

Addressing Key Mechanisms of Tumor Drug Resistance *April 2019*

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Corporate Summary

Well established drug class with significant growth potential

Differentiated approach to kinase inhibition

Wholly-owned pipeline with three clinical stage assets

Kinase Inhibitors: 40+ FDA-approved Drugs but Significant Opportunities Remain

- Drug resistance mutations limit rate and duration of response
- Low potency and selectivity cause poor tolerability
- Approved drugs target less than 10% of the 500+ known human kinases

Proprietary Kinase Switch Control Inhibitor Platform

- Broad activity against disease-initiating and drug-resistant mutant kinases
- Kinase-selective and spectrum-selective profiles
- Drug discovery engine that fuels long-term growth

Strong Pipeline of Tumor-Targeted and Immunokinase Programs

- Ripretinib: Broad spectrum KIT and PDGFRα inhibitor in two Phase 3 studies
- Rebastinib: Highly potent and selective TIE2 inhibitor
- DCC-3014: Highly selective and potent CSF1R inhibitor

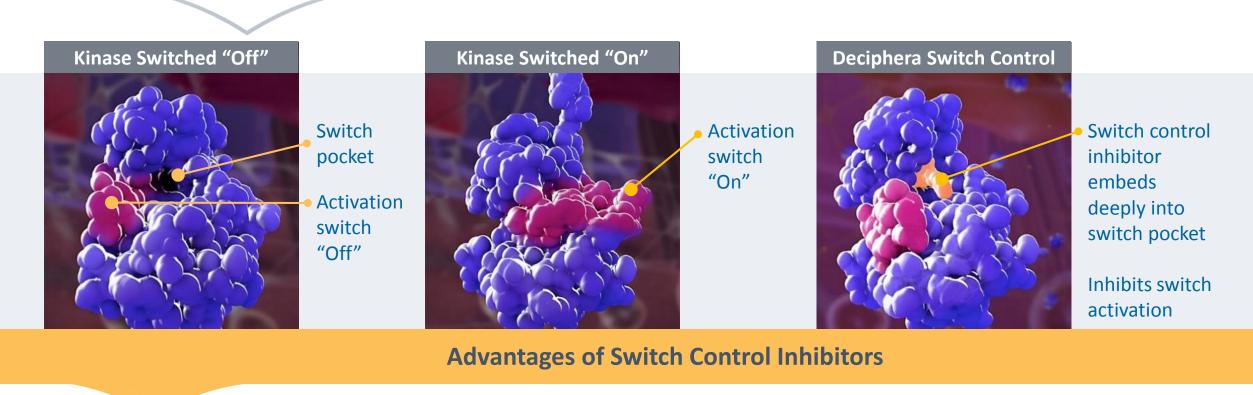


Strong Clinical Stage Oncology Pipeline of Novel Kinase Inhibitors

	Pre Clinical	Phase 1	Phase 1b/2	Phase 3	Global Rights
Ripretinib ⁽¹⁾ : Broad Spectrum Inhibitor of KIT & PDGFR α					
Gastrointestinal Stromal Tumors					
Systemic Mastocytosis					decīphera
Other Solid Tumors (includes Gliomas, NSCLC, & Sarcomas)					
Rebastinib: Selective Inhibitor of TIE2					
Solid Tumors in Combination with paclitaxel (includes breast, ovarian & endometrial cancers)					decīphera
Solid Tumors in Combination with carboplatin (includes mesothelioma, ovarian & breast cancers)					decipitera
DCC-3014: Selective Inhibitor of CSF1R					
Solid Tumors & Tenosynovial Giant Cell Tumors					decīphera
Additional Programs					
Cancer Metabolism (undisclosed kinase)					decīphera
Immunokinase (undisclosed kinase)					decīphera

decīphera™

Our Proprietary Kinase Switch Control Platform

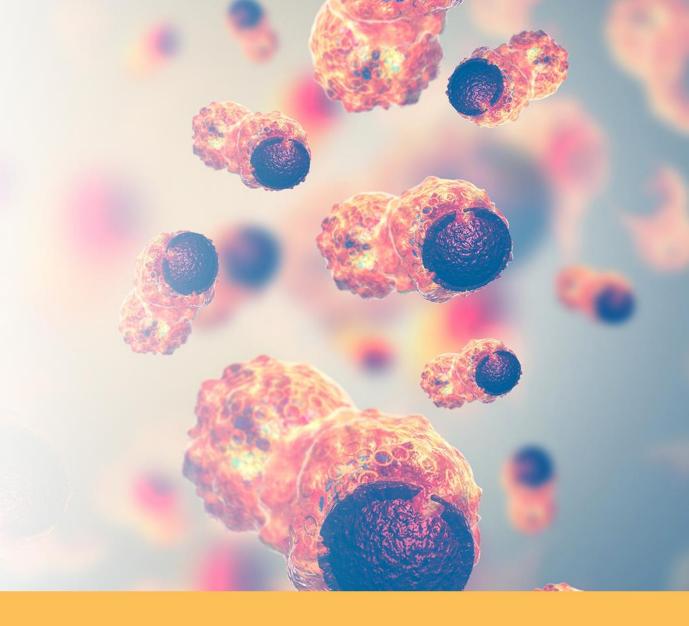


Tumor-Targeted Programs	Broader Activity Enhanced Durability	Inhibit wild-type and many or all mutant forms of targeted kinases Resilient to gain-of-function mutations and drug resistance
Immunokinase Programs	Engineered Profiles	Highly selective or target multiple kinases at desired potency
(Macrophage Checkpoints)	Superior Binding	More potent and more durable; resilient to ATP concentration





Ripretinib (DCC-2618): Broad Spectrum KIT & PDGFRα Inhibitor



Ripretinib (DCC-2618): A Potent, Broad Spectrum KIT and PDGFRα Inhibitor

Ripretinib Summary

Highly potent small molecule KIT and PDGFR α inhibitor

Designed to inhibit the full spectrum of known KIT and PDGFRα mutations

Fast-to-Market strategy with significant opportunity for label expansion

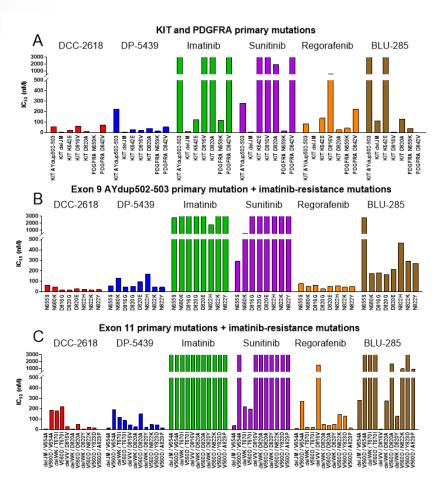
- Phase 3 pivotal trial in ≥4th Line GIST, read out expected mid-2019
- Phase 3 pivotal trial in 2nd Line GIST initiated December 2018
- Phase 1 expansion study ongoing

Clinical proof-of-concept in GIST ≥100 mg daily

- 2nd & 3rd Line: mPFS 40 weeks, 21% ORR Best Response, 81% DCR @3 months
- ≥4th Line: mPFS 24 weeks, 9% ORR Best Response, 66% DCR @ 3 months

Favorable tolerability profile

- Doses up to 400 mg total per day with no MTD
- IP: Composition and method of use (2032)



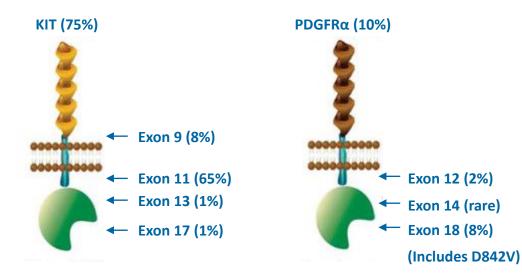
Preclinical Profile



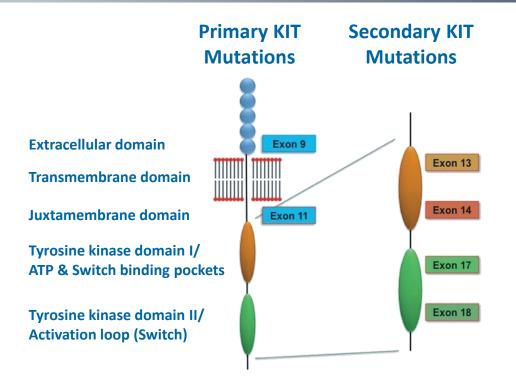
GIST: A Polyclonal Disease Driven by KIT and PDGFR α



KIT and PDGFRα Mutations in GIST "Wild-type" tumors: 15%



Multiple Secondary KIT Mutations Produce Drug Resistance



George; Ther. Adv. in Medical Oncology 2014

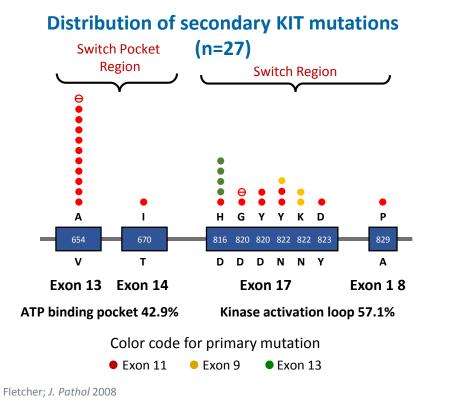
Corless; *M. Pathology* 2014



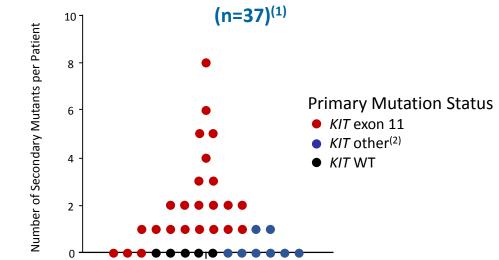
Multiple Drug-Resistant Secondary Mutations in GIST

Drug-Resistant Secondary KIT Mutations in GIST Patients Span Exon Regions 13-18

High Degree of Tumor Mutation Heterogeneity in GIST Patients



Number of secondary mutants detected per patient



- ≥2 secondary mutations were observed in 35% (13/37) of patients.
- 54% (13/24) of patients with KIT exon 11, with 1 patient harboring 8.

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Heinrich, Abstract 10517 ASCO 2015

Notes: (1) Number of unique secondary mutants per patient observed across all samples analyzed; (2) Includes exon 9 (n=6), exon 13 (n=1), and exon 17 (n=1).

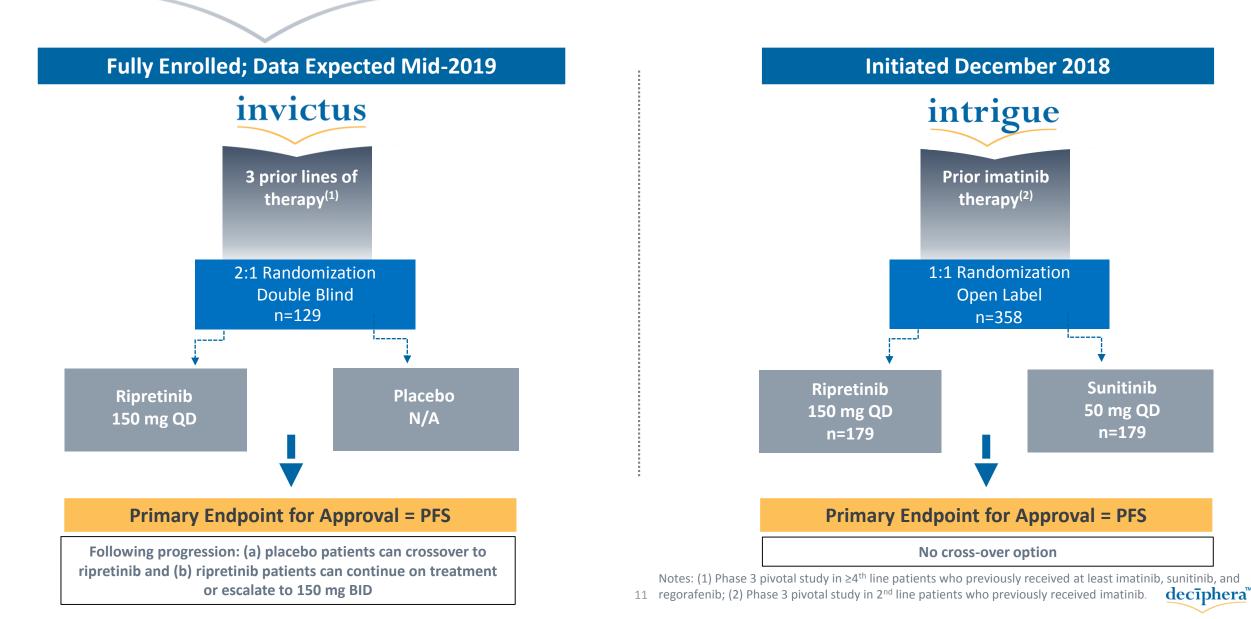
Approved Therapies for GIST: Clinical Goal is Disease Control

	First Line	Second Line	Third Line
	imatinib (n=147) (Blanke et al. 2008)	sunitinib (n=243) (Demetri et al. 2012)	regorafenib (n=133) (Demetri et al. 2013)
Progression Free Survival ¹ (months)	24.0	6.1	4.8
Objective Response Rate (%)	68.1%	7.0%	4.5%
Stable Disease (%)	15.6%	53.0%	48.1%
Disease Control Rate ("DCR") (%)	83.7 % ²	60.0% ²	52.6% ³
	No approved	therapy for 4 th line pa	itients

Notes: (1) Includes progression free survival and time to progression; (2) Time point not disclosed; (3) Time point at 12 weeks.

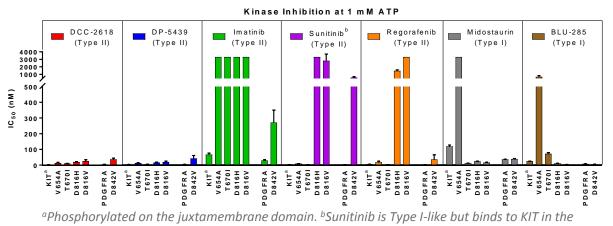


Ripretinib (DCC-2618): Global Pivotal Phase 3 GIST Programs



Ripretinib (DCC-2618): Broad Mutational Coverage in KIT and PDGFR α

Ripretinib Broadly Inhibits KIT and PDGFRα Mutations In Enzyme Assays

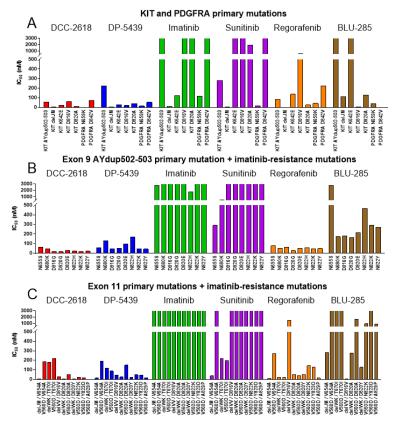


inactive Type II conformation.

- Ripretinib broadly inhibits KIT mutations in exons 9, 11, 13, 14, 17, 18, and a PDGFRA exon 18 mutant.
- Other Type II inhibitors do not block KIT exon 17 mutations, including D816V KIT.
- Type I inhibitors exhibit weak activity for primary KIT mutations in exon 9, exon 11 V560D, and exon 13 K642E and for secondary KIT mutations in exons 13 and 14.

Mutation	Exon
KIT V654A	13
KIT T670I	14
KIT D816H	17
KIT D816V	17
PDGFRA D842V	18

Ripretinib Inhibits Phosphorylation of KIT and PDGFR α in Cellular Assays



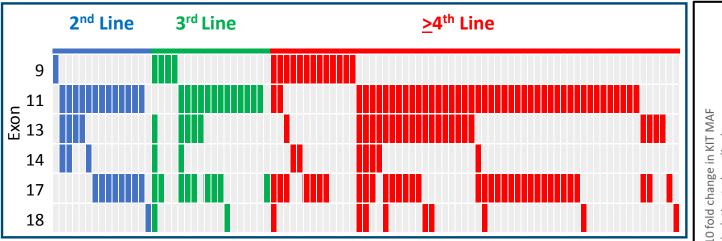
Notes: (A) GIST primary mutations; or imatinib-resistant KIT mutations with (B) exon 9 or (C) exon 11 primary mutations.



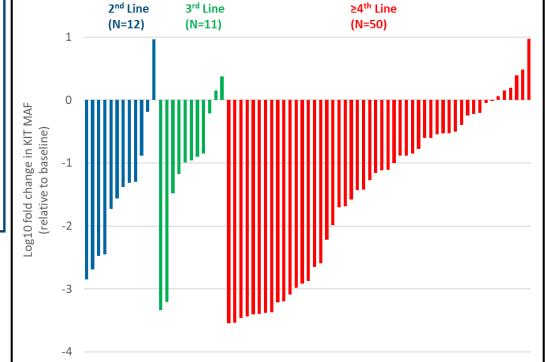
Ripretinib (DCC-2618): Clinical Validation of Broad KIT Mutant Profile

KIT Mutations in ctDNA (n=95) in 131 GIST patients by Line of Therapy

Cumulative Reductions in Circulating MAF of KIT Exons 9, 11, 13, 14, 17 and 18 by Lines of Therapy (n=73)⁽²⁾ (Note log scale: -1 = 10-fold reduction, -2 = 100-fold reduction)



Each column represents an individual GIST patient and each filled entry on rows indicates detection of one or more mutations in Exon 9, 11, 13, 14, 17 and 18.



• Secondary KIT mutations in exons 13, 14, 17 and 18 in patients with 2^{nd} to $\ge 4^{th}$ line GIST

78% achieved more than 50% KIT MAF reduction
 48% were KIT negative on treatment

Notes: (1) Based on liquid biopsy data from preliminary Phase 1 data presented at ASCO on J3 June 2, 2018; (2) Based on data from 73 patients with detectable KIT mutations at baseline.



Ripretinib (DCC-2618): Phase 1 Trial Summary

Part 1: Dose Escalation

- Key Objectives: MTD, recommended Phase 2 dose, safety, tolerability, pharmacokinetics and anti-tumor activity
- Design: 3+3 design with enrichment of targeted patients
- Dose Levels: 20, 30, 50, 100, 150, and 200 mg BID; and 100, 150 and 250 mg QD
- MTD: not determined

Advanced Malignancies (n=68) Recommended Dose 150 mg QD⁽¹⁾

Part 2: Dose Expansion

10 cohorts up to 270 pts; 4 cohorts fully enrolled



Notes: (1) 150 mg BID dosing also available for dose escalation for GIST patients and for SM patients; (2) Includes patients with GIST and other solid tumors with renal impairment.



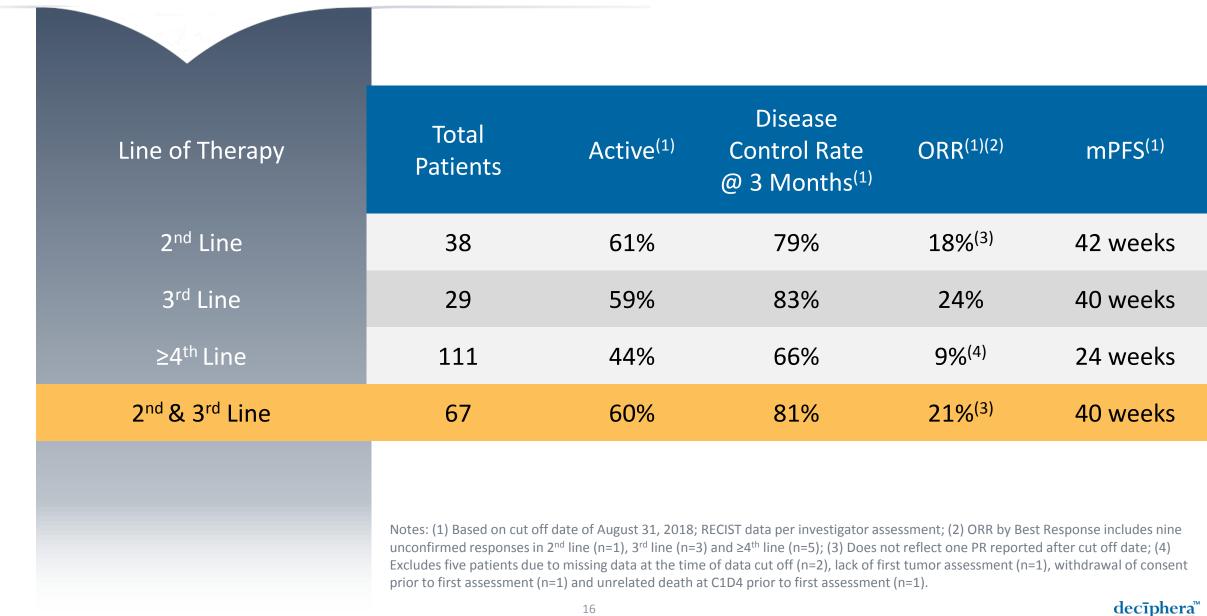
Ripretinib (DCC-2618): Phase 1 Demographics

	<u>ESMO 2018</u>
GIST Patients ≥100 mg /d	n=178
Age (years), median (range)	61 (27-87)
GIST Subtype	n (%)
KIT-driven	168 (94%)
PDGFRα-driven	9 (5%)
SDH deficient	1 (1%)
Line of Therapy	n (%)
2 nd Line	38 (21%)
3 rd Line	29 (16%)
≥4 th Line ⁽¹⁾	111 (62%)
DCC-2618 Dose	n (%)
150 mg QD	142 (80%)
Other (100 mg/d – 400 mg/d)	36 (20%)

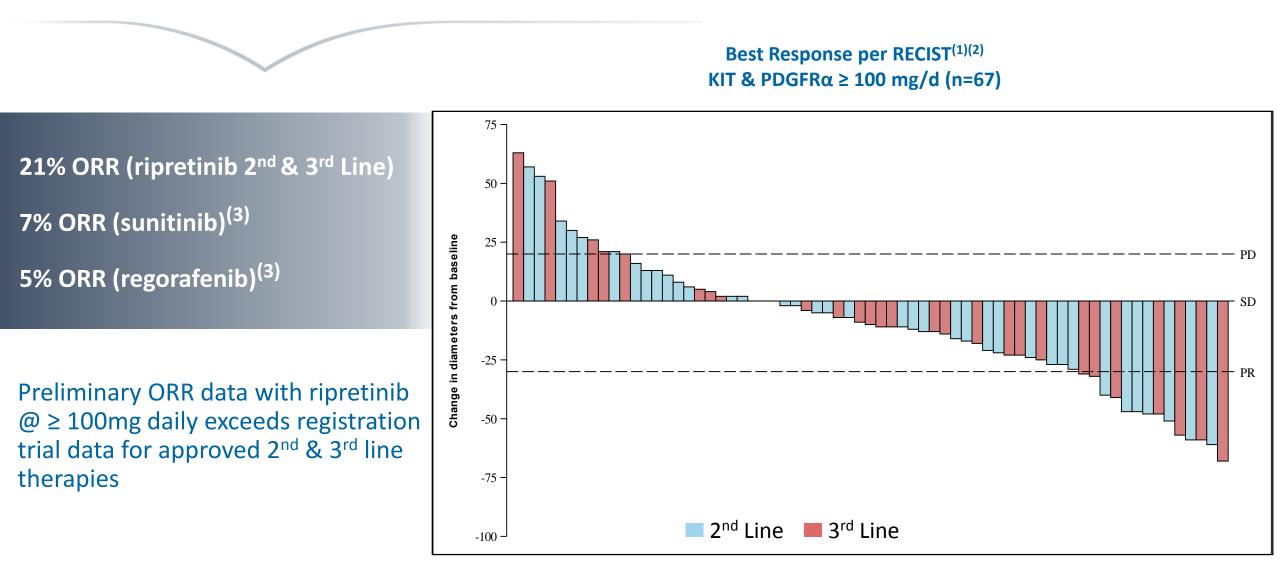
Notes: (1) Mean number of prior regimens for \geq 4th line patients was 3.6.



Ripretinib (DCC-2618): Preliminary Efficacy by Line of Treatment @ ≥100 mg Daily



Ripretinib (DCC-2618): Preliminary ORR by Best Response @ ≥100mg Daily



Notes: (1) Based on cutoff date of August 31, 2018; RECIST data per investigator assessment; (2) Includes unconfirmed responses in 2nd line (n=1) and 3rd line (n=3). Does not reflect one PR in 2nd line reported after cutoff date. Includes 14 patients who elected for intra-patient dose escalation; (3) RECIST data per central review in registration trial.



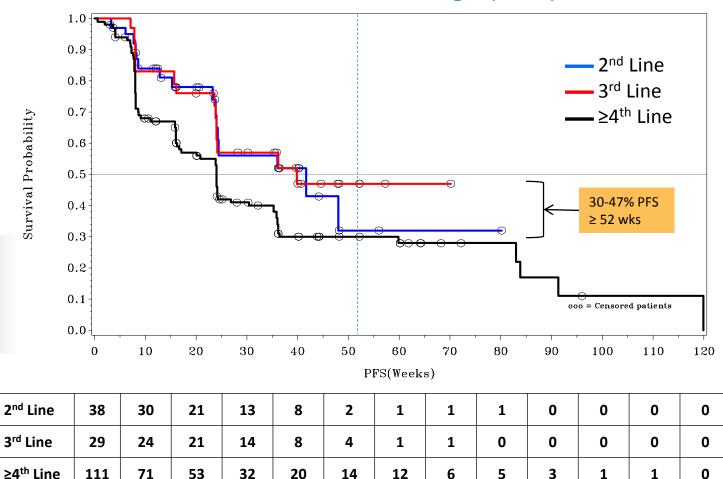
Ripretinib (DCC-2618): Preliminary mPFS @ ≥100 mg Daily

Line of Therapy	mPFS (ripretinib)	Number Censored
2	42 weeks	22 (58%)
3	40 weeks	15 (52%)
≥4	24 weeks	40 (35%)
2 & 3	40 weeks	37 (55%)

24 weeks mPFS (sunitinib)⁽²⁾

21 weeks mPFS (regorafenib)⁽²⁾⁽³⁾

Tumor Control per RECIST⁽¹⁾ KIT & PDGFR $\alpha @ \ge 100 \text{ mg/d} (n=178)$



Preliminary mPFS data with ripretinib @ ≥100mg daily exceeds registration trial data for approved 2nd & 3rd line therapies

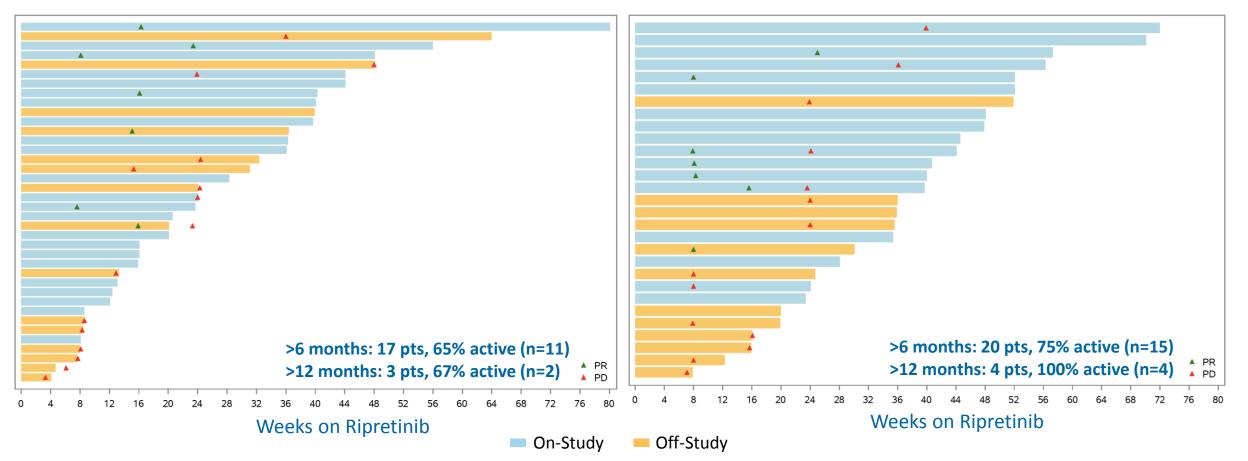
Notes: (1) Based on cutoff date of August 31, 2018; RECIST data per investigator assessment; (2) RECIST data per central review in registration trial; (3) mPFS of 4.8 months converted to weeks.



Ripretinib (DCC-2618): Preliminary Durability Data @ ≥100 mg Daily

2nd Line KIT and PDGFRα Patients (n=38)⁽¹⁾⁽²⁾

3rd Line KIT and PDGFRα Patients (n=29)⁽¹⁾⁽²⁾



Notes: (1) Based on cutoff date of August 31, 2018; RECIST data per investigator assessment; (2) Includes unconfirmed responses in 2nd line (n=1) and 3rd line (n=3). Does not reflect one PR in 2nd line reported after cutoff date. Includes 14 patients who elected for intra-patient dose escalation.



Ripretinib (DCC-2618): Favorable Tolerability Profile @ ≥100mg Daily

Treatment-emergent Adverse Events (TEAE) in >10% GIST Patients (n=178) @ ≥100 mg Daily

- 14% (24 of 178) patients experienced dose reductions due to TEAEs
- 11% (19 of 178) patients experienced treatment discontinuations due to TEAEs
- Clinically asymptomatic lipase elevations most frequent G3 TEAE

Notes: (1) Palmar-plantar erythrodysaesthesia syndrome reported in
19 patients; (2) Data presented at ESMO on October 19, 2018 based
on cutoff as of August 31, 2018.

GIST	PATIENTS @ >	100 MG DAILY	
ADVERSE EVENT	GRADE 1-2	GRADE 3-4	GRADE 1-4 TOTAL
ADVERSE EVENT	(N=178)	(N=178)	(N=178)
Alopecia	89 (50%)	0 (0%)	89 (50%)
Myalgia	79 (44%)	0 (0%)	79 (44%)
Fatigue	74 (42%)	2 (1%)	76 (43%)
Constipation	60 (34%)	0 (0%)	60 (34%)
Hand-Foot Skin Reaction ¹	56 (32%)	1 (1%)	57 (32%)
Nausea	53 (30%)	0 (0%)	53 (30%)
Decreased appetite	47 (26%)	2 (1%)	49 (28%)
Weight decreased	43 (24%)	0 (0%)	43 (24%)
Abdominal pain	33 (19%)	8 (5%)	41 (23%)
Diarrhea	38 (21%)	3 (2%)	41 (23%)
Lipase increased	21 (12%)	20 (11%)	41 (23%)
Vomiting	32 (18%)	1 (1%)	33 (19%)
Arthralgia	32 (18%)	0 (0%)	32 (18%)
Hypertension	22 (12%)	10 (6%)	32 (18%)
Dry skin	31 (17%)	0 (0%)	31 (17%)
Rash	31 (17%)	0 (0%)	31 (17%)
Muscle spasms	30 (17%)	0 (0%)	30 (17%)
Anemia	14 (8%)	13 (7%)	27 (15%)
Dyspnea	25 (14%)	2 (1%)	27 (15%)
Cough	26 (15%)	0 (0%)	26 (15%)
Headache	25 (14%)	0 (0%)	25 (14%)
Dizziness	23 (13%)	0 (0%)	23 (13%)
Back pain	20 (11%)	2 (1%)	22 (12%)
Blood bilirubin increased	15 (8%)	6 (3%)	21 (12%)
Pain in extremity	21 (12%)	0 (0%)	21 (12%)
Dysgeusia	18 (10%)	0 (0%)	18 (10%)
Hypomagnesaemia	18 (10%)	0 (0%)	18 (10%)
Pruritus	18 (10%)	0 (0%)	18 (10%)



Ripretinib (DCC-2618): Opportunity in Advanced Systemic Mastocytosis (SM)

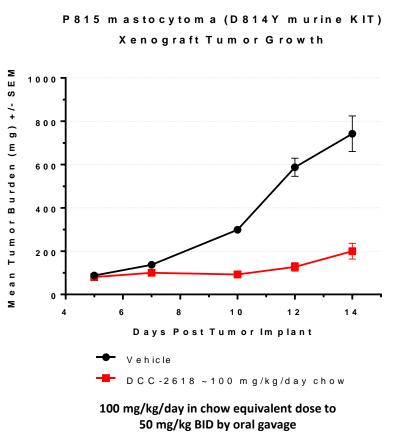
Overview

- Potent inhibitor of KIT D816V mutation that drives SM
 - 25 nM IC₅₀ is nearly 1/100th of 2,000 nM RP2D mean, steady state plasma C_{min}
- Activity demonstrated in multiple SM models
 - P815 mastocytoma murine model and patient-derived SM cells (*in vitro*)
- Clinical dose response relationship with serum tryptase levels in non-SM patients
- Favorable tolerability profile important across spectrum of SM
- Currently enrolling SM patients in Phase 1 expansion cohort

	D816V Exon 17	P815 Mastocytoma (mouse D814Y KIT) Exon 17	HMC1.2 Mast Cells (V560G/D816V) Exons 11/17
	IC ₅₀ (nM) ²	Cell Proliferation IC ₅₀ (nM)	Cell Proliferation IC ₅₀ (nM)
Ripretinib	25	23	47
DP-5439	19	41	47
Imatinib	>3,300	>3,000	>3,000
Sunitinib	2,800	174	1,410
Regorafenib	>3,300	>3,000	>3,000
Midostaurin	15	151	270
BLU-285	3.4	22	147

Notes: (1) green < 50 nM; yellow >50 and <100 nM; blue > 100 nM and < 500 nM; red > 500 nM; (2) All enzyme assays run at 1 mM ATP.

P815 Mastocytoma Model of SM



Source: Unpublished company data.





Ripretinib (DCC-2618): Estimated Market Opportunity: US, EU & Japan

	US	EU & Japan	Total (exc. ROW)
GIST KIT 4 th Line ^{1&2}	~2,100	~4,100	~6,200
GIST KIT 2 nd Line ^{1&2}	~2,600	~5,000	~7,600
GIST PDGFRa1&2	~400	~760	~1,160
Advanced Systemic Mastocytosis ³	~1,400	~2,600	~4,000
	Estimated Annua	I Incidence of New Patients by Ind	ication
	Sources: Internal Deciphera estimates based on applying epidemiology data reported in the following publications to population estimates for US, EU (28) and Japan: ¹ Zhao <i>et al.</i> J Gastrointest Oncol 2012;3(3):189-208 ² Metaxas Y, <i>et al.</i> ESMO Open 2016 ³ Cohen <i>et al.</i> British Journal of Haematology, 2014, 166, 521–528		

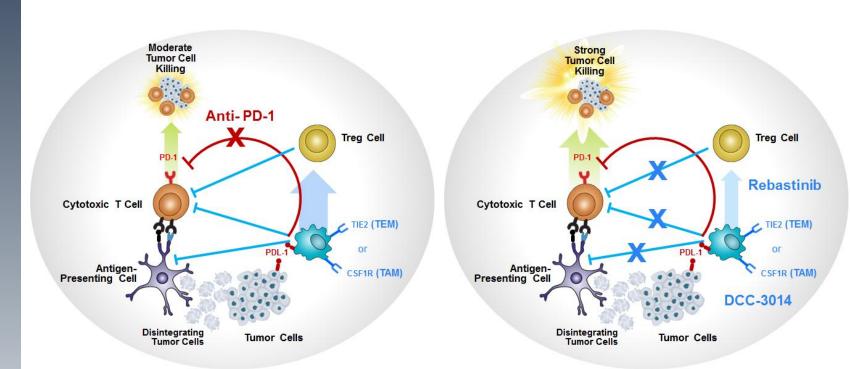


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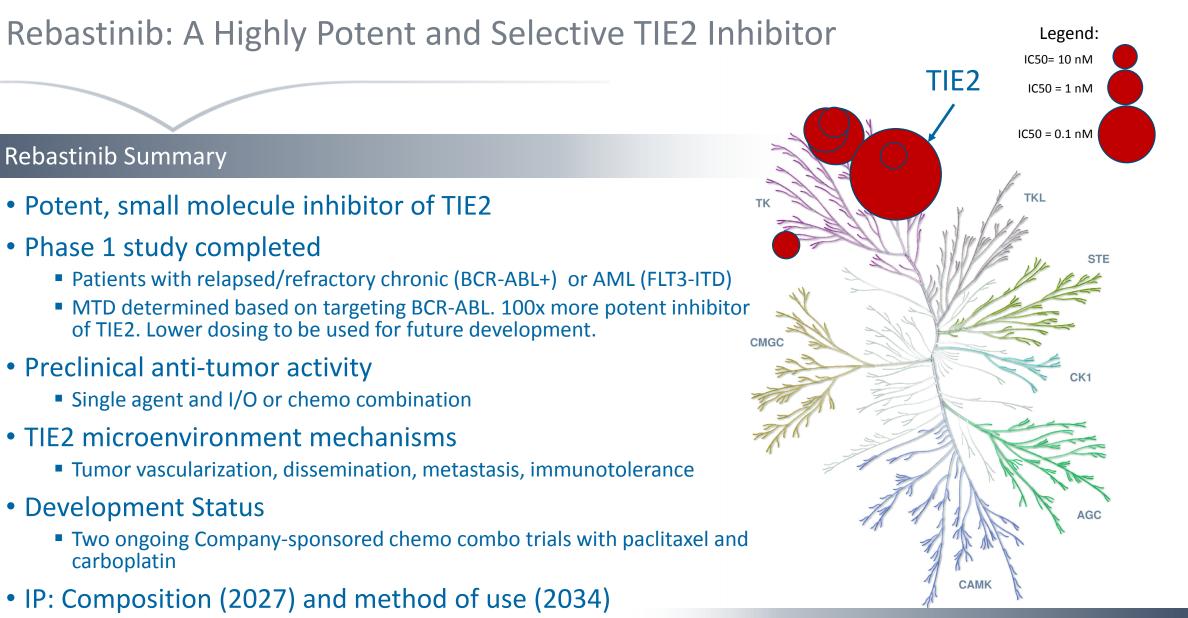
Immunokinase Programs Targeting Macrophage Checkpoints: Rebastinib and DCC-3014

Immunokinase Programs: Rebastinib and DCC-3014

Combining T-Cell and Macrophage Checkpoint Inhibitors Targeting T-Cells and Macrophages to Produce Strong Tumor Cell Killing







Kinome Profile

Notes: All kinases within 100-fold of TIE2 IC50 (0.058 nM) are shown. Includes enzyme data at low ATP and 4 mM ATP, and cellular data.



Rebastinib: Potential Benefits in Combination with Chemotherapy

Rebastinib

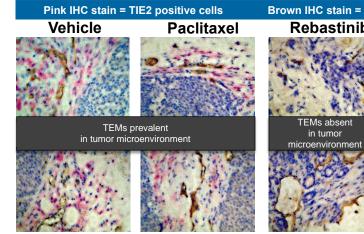
in tumor

hicroenvironmen

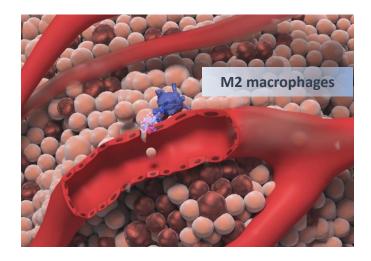
Rebastinib targets TIE2 expressing macrophages (TEMs) and endothelial cells in tumor environment

Combination of rebastinib with chemotherapy may increase tumor killing through multiple

•



- Chemotherapy leads to recruitment of protumoral M2 macrophages from the bone marrow
- Rebastinib is designed to inhibit ٠ chemotherapy-induced recruitment of M2 macrophages to tumors



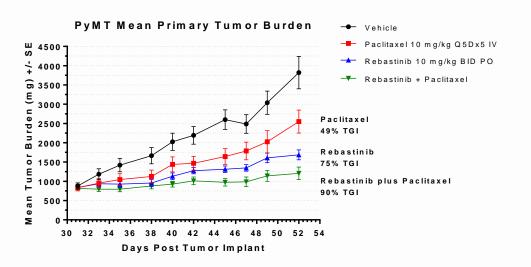
- M2 macrophages serve as pumps for tumor cell intravasation and metastasis
- Rebastinib is designed to block rebound angiogenesis and inhibit M2 macrophages



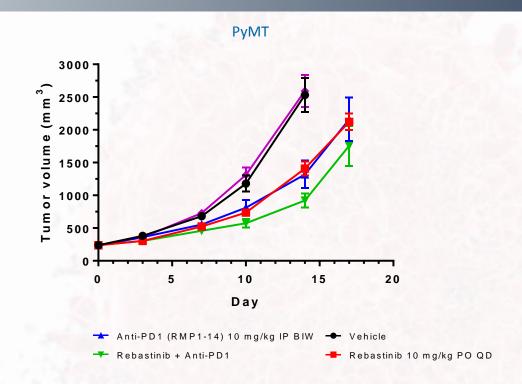
Rebastinib: Rationale for Use in Combination Therapies

Rebastinib Inhibits Growth of Breast Tumors in PyMT Mouse Model Alone and in Combination With Paclitaxel

PyMT Mean Primary Tumor Burden

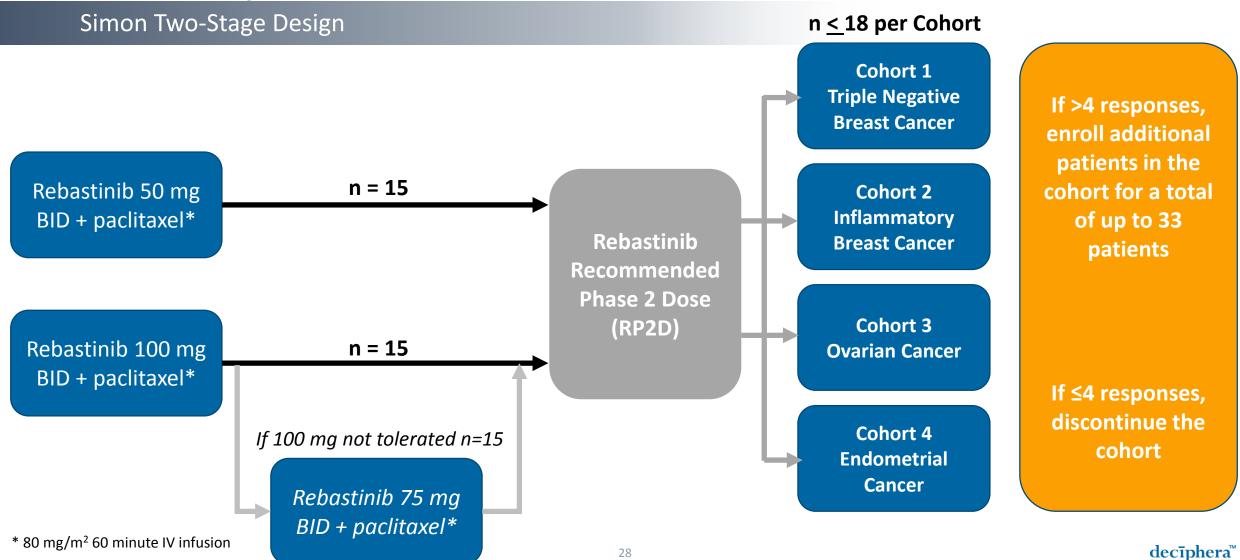


Notes: *TGI normalized to starting tumor size: Paclitaxel (49%TGI*) Rebastinib (75%TGI*); Rebastinib plus Paclitaxel (90%TGI*). Rebastinib Inhibits Growth of Breast Tumors in PyMT Mouse Model Alone and in Combination With PD-1





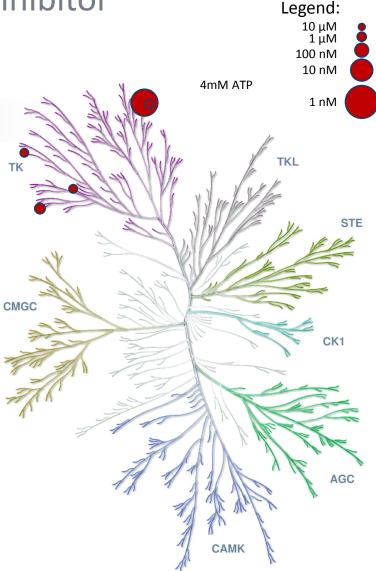
Rebastinib: Phase 1b/2 Study Combination with Paclitaxel



DCC-3014: A Highly Selective and Potent CSF1R Inhibitor

DCC-3014 Summary

- Highly selective, potent, small molecule CSF1R inhibitor
 - 100x selectivity over closest kinases
- Preclinical anti-tumor activity & CSF1R MOA
 - Single agent and in combination with anti-PD1
 - Inhibited immunosuppression via reduction of TAMs, increases in cytotoxic T cells and decreases in T_{reg} cells
- Ongoing Phase 1 escalation trial demonstrated mechanistic Proof of Concept (mPoC)⁽¹⁾
 - Material reductions in circulating CSF1R+ macrophages mPoC
 - PK analysis demonstrated dose-proportional exposure that we believe supports twiceweekly maintenance dosing after five-day loading dose regimen
 - Generally well tolerated at doses of up to 30 mg in patients receiving twice weekly maintenance/five-day loading regimen
 - No DLTs; no DCC-3014 related G3/4 TEAEs in \geq 10% patients
 - Study expanded to include patients with Tenosynovial Giant Cell Tumors (TGCT)
- IP: Composition and method of use (2034)



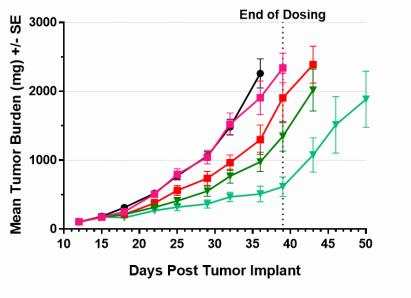
Kinome Profile



DCC-3014: Rationale for Combination with PD-1 Inhibitors

DCC-3014 Inhibits Growth of Colorectal Tumors in MC-38 Mouse Model Alone and in Combination with anti-PD-1

MC-38 Primary Tumor Growth

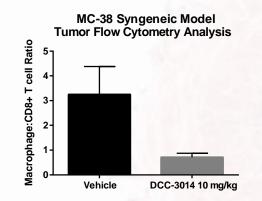


- Vehicle
- PD1 isotype IP BIW
- DCC-3014 10 mg/kg PO QD
- ➡ Day 32: 52% TGI p < 0.0001</p>

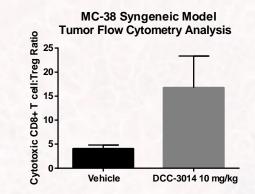
- Anti-PD1 (RMP1-14) 10 mg/kg IP BIW Day 32: 38% TGI p < 0.0001
 - DCC-3014 10 mg/kg + Anti-PD1
- Day 32: 74% TGI
 p < 0.0001 vs Vehicle and Anti-PD1

DCC-3014 Reverses Immunosuppression in MC-38 Mouse Colorectal Tumor Model

Decrease in ratio of TAMs to CD8 cytotoxic T Cells



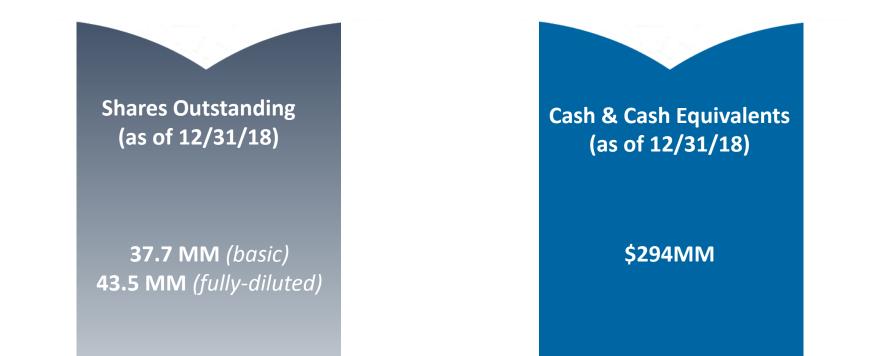
Increase in ratio of CD8 cytotoxic T Cells to T_{reg} cells



Recent & Upcoming Milestones

	2018	2019
Ripretinib (DCC-2618)	 ✓ INVICTUS (≥4th Line GIST): Pivotal Phase 3 Initiated & Fully Enrolled ✓ INTRIGUE (2nd Line GIST): Pivotal Phase 3 Initiated ✓ AACR & EORTC: Phase 1 Safety/PK Data & Preclinical Data ✓ ASCO & ESMO: Phase 1 GIST Updates 	INVICTUS (≥4 th Line GIST: Pivotal Phase 3 Results (Expected Mid-2019) Phase 1 Expansion Data
Rebastinib	✓ Phase 1b/2 Paclitaxel Combination Initiated	 ✓ Phase 1b/2 Carboplatin Combination Initiated Phase 1b/2 Initial Combination Data
DCC-3014		 ✓ Phase 1 Dose Escalation Update Phase 1 Initial Data
Discovery Platform	 Initiated 2 New Research Programs 31 	Select Clinical Candidate & Initiate IND Studies decīphera [™]
		deerphera





Cash expected to fund operating expenses and cap ex into 2H 2020



Corporate Summary

Well established drug class with significant growth potential

Differentiated approach to kinase inhibition

Wholly-owned pipeline with three clinical stage assets

Kinase Inhibitors: 40+ FDA-approved Drugs but Significant Opportunities Remain

- Drug resistance mutations limit rate and duration of response
- Low potency and selectivity cause poor tolerability
- Approved drugs target less than 10% of the 500+ known human kinases

Proprietary Kinase Switch Control Inhibitor Platform

- Broad activity against disease-initiating and drug-resistant mutant kinases
- Kinase-selective and spectrum-selective profiles
- Drug discovery engine that fuels long-term growth

Strong Pipeline of Tumor-Targeted and Immunokinase Programs

- Ripretinib: Broad spectrum KIT and PDGFRα inhibitor in two Phase 3 trials
- Rebastinib: Highly potent and selective TIE2 inhibitor
- DCC-3014: Highly selective and potent CSF1R inhibitor





Addressing Key Mechanisms of Tumor Drug Resistance *April 2019*

Thank You