MEK=mitogen-activated extracellular signal-regulated kinase.

QINLOCK® (ripretinib)

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FIRST APPROVED TKI DESIGNED SPECIFICALLY FOR GIST

HIGHLY SUCCESSFUL U.S. LAUNCH

Clear standard-of-care in the U.S. for 4L setting across all mutational profiles

CONTINUED GEOGRAPHIC EXPANSION IN KEY EUROPEAN MARKETS

Strong momentum driven by launch in Germany and the post-approval paid-access program in France

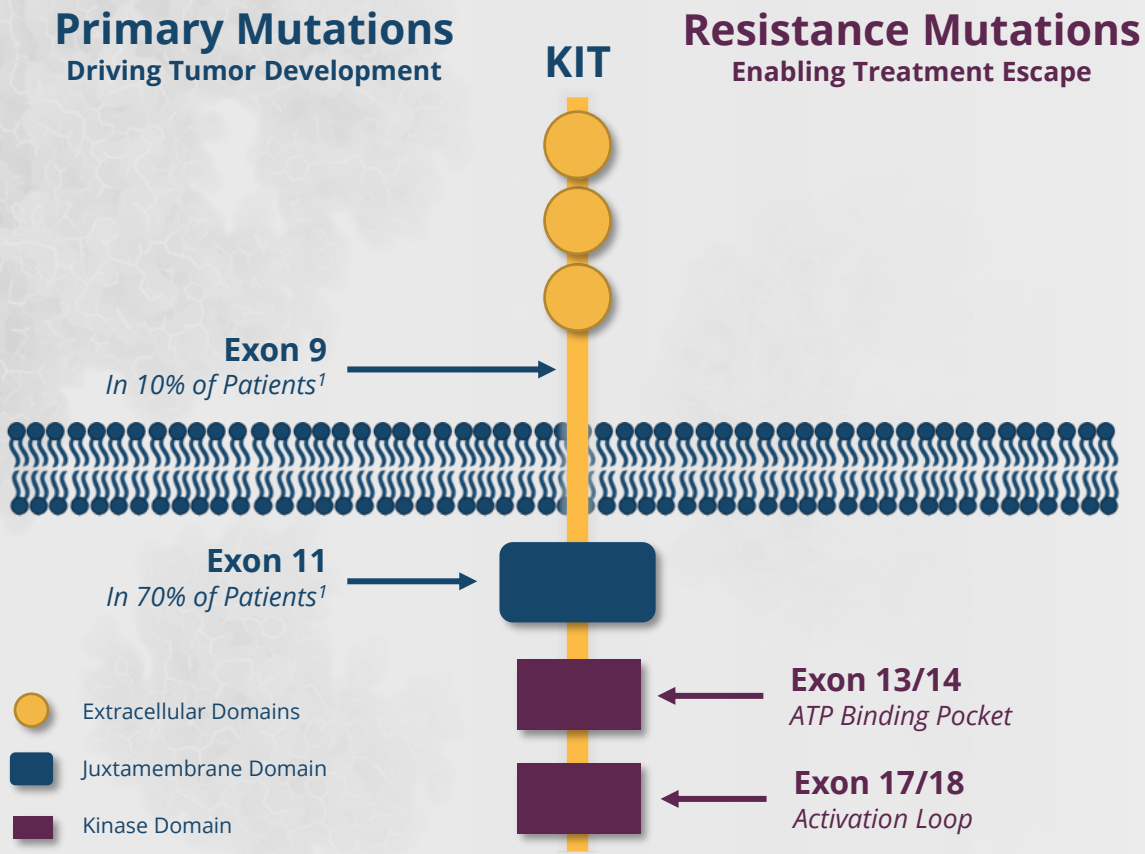
NEW PIVOTAL PHASE 3 INSIGHT STUDY PLANNED

Study supported by compelling activity seen in ctDNA analysis in 2L GIST patients with mutations in KIT exon 11+17/18 only

Notes: Full prescribing information is available at www.QINLOCK.com; 2L=second-line; 4L=fourth-line; ctDNA=circulating tumor deoxyribonucleic acid; GIST=gastrointestinal stromal tumor; KIT=KIT proto-oncogene receptor tyrosine kinase; TKI=Tyrosine kinase inhibitor;

PROGRESSION DRIVEN BY SECONDARY RESISTANCE MUTATIONS IN KIT

KIT-DRIVEN MUTATIONS



- Early disease is driven by primary mutations in KIT exons 11 or 9
- Imatinib-resistant disease is driven by secondary mutations in KIT exons 17/18 and/or exons 13/14

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Notes: ATP=Adenosine Triphosphate; KIT=KIT proto-oncogene receptor tyrosine kinase; (1) Oppelt et al. J Gastrointest Oncol 2017;8(3):466-473.

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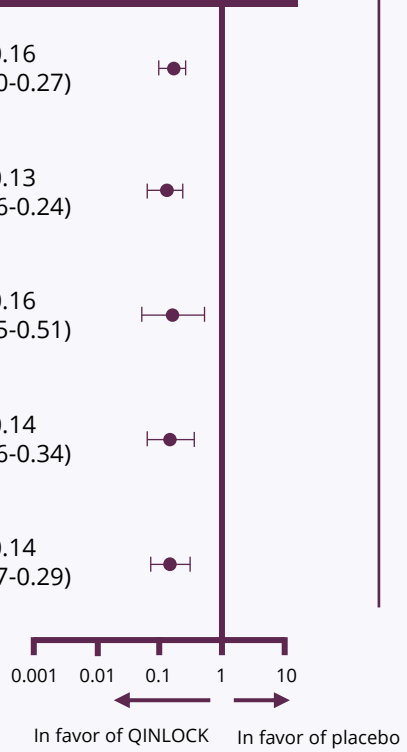
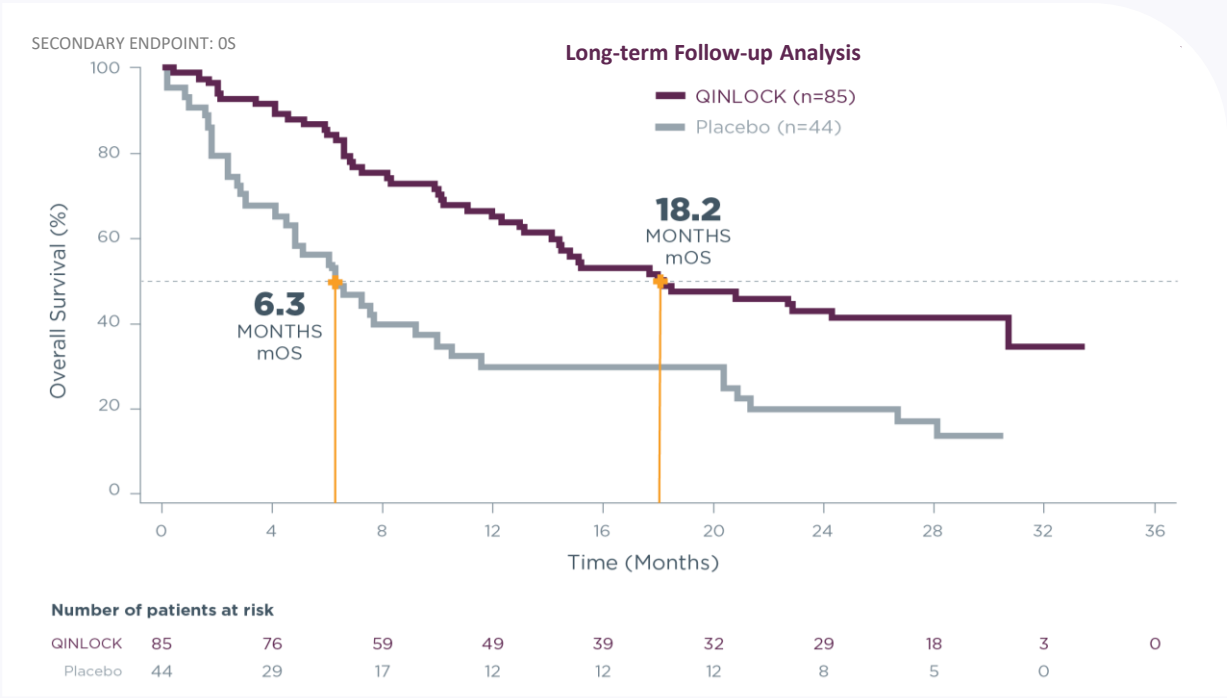
INVICTUS (4L+): QINLOCK SHOWED BENEFIT IN ALL MUTATION SUBGROUPS

Progression-Free Survival (INVICTUS 4L+)[3]

Mutation Subgroup	QINLOCK 150 mg QD (N)	Placebo (N)	Hazard Ratio (95% CI)
All Patients	85	44	0.16 (0.10-0.27)
Any KIT exon 11	52	34	0.13 (0.06-0.24)
Any KIT exon 9	16	7	0.16 (0.05-0.51)
Any KIT exon 13	27	16	0.14 (0.06-0.34)
Any KIT exon 17	44	27	0.14 (0.07-0.29)



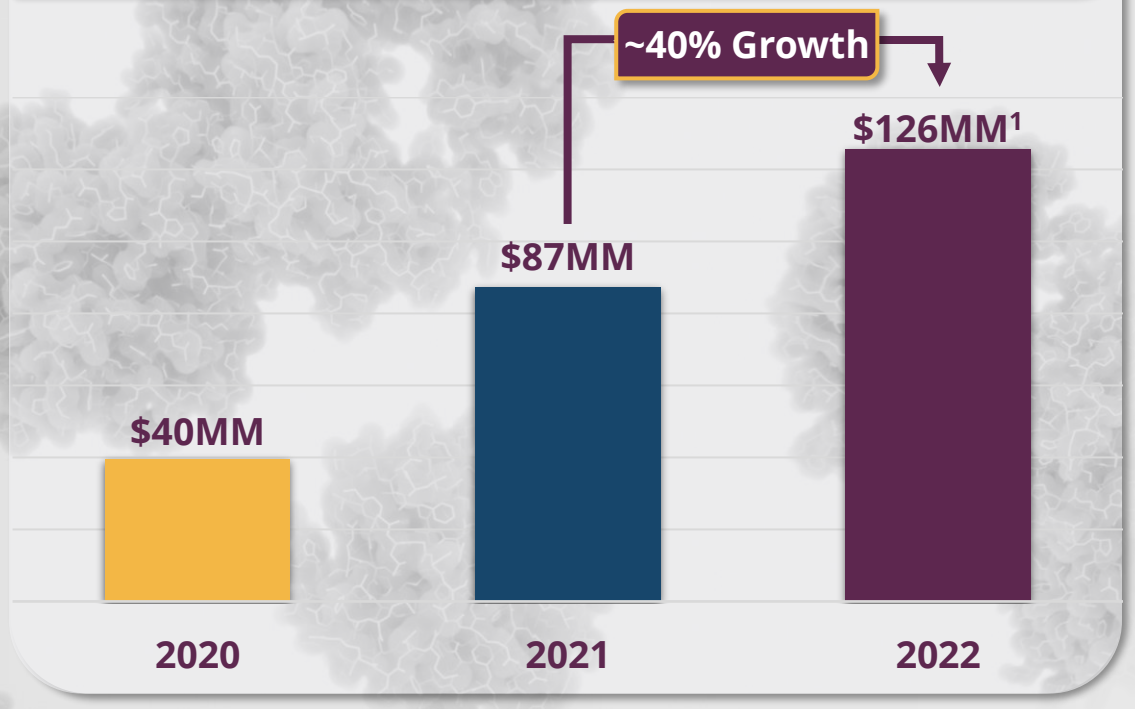
Kaplan-Meier Plots of Overall Survival (INVICTUS 4L+)[1,2]



Notes: 4L=fourth-line; CI=confidence interval; HR=hazard ratio; mOS=median overall survival; OS=overall survival; PFS=progression-free survival; QD=daily; (1) Updated data on the INVICTUS Study presented at the ESMO Congress 2021, the long-term follow-up analysis was conducted approximately 19 months from the data cutoff date in the primary analysis and was not powered to show statistical significance; (2) QINLOCK OS in the primary analysis was 15.1 months vs 6.6 months (HR = 0.36 [95% CI, 0.21 – 0.62], nominal p value 0.0004); (3) Bauer et al. Clin Cancer Res. 2021;27(23):6333–6342.

SUCCESSFUL LAUNCH OF QINLOCK AROUND THE WORLD

QINLOCK Global Product Revenue



4Q 2022 Summary[1]

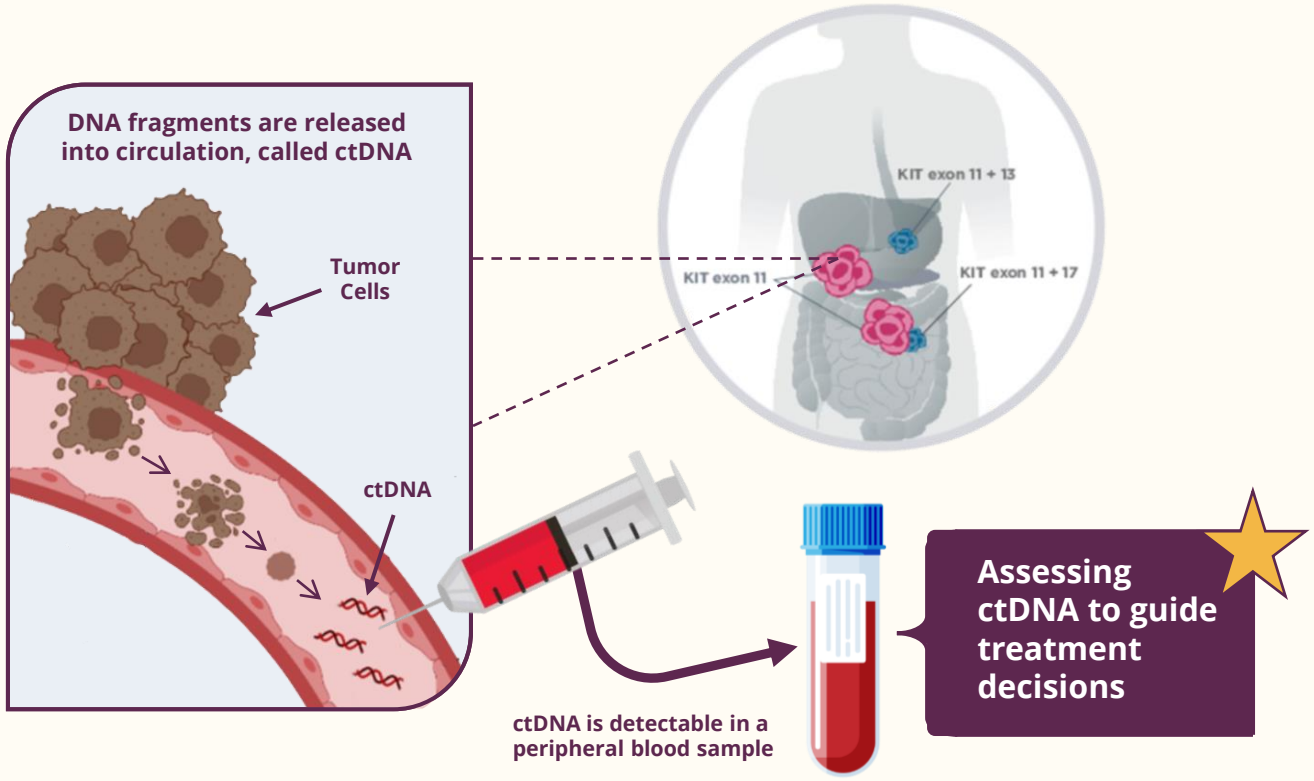
- Total revenue of approximately **$36MM** including:
  - QINLOCK product revenue: **~$33MM**
    - U.S. net product sales of approximately **$26MM**
    - International net product sales of approximately **$7MM**[2]
  - Collaboration revenue: **~$3MM**

Potential Key 2023 Growth Drivers

- U.S. demand volume driven by expected gradual growth of average duration of therapy
- Continued geographic expansion in key European markets following pricing and reimbursement negotiations

Notes: Full prescribing information is available at www.QINLOCK.com; (1) Financial information presented for the quarter and year ended December 31, 2022 are preliminary and are subject to completion of financial closing procedures. As a result, these amounts may differ materially from the amounts that will be reflected in the Company's consolidated financial statements for the year ended December 31, 2022; (2) includes a one-time reserve for QINLOCK product sales in Germany due to a change in German law effective retroactively as of November 2022 shortening the free pricing period to six months from twelve months.

PRACTICE CHANGING POTENTIAL WITH ctDNA IN GIST



- ctDNA is rapidly being adopted in oncology to identify patients harboring sensitive mutations and to treat patients with precision medicines
- Tissue biopsies may not capture the full clonal heterogeneity of GIST
- ctDNA was collected at baseline in the INTRIGUE study as an exploratory analysis

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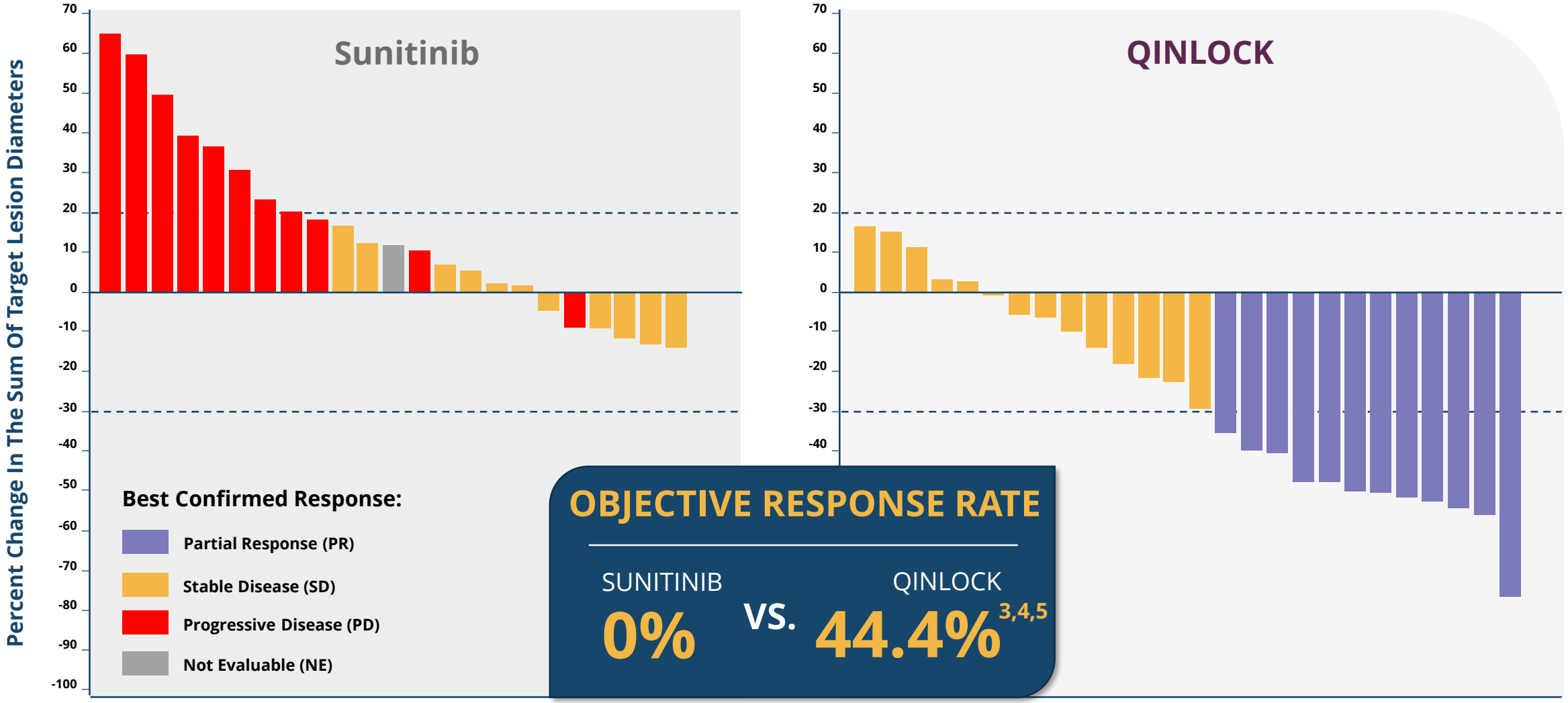
Notes: ctDNA=circulating tumor deoxyribonucleic acid; DNA=deoxyribonucleic acid; GIST=gastrointestinal stromal tumor; KIT=KIT proto-oncogene receptor tyrosine kinase.

IMPRESSIVE ORR FOR QINLOCK IN KIT EXON 11+17/18 ONLY PATIENTS[1,2]

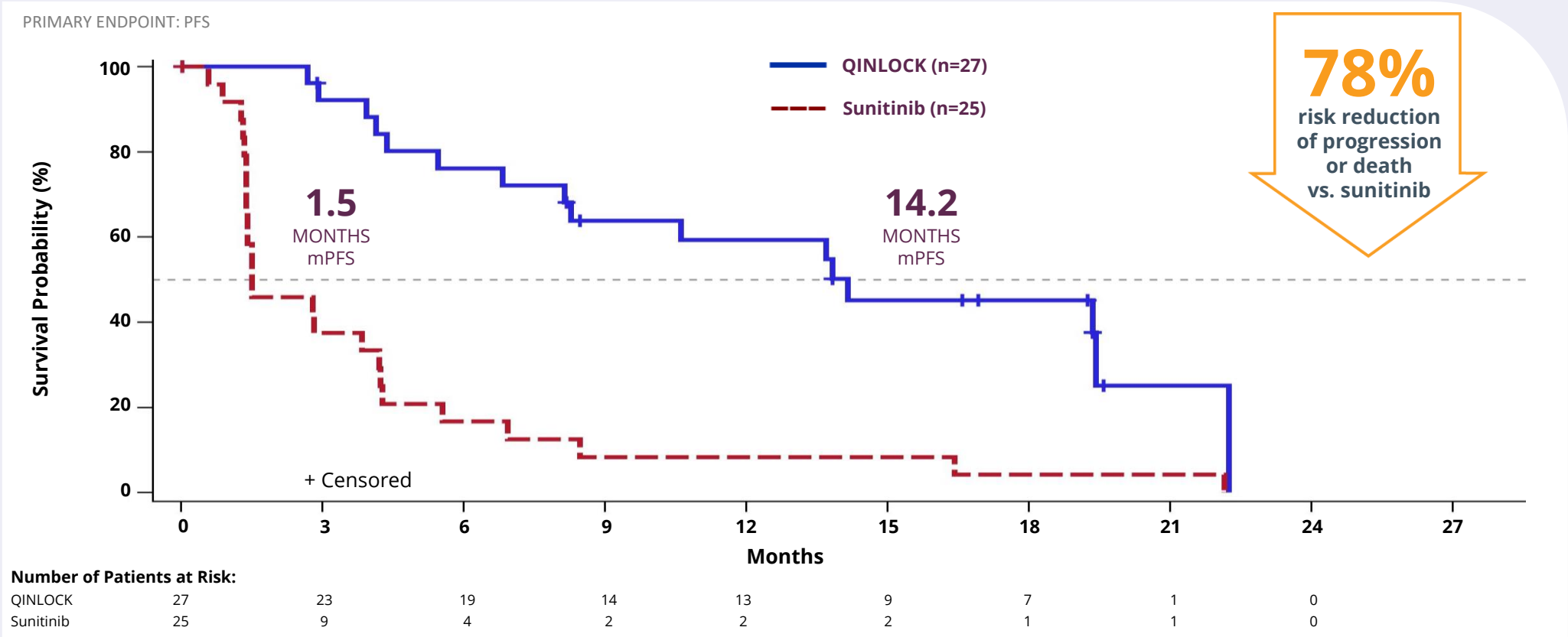


Notes: Full prescribing information is available at www.QINLOCK.com ; Deciphera Data on File; 2L=second-line; (1) data cut off date of September 1, 2021; (2) for 2 patients in the sunitinib arm and 1 patient in the ripretinib arm, no postbaseline disease assessment was available; (3) ORR was confirmed with follow-up imaging; (4) determined using modified Response Evaluation Criteria in Solid Tumors (RECIST) 1.1 criteria; (5) response difference=44.4%, 95% CI (23.0, 62.7), nominal p value 0.0001.

PFS STRONGLY FAVORS QINLOCK IN KIT EXON 11+17/18 ONLY PATIENTS[1]

Progression-Free Survival

KIT exon 11+17/18 only



(median PFS of 14.2 months vs. 1.5 months; HR=0.22, 95% CI [0.11-0.44], nominal p value <0.0001)

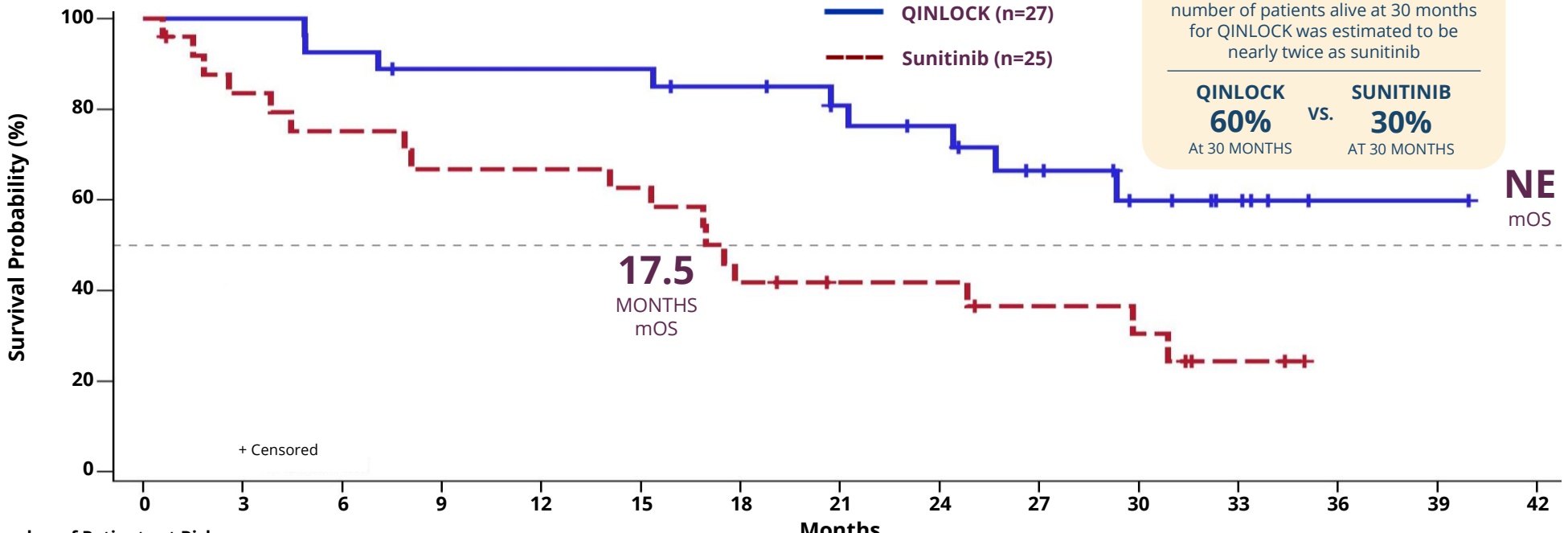
Notes: Full prescribing information is available at www.QINLOCK.com ; Deciphera Data on File; 2L=second-line; HR=hazard ratio; KIT=KIT proto-oncogene receptor tyrosine kinase; mPFS=median progression-free survival; PFS=progression-free survival; (1) data cut off date of September 1, 2021.

SUBSTANTIAL OS FOR QINLOCK IN KIT EXON 11+17/18 ONLY PATIENTS[1]

Overall Survival Analysis

KIT exon 11+17/18 only

SECONDARY ENDPOINT: OS



LANDMARK ANALYSIS

number of patients alive at 30 months for QINLOCK was estimated to be nearly twice as sunitinib

QINLOCK	VS.	SUNITINIB
60%		30%
At 30 MONTHS		AT 30 MONTHS

(median OS of NE months vs. 17.5 months; HR=0.34, 95% CI [0.15-0.76], nominal p value 0.0061)

Notes: Full prescribing information is available at www.QINLOCK.com; Deciphera Data on File; 2L=second-line; HR=hazard ratio; KIT=KIT proto-oncogene receptor tyrosine kinase; NE=not estimable; OS=overall survival; (1) the data cut off date for the second interim analysis for overall survival was September 1, 2022.

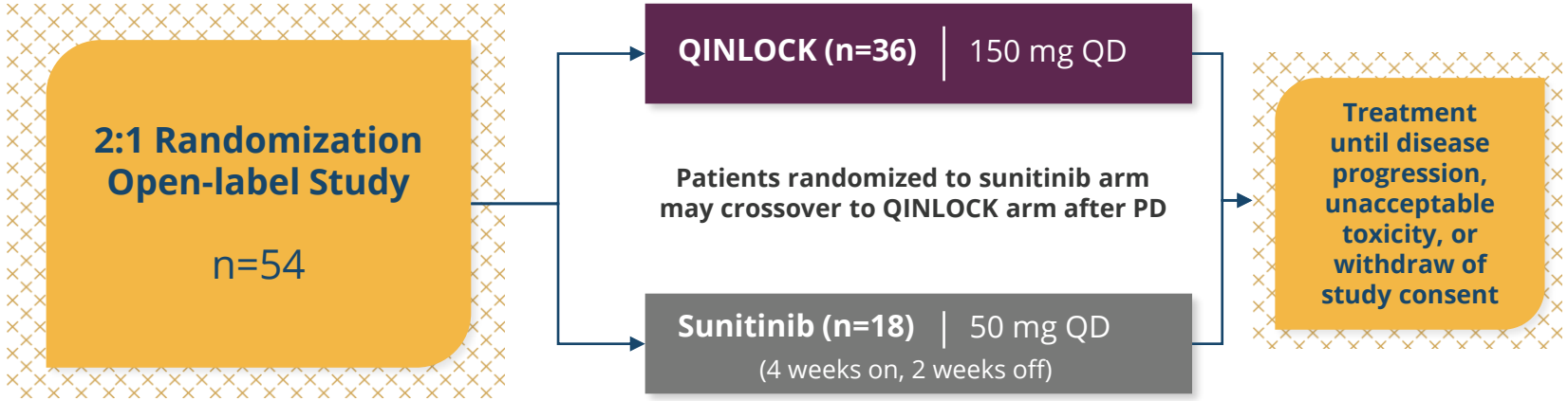
INSIGHT PIVOTAL PHASE 3 STUDY EXPECTED TO INITIATE IN 2H 2023

INCLUSION CRITERIA

Patients with GIST previously treated with imatinib

- 1 prior line of imatinib
- KIT exon 11+ (17 and/or 18) via ctDNA at prescreening
  - KIT exon 9, 13, and/or 14 are excluded
  - Other co-mutations are allowed
- Measurable disease per mRECIST
- ECOG performance status ≤ 2

PLANNED PHASE 3, RANDOMIZED, MULTICENTER, OPEN-LABEL STUDY



Primary Endpoint
- PFS by IRR using mRECIST

Key Secondary Endpoints
- ORR by IRR using mRECIST
- OS

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Notes: 2L=second-line; ctDNA=circulating tumor deoxyribonucleic acid; ECOG=Eastern Cooperative Oncology Group; GIST=gastrointestinal stromal tumor; IRR= individual research result; KIT=KIT proto-oncogene receptor tyrosine kinase; mRECIST=modified Response Evaluation Criteria in Solid Tumors; ORR=objective response rate; OS=overall survival; PD=progressive disease ; PFS=progression-free survival; QD=daily.

OPPORTUNITY TO ADVANCE THE STANDARD OF CARE ACROSS MULTIPLE LINES OF THERAPY

4L

Established 4L Standard-of-Care Across All Mutations

QINLOCK® (ripretinib) 50 mg tablets

6.3 mo. mPFS (HR=0.16)[1]
11.8% ORR
mOS 18.2 mo. (HR=0.41)

~90% of prescribers cite QINLOCK as the 4L standard-of-care across all mutations[2]

- ✓ KIT exon 11
- ✓ KIT exon 9
- ✓ PDGFRA
- ✓ Wild Type
- ✓ Unknown mutational status

+

2L[3]

Potential to Optimize 2L Therapy Based on Secondary Mutations

QINLOCK® (ripretinib) 50 mg tablets

For exon 11+17/18 only patients

ctDNA Analysis

14.2 mo. mPFS (HR=0.22)[4]
44.4% ORR
mOS not estimable (HR=0.34)

Sunitinib

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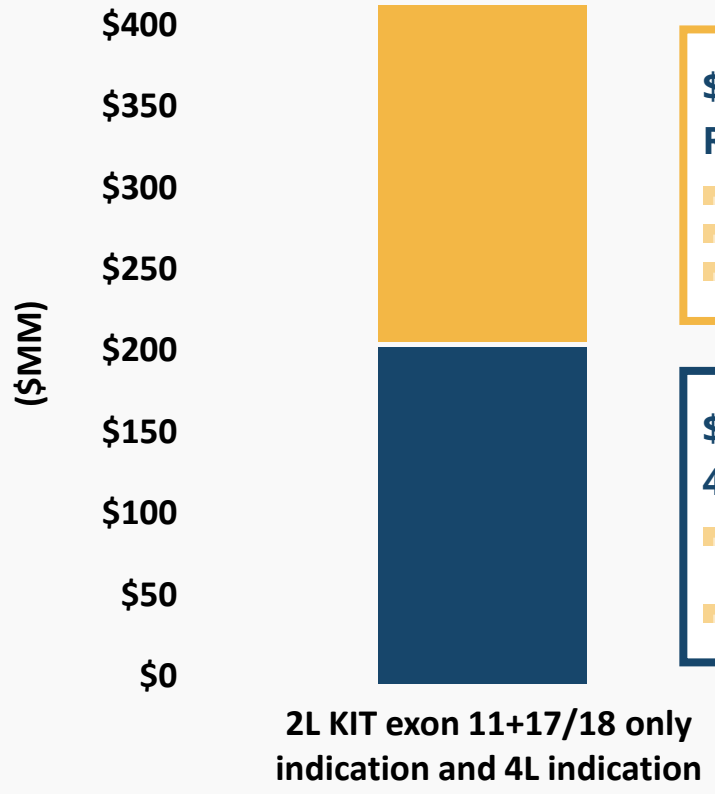
Notes: 2L=second-line; 4L=fourth-line; HR=hazard ratio; mOS=median overall survival; mPFS=median progression-free survival; (1) Updated data on the INVICTUS Study presented at the ESMO Congress 2021; Full prescribing information is available at www.QINLOCK.com; Overall survival data includes all time periods, including dose escalation. Placebo arm includes patients taking placebo who, following progression, were crossed-over to QINLOCK treatment; The long-term follow-up analysis was conducted approximately 19 months from the data cutoff date in the primary analysis and was not powered to show statistical significance; (2) Deciphera ATU survey, 1Q 2022; approximate % of GIST Treaters agreeing to strongly agreeing that QINLOCK is the standard of care for 4L+ advGIST patients; % of GIST treaters stating their likelihood to prescribe QINLOCK across GIST mutational types.; (3) Use of QINLOCK in the 2nd line setting for patients with GIST with exon 11 + 17/18 only mutations is subject to positive INSIGHT phase 3 study and approval by regulatory authorities; (4) Deciphera Data on File. Data cut off date of September 1, 2021.

A 2L KIT EXON 11+17/18 ONLY INDICATION ESTIMATED TO DOUBLE QINLOCK U.S. PEAK REVENUE POTENTIAL[1]

QINLOCK Estimated U.S. Peak Revenue ($MM)[1]



$175-$200MM *Incremental* Peak Revenue for 2L Indication

- New QINLOCK-treated patients in 2L
- More months of therapy per patient
- Net price growth

$175-$200MM Peak Revenue for 4L Indication

- Modest volume growth as average DOT matures
- Net price growth

$350-$400MM Total U.S. Peak Revenue[1]

Notes: Full prescribing information is available at www.QINLOCK.com; 2L=Second-Line; 4L=Fourth-Line; DOT=Duration of Therapy; (1) These estimates are based on management's current expectations and assumptions, including, without limitation, reasonable expectations of the potential impact of the Inflation Reduction Act (the full impact of which is still under review) and an assumption of a second-line approval in GIST patients with mutations in KIT exon 11 and 17 or 18 only; estimates are subject to change and are inherently uncertain.

QINLOCK® | EXPLORATORY ANALYSIS OF INTRIGUE STUDY IN 2L GIST

COMPELLING EFFICACY RESULTS IN KIT EXON 11+17/18 ONLY PATIENTS

OBJECTIVE RESPONSE RATE[1]

QINLOCK		SUNITINIB
44.4%[2]	vs.	0%

MEDIAN PROGRESSION-FREE SURVIVAL[1,3]

QINLOCK		SUNITINIB
14.2 MONTHS	vs.	1.5 MONTHS

MEDIAN OVERALL SURVIVAL[4]

QINLOCK		SUNITINIB
Not Estimable	vs.	17.5 MONTHS

★ *ADDITIONAL DATA TO BE PRESENTED AT UPCOMING ASCO PLENARY SESSION ON JANUARY 24, 2023*

INSIGHT PIVOTAL PHASE 3 STUDY
EXPECTED TO INITIATE IN 2H 2023

QINLOCK PEAK U.S. REVENUE POTENTIAL
ESTIMATED TO DOUBLE WITH
2L KIT EXON 11+17/18 ONLY INDICATION[5]

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Notes: Full prescribing information is available at www.QINLOCK.com ; Deciphera Data on File; 2L=second-line; KIT=KIT proto-oncogene receptor tyrosine kinase; ORR=objective response rate; OS=overall survival; PFS=progression-free survival; (1) data cut off date of September 1, 2021; (2) ORR was confirmed with follow-up imaging; (3) determined using modified Response Evaluation Criteria in Solid Tumors (RECIST) 1.1 criteria; (4) the data cut off date for the second interim analysis for overall survival was September 1, 2022; (5) These estimates are based on management's current expectations and assumptions, including, without limitation, reasonable expectations of the potential impact of the IRA (the full impact of which is still under review) and an assumption of a second-line approval in GIST patients with mutations in KIT exon 11 and 17 or 18 only; estimates are subject to change and are inherently uncertain.

VIMSELTINIB

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TOP-LINE RESULTS FROM MOTION PHASE 3 STUDY EXPECTED IN 4Q 2023

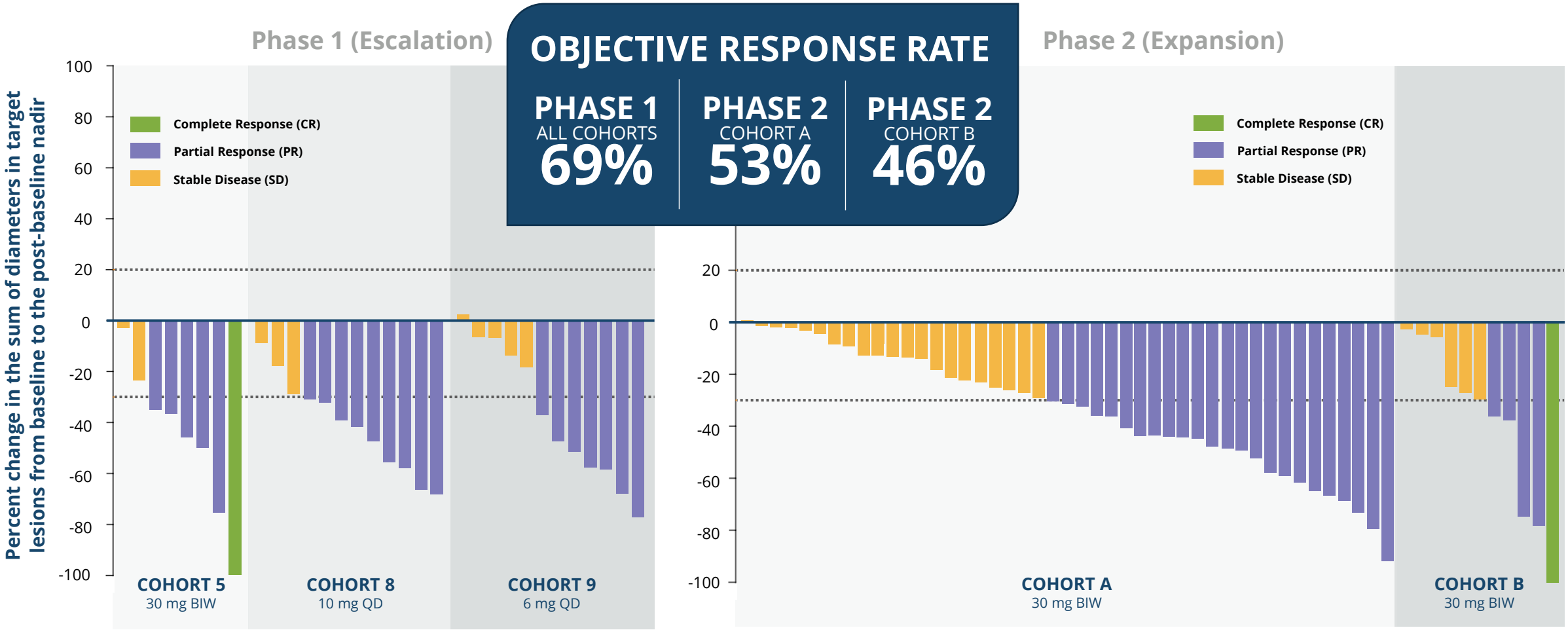
- **Vimseltinib** is an oral, switch-control TKI specifically designed to selectively and potently inhibit CSF1R
- Positive Phase 1/2 data in Tenosynovial Giant Cell Tumor (TCGT) strongly supports ongoing MOTION Phase 3 study[1]
- +$850MM TGCT market in U.S. with 90% of prescribers already targeted with GIST franchise[2]

Expected 2023 Milestones[3]

1H 2023	Complete enrollment in the MOTION Phase 3 study
4Q 2023	Announce top-line results from MOTION Phase 3 study
2H 2023	Present updated Phase 1/2 data in TGCT patients

Notes: CSF1R=colony-stimulating factor 1 receptor; GIST=gastrointestinal stromal tumor; KOL=key opinion leader; TGCT=tenosynovial giant cell tumor; TKI=tyrosine kinase inhibitor; (1) Data presented at the ESMO Congress 2022; (2) Based on HCP list match between Symphony Health IDV Claims; Analysis Period: 7/1/2020 – 6/1//2021 and internal Deciphera Targeted GIST HCP prescribers; (3) 2023 Corporate Goal.

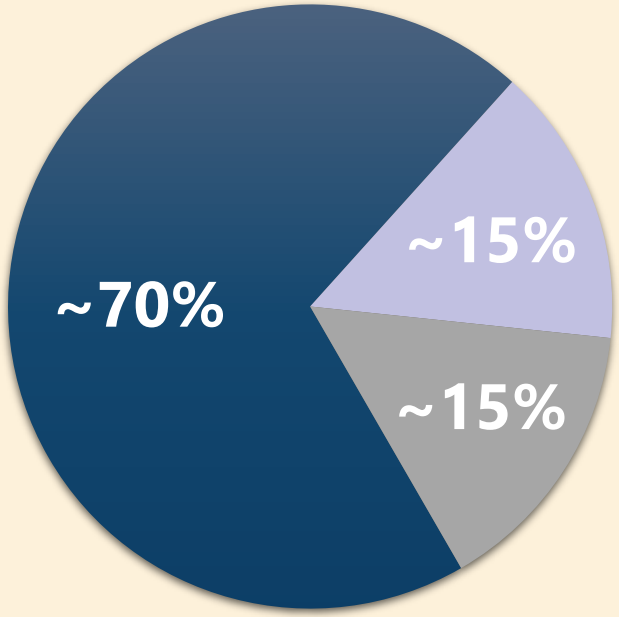
ENCOURAGING ANTI-TUMOR ACTIVITY REGARDLESS OF PRIOR CSF1R THERAPY



Notes: Data presented at the ESMO Congress 2022; results are reported for patients with TGCT with a data cutoff of May 6, 2022; ORR=objective response rate.

TGCT MARKET LANDSCAPE OVERVIEW

U.S. TGCT Market Landscape: Imatinib is the Leading TKI Prescribed[1]



Imatinib **Pexidartinib** **Other TKI** (sunitinib or nilotinib)

Avg. Duration of Therapy
Imatinib: ~18 months, Pexidartinib: ~8 months[2]

Existing Product Profiles and Unmet Need

Imatinib

- Not FDA or EMA approved for TGCT
- Weak CSF1R inhibitor
- Guideline listed based on retrospective data showing 19% ORR[3,4]

Pexidartinib

- The only FDA approved agent for TGCT, not approved by EMA
- Inhibitor of CSF1R, KIT, FLT3, and PDGFRA/B
- Boxed warning for hepatoxicity, REMS, intensive liver monitoring

High Unmet Need

- Lifelong condition with significant morbidity
- HCPs and patients cite desire for effective therapy without having to sacrifice safety and tolerability[5]

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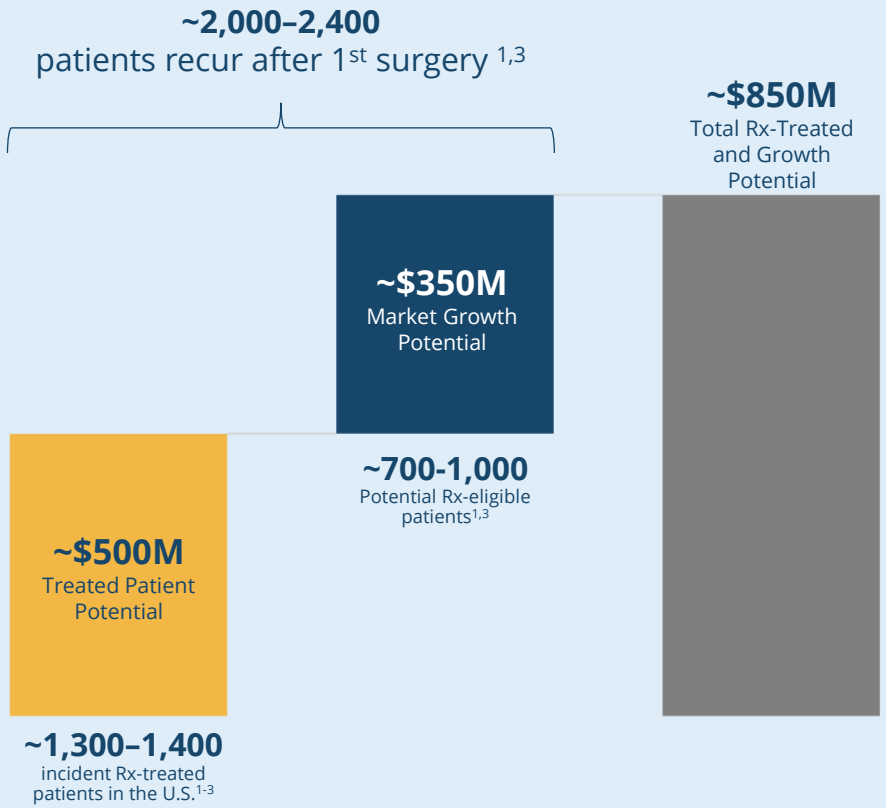
Notes: TGCT=tenosynovial giant cell tumor; TKI = Tyrosine Kinase Inhibitor. (1) Symphony Health IDV Claims; Analysis Period: 7/1/2020 – 6/1//2021; (2) Symphony Health IDV Claims; Analysis Period: 1/1/2008 – 2/1/2021; Patient Qualification: 1/1/2016 – 12/31/2020, Symphony Health IDV Claims; Analysis Period: Q3 2019 – Q32022 and Symphony Health Metys database (estimates calculated from pexidartinib data 2019 – 2022); (3) NCCN Guidelines Version 2.2022 Soft Tissue Sarcoma; (4) Cassier et al Cancer 2012:119:1649-1655; (5) Internal Deciphera market research.

SIGNIFICANT OPPORTUNITY TO BENEFIT PATIENTS WITH TGCT GLOBALLY

U.S. Total Addressable Market Based on Incident Population



+

U.S. Prevalent Population

~8,000
estimated prevalent Rx-eligible patients in the U.S.[1-3]

+

E.U. Opportunity

- Comparable incidence and recurrence rates in Europe[1,2]
- No approved therapies for TGCT

Notes: TGCT=tenosynovial giant cell tumor; (1) Mastboom et al. Acta Orthopaedica. 2017;88(6):688-694; (2) Internal Deciphera estimates based on market research and secondary data; estimates are inherently uncertain; (3) Ehrenstein. J Rheumatol. 2017;44(10):1476-1483. Total Addressable Market calculated by estimated patient incidence x 18 months duration x current pexidartinib WAC price and assumes opportunity at steady state.

A MULTICENTER, RANDOMIZED, PLACEBO-CONTROLLED, DOUBLE-BLIND STUDY

Top-line Results Expected in 4Q 2023

International Study with ~40 Sites

DOUBLE-BLIND PERIOD

Part 1: Eligible study participants will be assigned to receive either vimseltinib or matching placebo for 24 weeks.

Vimseltinib (n = 80)
30 mg BIW (24 weeks)

2:1 Randomization
(n=120)

Placebo (n = 40)
(24 weeks)

OPEN-LABEL PERIOD

Part 2: A long-term treatment phase in which all participants receive open-label vimseltinib.

Open-Label Study

Patients have the option to continue or cross over to vimseltinib 30 mg BIW

MOTION Phase 3 Study

will assess the efficacy and safety of vimseltinib for the treatment of patients with TGCT not amenable to surgery

Primary Endpoint

- Objective response rate (ORR) at week 25

Key Secondary Endpoints

- ORR per tumor volume score
- Range of motion (ROM)
- Patient-reported outcomes

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Notes: BIW=twice weekly; TGCT=tenosynovial giant cell tumor.

DCC-3116

HIGHLY SELECTIVE SWITCH-CONTROL INHIBITOR OF THE ULK KINASE

- **DCC-3116** is a potential first-in-class small molecule designed to inhibit cancer autophagy by targeting the ULK kinase
- The combination dose-escalation portion of the **DCC-3116** Phase 1 study is underway
- Pfizer supply agreement to support a new dose escalation combination evaluating **DCC-3116** + encorafenib/cetuximab in CRC

Expected 2023 Milestones[1]

Present preclinical data on new combinations

1H 2023

Present updated Phase 1 single agent and initial combination dose escalation data

2H 2023

Initiate escalation cohort for encorafenib/cetuximab

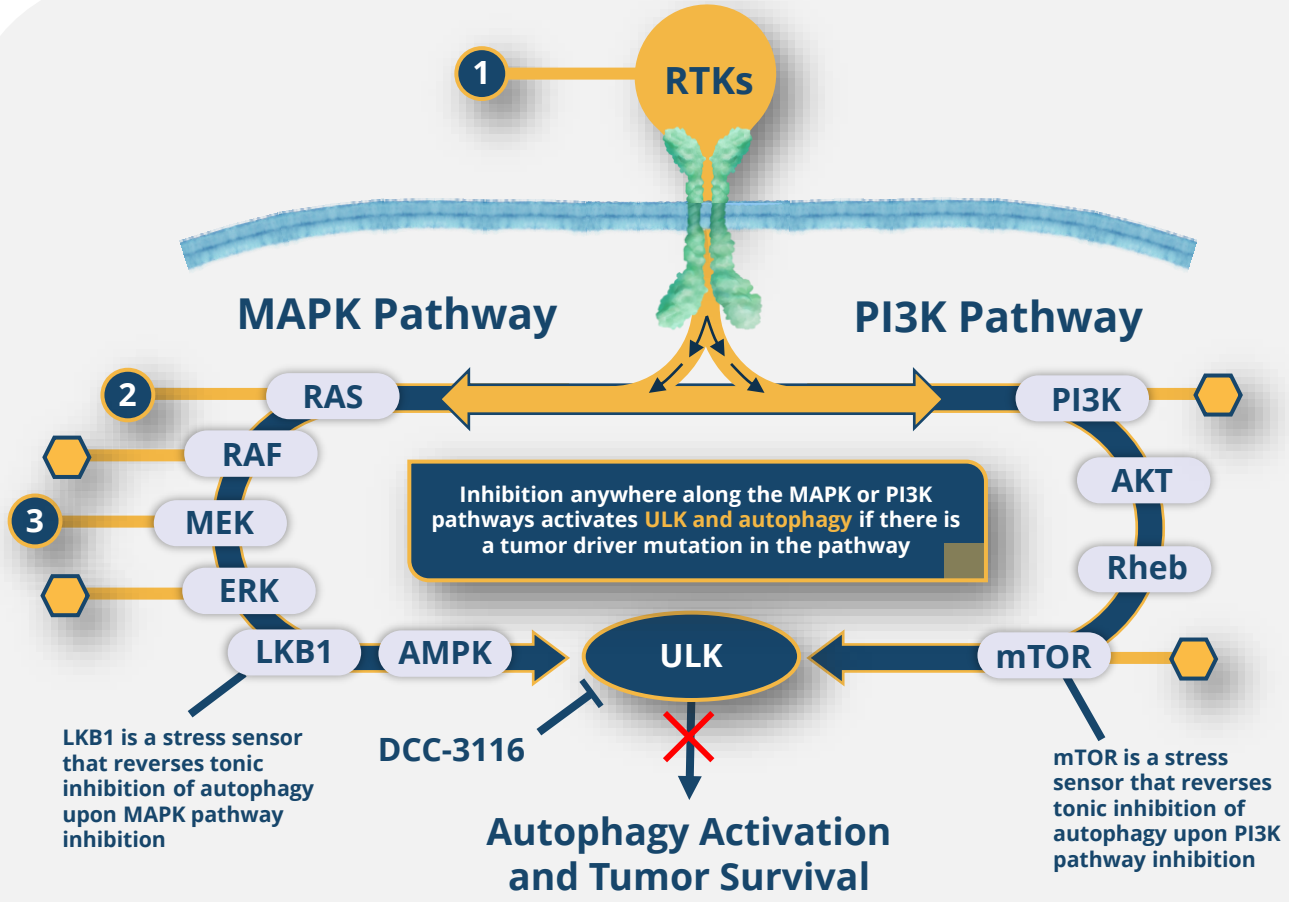
2H 2023

Initiate MEK/G12C expansion cohort(s)

2H 2023

Notes: CRC=colorectal cancer; G12C=single point mutation with a glycine-to-cysteine substitution at codon 12; MEK=mitogen-activated extracellular signal-regulated kinase; ULK=unc-51-like kinase; (1) 2023 Corporate Goal.

CENTRAL ROLE FOR AUTOPHAGY IN THE RAS/MAPK AND PI3K PATHWAYS



GROWING PRECLINICAL VALIDATION FOR ROLE OF AUTOPHAGY IN CANCER

1 **DCC-3116 In Combination with RTK Inhibition**

- DCC-3116 exhibits synergy with osimertinib and afatinib resulting in tumor regression in EGFR-mutant NSCLC *in vivo*

2 **DCC-3116 In Combination with KRAS^{G12C} Inhibition**

- DCC-3116 exhibits synergy with sotorasib and adagrasib resulting in tumor regression in KRAS^{G12C}-mutant NSCLC *in vivo*

3 **DCC-3116 In Combination with MEK Inhibition**

- DCC-3116 exhibits synergy in combination with trametinib and inhibited pancreatic, lung, and melanoma xenograft tumor growth

Other targets where therapeutic intervention activates ULK and autophagy

Notes: AKT=protein kinase B; AMPK=AMP-activated protein kinase; EGFR=epidermal growth factor receptor; ERK=extracellular signal-regulated kinase; G12C=single point mutation with a glycine-to-cysteine substitution at codon 12; KRAS=Kirsten rat sarcoma virus; LKB1=liver kinase B1; MAPK=mitogen-activated protein kinase; MEK=mitogen-activated extracellular signal-regulated kinase; mTOR=mammalian target of rapamycin; NSCLC=non–small-cell lung cancer; PI3K=phosphatidylinositol-3 kinase; RAF=rapidly accelerated fibrosarcoma; RAS=rat sarcoma gene; Rheb=ras homolog enriched in brain; RTK=receptor tyrosine kinase; ULK=unc-51-like kinase.

SUMMARY OF INITIAL SINGLE AGENT PHASE 1 STUDY RESULTS

- DCC-3116 was well tolerated at doses from 50 to 300 mg BID, which achieved exposure and ULK1/2 inhibition associated with anticancer efficacy with MEK inhibitors in preclinical studies
- Treatment-related TEAEs were mainly Grade 1/2, except for related asymptomatic and reversible Grade 3 ALT increases

DCC-3116 EXPOSURE APPEARED TO INCREASE DOSE PROPORTIONALLY ACROSS 50 – 300 mg BID

All DOSES ACHIEVED EXPOSURE AND ULK1/2 INHIBITION ASSOCIATED WITH EFFICACY IN PRECLINICAL STUDIES

NO DLTs OR TREATMENT-RELATED SAEs OBSERVED

MONOTHERAPY RESULTS DEMONSTRATED STABLE DISEASE AS BEST OVERALL RESPONSE

NOV '22 UPDATE

MAXIMUM TOLERATED DOSE NOT REACHED

50 mg BID SELECTED AS STARTING DOSE FOR COMBINATION DOSE ESCALATION

FIRST PATIENT TREATED IN COMBINATION DOSE ESCALATION

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Notes: Data presented at the ESMO Congress 2022; data cutoff: June 9, 2022; ALT=alanine aminotransferase; BID=twice daily; DLTs=dose-limiting toxicities; MEK=MAPK/ERK kinase; PD=pharmacodynamics; PK=pharmacokinetics; SAE=serious adverse event; TEAE=treatment-emergent adverse event; ULK=unc-51-like autophagy-activating kinase.

DECIPHERA'S PROPRIETARY DRUG DISCOVERY PLATFORM

DRIVING INNOVATION THROUGH OUR PROVEN DISCOVERY ENGINE

Fueled by our **proprietary drug discovery platform**, we intend to advance new drug candidates into clinical development to continue to fulfill our mission to defeat cancer

Expected 2023 Milestones

Nominate a new development candidate

1H 2023

Present data on the preclinical profile of DCC-3084

1H 2023

Present new preclinical data from undisclosed research programs

1H 2023

Submit IND to FDA for DCC-3084

2H 2023

Notes: FDA=U.S. Food and Drug Administration; IND=Investigational New Drug Application.

DECIPHERA

EXPECTED 2023 MILESTONES

QINLOCK®

- Present additional data from Phase 3 INTRIGUE ctDNA analysis at an ASCO Plenary Session **(January 24, 2023)**
- Initiate INSIGHT Phase 3 study in 2L KIT exon 11+17/18 only GIST patients **(2H 2023)**
- Continue geographic expansion with launches in key European markets **(2023)**

VIMSELTINIB

- Complete enrollment in the Phase 3 MOTION study **(1H 2023)**
- Announce top-line results from MOTION study **(4Q 2023)**
- Present updated Phase 1/2 data in TGCT patients **(2H 2023)**

DCC-3116

- Present updated Phase 1 single agent and initial combination dose escalation data **(2H 2023)**
- Initiate MEK/G12C expansion cohort(s); initiate escalation cohort for encorafenib/cetuximab **(2H 2023)**
- Present preclinical data on new combinations **(1H 2023)**

DCC-3084

- Submit IND to FDA **(2H 2023)**
- Present data on preclinical profile **(1H 2023)**

PROPRIETARY DRUG DISCOVERY PLATFORM

- Nominate a new development candidate **(1H 2023)**
- Present new preclinical data from research programs **(1H 2023)**

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Notes: 2L=second-line; ASCO=American Society of Clinical Oncology; ctDNA=circulating tumor deoxyribonucleic acid; FDA=U.S. Food and Drug Administration; G12C=single point mutation with a glycine-to-cysteine substitution at codon 12; GIST=gastrointestinal stromal tumor; IND=Investigational New Drug Application; MEK=mitogen-activated extracellular signal-regulated kinase; TGCT= tenosynovial giant cell tumor.

DECIPHERA

PRELIMINARY UNAUDITED FINANCIAL HIGHLIGHTS

As of December 31, 2022

Weighted-Average Shares Outstanding[1]

76.4MM

Weighted average shares includes outstanding common stock and common stock issuable upon exercise of prefunded warrants

Cash, Cash Equivalents & Marketable Securities

~$339MM

Cash Expected to Fund Operating Expenses and CapEx into 2025

Notes: Financial information presented for the quarter and year ended December 31, 2022 are preliminary and are subject to completion of financial closing procedures. As a result, these amounts may differ materially from the amounts that will be reflected in the Company's consolidated financial statements for the year ended December 31, 2022; The preliminary financial data included in this corporate presentation has been prepared by, and is the responsibility of, Deciphera's management. PricewaterhouseCoopers LLP has not audited, reviewed, examined, compiled, nor applied agreed-upon procedures with respect to the preliminary financial data. Accordingly, PricewaterhouseCoopers LLP does not express an opinion or any other form of assurance with respect thereto; (1) As of December 31, 2022, there were 67.6MM outstanding shares, 8.9MM prefunded warrants, and 8.3MM options outstanding.

THANK YOU