FivePrime®

2Q16 Earnings Update

August 4, 2016

NASDAQ:FPRX

Forward-Looking Statements Disclaimer

This presentation contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Words such as "may," "will," "expect," "plan," "anticipate" and similar expressions (as well as other words or expressions referencing future events or circumstances) are intended to identify forward-looking statements. These forward-looking statements reflect FivePrime's current beliefs and expectations. Each of these forward-looking statements involves risks and uncertainties. Actual results may differ materially from these forward-looking statements. Forward-looking statements contained in this press release include statements about (i) the timing of IND filings; (ii) the timing of initiation, progress and scope of clinical trials for Five Prime's product candidates; (iii) Five Prime's full-year 2016 net cash used in operating activities and the portion of net cash used in operating activities attributable to tax payments; and (iv) the amount of Five Prime's cash, cash equivalents and marketable securities at the end of 2016.

Many factors may cause differences between current expectations and actual results, including unexpected safety or efficacy data observed during preclinical or clinical studies, clinical site activation rates or clinical trial enrollment rates that are lower than expected, changes in expected or existing competition, failure of our collaborators to support or advance collaborations or product candidates and unexpected litigation or other disputes. Other factors that may cause our actual results to differ from current expectations are discussed in FivePrime's filings with the U.S. Securities and Exchange Commission, including the "Risk Factors" sections contained therein. Except as required by law, we assume no obligation to update any forward-looking statements contained herein to reflect any change in expectations, even as new information becomes available.

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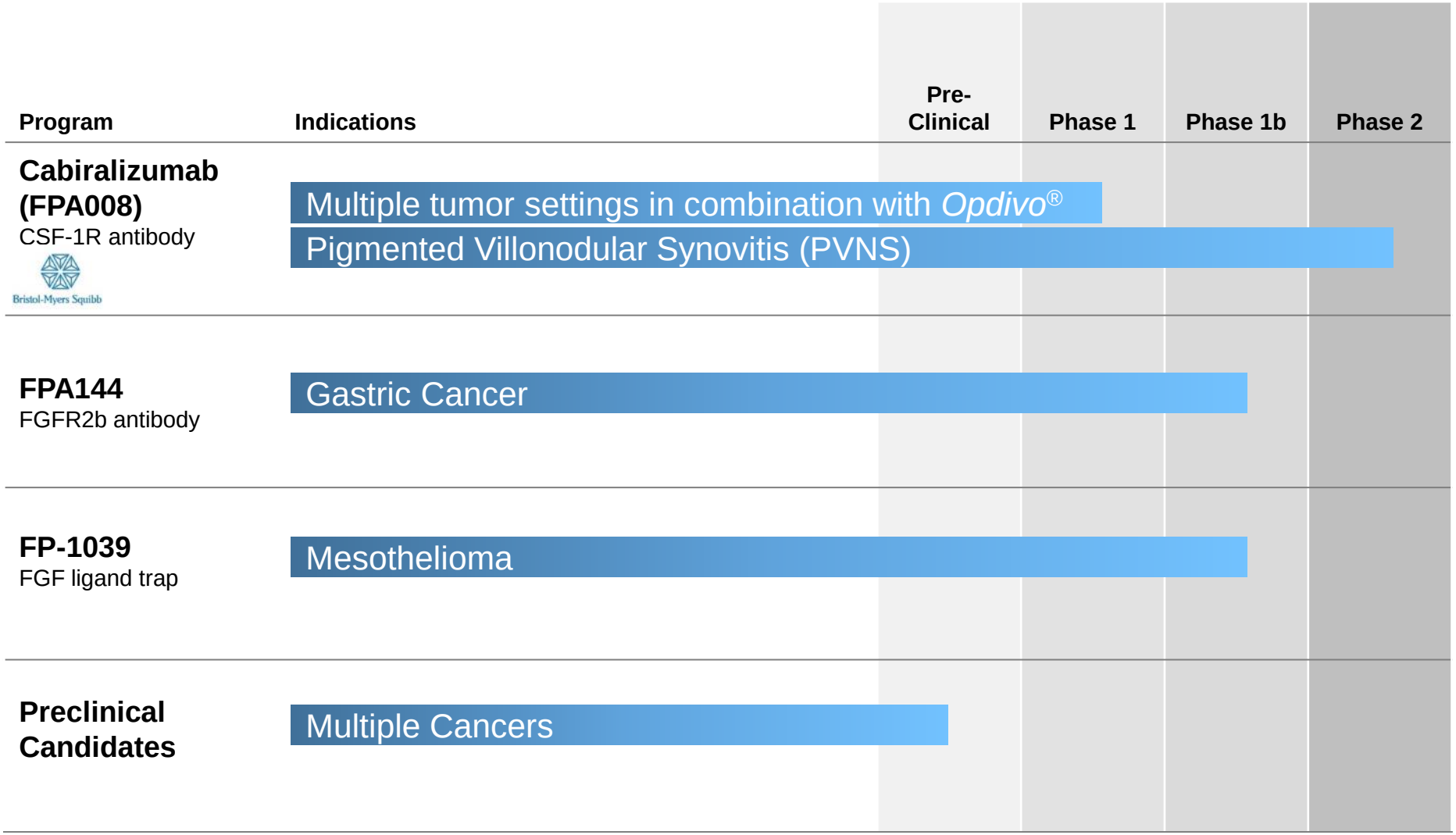
Oncology-Focused Pipeline with Multiple Clinical Candidates



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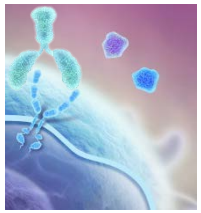
Cabiralizumab (FPA008) Second Quarter 2016 and Recent Highlights



Immuno-oncology

- Continued dose exploration in Phase 1a/1b cabiralizumab (FPA008)/OPDIVO® combination trial that is expected to enroll up to 280 patients
- Approaching the end of dose escalation in Phase 1a in cancer patients, combining cabiralizumab with OPDIVO and exploring cabiralizumab as monotherapy
- Remains on target to move into Phase 1b during the second half of 2016
- Will explore the cabiralizumab/OPDIVO combination in selected cohorts: lung, head and neck, pancreatic, renal, ovarian and glioblastoma

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Cabiralizumab (FPA008)/*Opdivo*® Combination Trial in Multiple Tumor Settings Remains on Track

PHASE 1a

Initiated Sept 2015

*Exploring **Multiple Dose Levels** in Cancer Patients*

- Cabiralizumab (FPA008) Monotherapy
- Cabiralizumab (FPA008) + *Opdivo*®

*Exploring **Selected Tumor Settings** at the Highest Dose*

- Cabiralizumab (FPA008) Monotherapy
- Cabiralizumab (FPA008) + *Opdivo*®

PHASE 1b
Cabiralizumab (FPA008) + *Opdivo*
Initiation Anticipated in 2H16

- LUNG (NSCLC) Anti-PD-1 Naïve
- LUNG (NSCLC) Anti-PD-1 Resistant
- HEAD & NECK 2nd-line
- PANCREATIC 2nd-line
- RENAL 3rd-line
- OVARIAN 3rd-line
- GLIOBLASTOMA 2nd-line

N ~280 patients

Study Objectives

- Safety
- Objective response rate and duration
- Survival
- Baseline and on-treatment biopsies to assess monotherapy and combination

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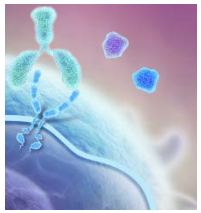
Cabiralizumab (FPA008) Second Quarter 2016 and Recent Highlights



PVNS

- In May, advanced into the Phase 2 dose expansion portion of the ongoing Phase 1/2 trial in PVNS, a CSF-1 receptor-driven tumor
- The Phase 2 portion of the trial is evaluating clinical measures including response rate, pain and range of motion in approximately 30 PVNS patients
- FDA granted cabiralizumab Orphan Drug Designation for the treatment of PVNS
- Five Prime estimates the U.S. prevalence for diffuse PVNS patients may be as high as 25,000 patients

Cabiralizumab (FPA008) – Initiated Phase 2 Trial in PVNS

Phase 1:
Dose Escalation

Select dose for Phase 2

Phase 2:
~ 30 patients

May 2016
Initiated Phase 2

Study Objectives

- Objective response
- Pain
- Range of motion

FPA144 Second Quarter 2016 and Recent Highlights

Received FDA Orphan Drug Designation

- In July, received FDA Orphan Drug Designation for the treatment of gastric cancer and cancer of the gastroesophageal junction in patients whose tumors overexpress FGFR2b

Presented data from ongoing Phase 1 trial of FPA144 at ASCO Annual Meeting in June*

- 3 confirmed partial responses (PRs) out of 9 over-expressing gastric cancer patients treated (33%); 1 of these 3 PRs was confirmed after the data cutoff
- 7 of 9 over-expressing gastric cancer patients with disease control (3 PRs + 4 stable disease), disease control rate (DCR) = 77%
- 12-week progression-free survival (PFS) in 6 of 9 gastric cancer patients (67%)
- Median duration of treatment of 112 days (range 42-182 days)
- A patient with metastatic bladder cancer in the dose escalation portion of the trial in solid tumors achieved a confirmed complete response (CR)
- No dose-limiting toxicities (DLTs); maximum-tolerated dose (MTD) was not reached

Presented pre-clinical data at AACR Annual Meeting.

- FPA144's enhanced ADCC mechanism drives innate and adaptive immune responses
- Recruits natural killer (NK) and T cells into tumor and inhibits tumor growth *in vivo*
- Produced an additive effect on tumor growth inhibition when combined with PD-1 blockade

*Tumor responses were assessed with the use of Response Evaluation Criteria in Solid Tumors (RECIST), version 1.1; (data as of April 1, 2016); Data are preliminary and subject to change

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FPA144 Phase 1 Study is Currently Enrolling FGFR2b+ Patients in Defined Cohorts

PART 1
Dose Escalation

PART 1A:
Dose Escalation* in Solid Tumors

*** 6 dose cohorts ranging from 0.3 to 15 mg/kg**

PART 1B:
Gastric Cancer

PART 2
Selected Patients (up to 30/arm)

All at 15 mg/kg q2w

- IHC High Gastric
- IHC Moderate Gastric
- IHC Low Gastric
- IHC Negative Gastric
- IHC Positive Bladder

Nov. 2015 — Start of enrollment expected 2H16

Study Objectives

- Safety
- PK
- Objective response rate and duration
- Baseline and on-treatment biopsies to evaluate changes in the tumor microenvironment

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Summary of Initial Monotherapy Antitumor Activity of FPA144 in FGFR2b+ Gastric Patients*

Outcome	FPA144 Treated (N=9)
ORR ** (95% CI)	33% (7%, 70%)
Best Objective Response (%)	
Complete Response	0 (0%)
Partial Response	3* (33%)
Stable Disease	4 (44%)
Progressive Disease	2 (23%)
Disease Control Rate (95% CI)	77% (40%, 97%)
12-Week PFS (95% CI)	67% (30%, 93%)
Median Duration of Treatment, days (Range)	112 (42-182)

* ASCO 2016. Data cutoff was April 1, 2016.

** Pooled across all dosing cohorts (1 at 6 mg/kg, 1 at 10 mg/kg and 1 at 15 mg/kg). All responses were confirmed (one after the data cutoff with the patient still on treatment). Investigator review used for assessments.

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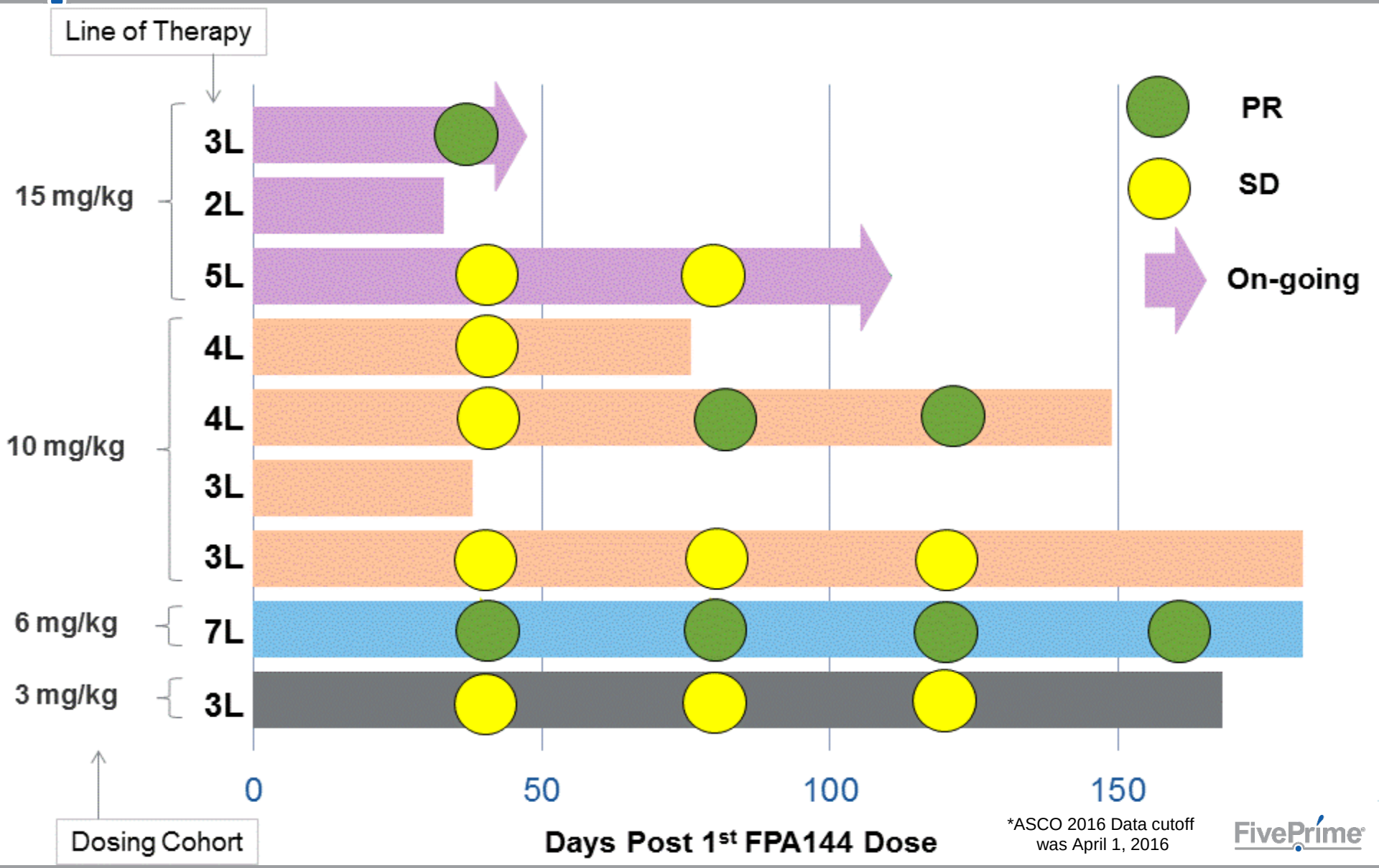
Initial Monotherapy Antitumor Activity of FPA144 in FGFR2b+ Gastric Patients in Multiple Dosing Cohorts*



*ASCO 2016 Data cutoff was April 1, 2016

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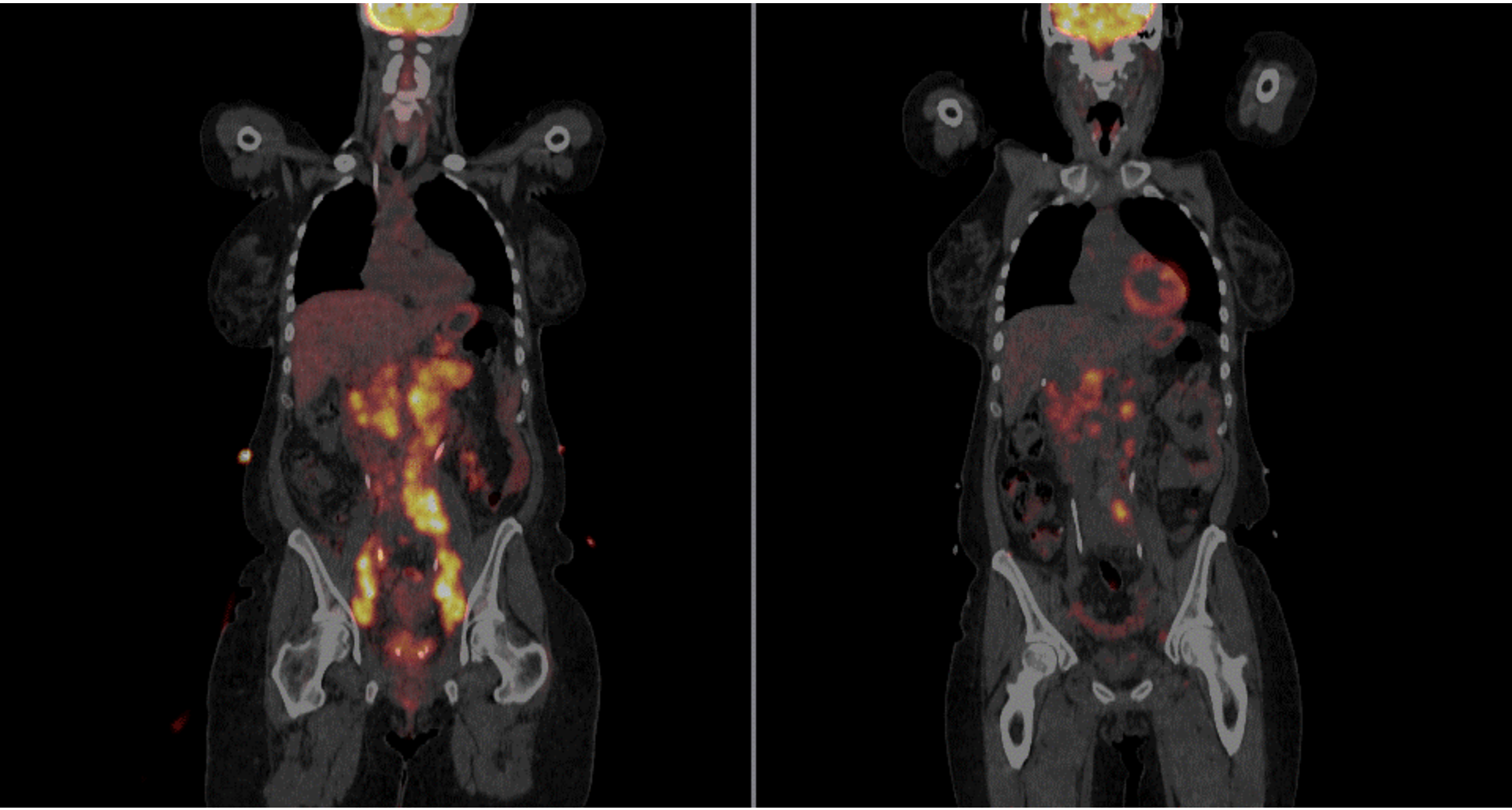
Metabolic Response by FDG-PET in an Additional Gastric Cancer Patient, the 4th Patient in the 15 mg/kg IHC High Cohort*

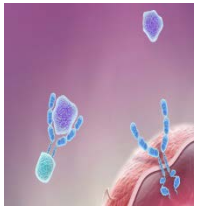
Pre Treatment

Post Treatment with 4 doses of FPA144 (15 mg/kg)



* ASCO 2016. Data from the 10th patient in the trial, or the 4th patient treated in the 15 mg/kg cohort, became available after the data cutoff of April 1, 2016. The patient remains on treatment as an unconfirmed partial response by CT.

FP-1039 Second Quarter 2016 and Recent Highlights



Although GSK has terminated its FP-1039 license from Five Prime, GSK is continuing to conduct the ongoing Phase 1b trial of FP-1039 in combination with1st-line pemetrexed and cisplatin in patients with untreated, unresectable mesothelioma

- GSK has now capped the trial at the 25 mesothelioma patients enrolled at the 15 mg/kg dose
- The trial data are not sufficiently mature for Five Prime to make decisions yet on potential future development of FP-1039 in mesothelioma
- Those decisions will be based on our future assessment of the response rate and durability in this trial, as well as other considerations, such as drug supply and manufacturing

GSK presented data in mesothelioma patients from the ongoing trial of FP-1039 at the 2016 ASCO Annual Meeting

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FP-1039: Progress on Phase 1b Trial*

Best Tumor Confirmed Responses	Arm C: Evaluable Patients at or below MTD** (n=18)
Complete Response (CR), n	0
Partial Response (PR), n	7
Stable Disease (SD), n	11
Progressive Disease (PD), n	0
Objective Response Rate	39%
Disease Control Rate (CR+PR+SD)	100%
Median PFS	6.8 months

*ASCO 2016

**Due to the reduced tolerability observed at 20 mg/kg, only evaluable patients at or below MTD (i.e., 10 and 15 mg/kg) are shown. Evaluable patients were defined as patients who enrolled at least 42 days (i.e., 2 cycles) prior to the cutoff date, which was the minimum time duration utilized in the calculation of disease control rate.

The preliminary objective response rate (as of April 18, 2016) was 39%, with a disease control rate of 100% (evaluable patients, 10 and 15 mg/kg GSK3052230, confirmed per mRECIST 1.1)

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Summary of Cash and Cash Guidance

CASH, CASH EQUIVALENTS & MARKETABLE SECURITIES

~$469.2 million as of June 30, 2016

FY 2016 ESTIMATED NET CASH USED IN OPERATIONS

<$120 million comprising:

- <$90 million from operations, plus
- <$30 million used for tax payments

ESTIMATED CASH, CASH EQUIVALENTS & MARKETABLE SECURITIES

Estimate ending 2016 with ~$400 million

SHARES OUTSTANDING

28.3 million (as of June 30, 2016)

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Summary of Financial Results

(as of June 30, 2016; In Millions Except Per Share Amounts)

	2Q16	2Q15
Revenue	$9.2	$6.3
R&D Expenses	$22.2	$13.3
G&A Expenses	$8.1	$4.6
Net Loss	$13.1	$11.5
EPS Basic and Diluted	$(0.49)	$(0.45)

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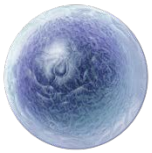
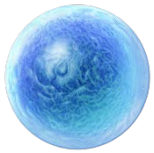
A Productive R&D Engine

Research

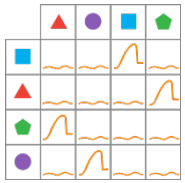
Treg cell screen



CD8 T cell screen



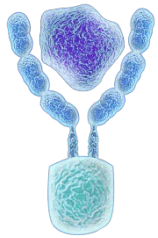
Immunome by Immunome



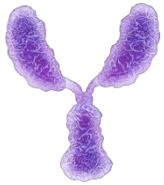
In vivo screens

Preclinical Programs

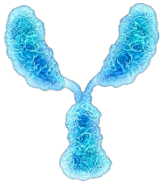
T cell modulator
(lead selected)



Anti-GITR
(lead selected)



T cell redirector

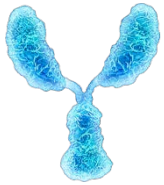


Immune modulator
(lead selection underway)

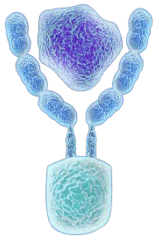
Clinical

FPA008
(anti-CSF-1R)

FPA144
(anti-FGRF2b)



FP-1039
(FGF ligand trap)



Candidates planned for 1 new IND in 2017 and 1 yearly thereafter

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2016 News Flow and Anticipated Milestones

FPA008

PVNS
- Began Phase 2 trial in **May**

MULTIPLE I-O TUMOR SETTINGS
- Complete Phase 1a dose escalation & expand to Phase 1b **2H16**

Research

- Advance 2 programs into IND-enabling activities

FPA144

GASTRIC CANCER
- Reported data from Part 1 at **ASCO GI in January** and preclinical data at **AACR in April**
- Oral presentation with Part 1 data presented at **ASCO in June**

FP-1039

MESOTHELIOMA
- Ongoing trial
- GSK presented data at **ASCO in June**

R&D Day NYC
December 8

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THANK YOU

www.fiveprime.com

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