FivePrime®

2Q17 Earnings Update

August 8, 2017

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 from these forward-looking statements. Forward-looking statements contained in this presentation include statements about (i) the timing of initiation, progress and scope of clinical trials for our product candidates; (ii) the potential use of our product candidates to treat patients; (iii) the extent of gene amplification and protein overexpression in and the size of certain patient populations; (iv) the prevalence of certain diseases; (v) the timing of the filing of INDs; (vi) the timing of data disclosures; and (vii) our estimated 2017 net cash used in operating activities and estimated year-end balance of cash, cash equivalents and marketable securities.

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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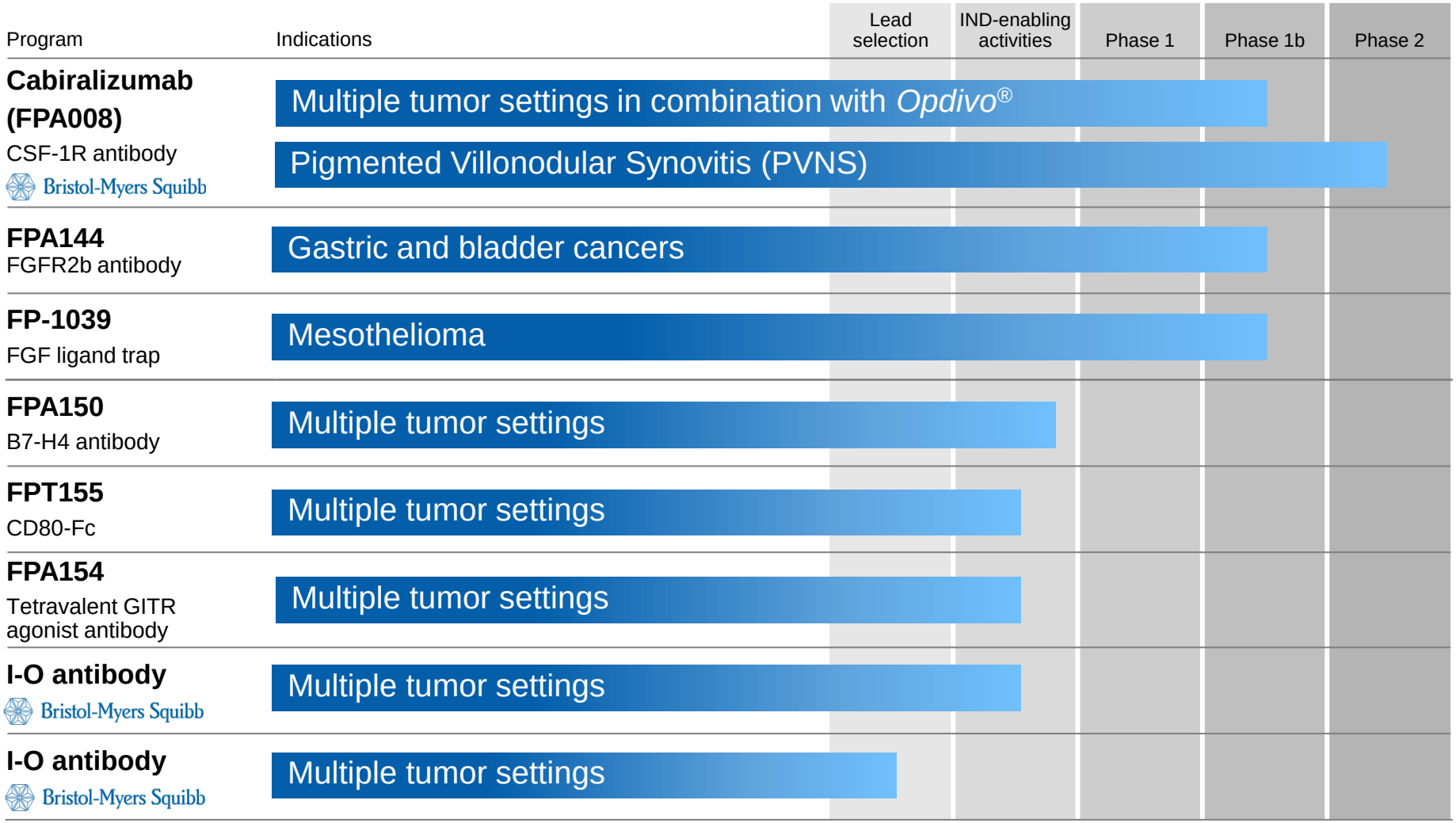
Oncology-Focused Pipeline with Multiple Clinical Candidates



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Five Prime Second Quarter Highlights

- **Cabiralizumab**
  - Completed enrollment in some of the Phase 1b I-O cohorts; on track to complete enrollment in all seven Phase 1b cohorts by end of 2017
  - Five Prime and BMS expect to present initial clinical trial data at the SITC meeting in November
  - At the ASCO meeting in June, announced preliminary clinical trial data in PVNS that demonstrated clinical responses, and improvement in pain and joint function

- **FPA144**
  - At ASCO, announced updated clinical trial data, demonstrating monotherapy activity in heavily pretreated patients with gastric cancer
  - Preparing for pivotal chemotherapy combination trial in front-line gastric cancer of the 10% of patients whose tumors are FGFR2 positive
  - Initiated a Phase 1 safety trial in Japan; pursuing a development strategy in China

- **Early Research Programs**
  - Advanced three preclinical therapeutic candidates in IND-enabling activities
  - FPA150 oral panel discussion at ESMO; submitted FPT155 abstract to AACR-NCI-EORTC
  - Plan to file an IND by the end of 2017

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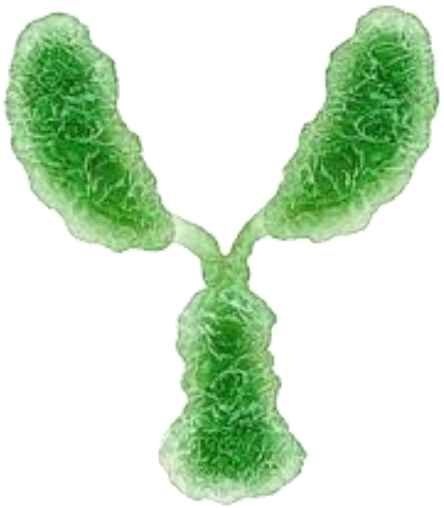
FPA150: Novel B7-H4 Antibody is Designed for Two Mechanisms of Action

FPA150



- Blocks a T cell checkpoint pathway
- Engineered to enhance ADCC against B7-H4-expressing tumor cells
- B7-H4 is overexpressed in breast, ovarian and endometrial cancers

IND planned 4Q17

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FPT155 is One of Most Potent Tumor Inhibitors Identified in Our *In Vivo* Screens of More Than 500 Immunome Proteins

CD80

- Co-stimulatory molecule expressed on antigen presenting cells
- Binds to the T cell activating receptor CD28, the T cell inhibitory receptor CTLA4, and PD-L1

FPT155 (CD80-Fc) Can Activate T Cells Through Three Pathways

CD28 Activation (activates T cells without superagonism)

CTLA4 Blockade (activates T cells)

PD-L1 Blockade (prevents checkpoint inhibition)

Potential 2018 IND

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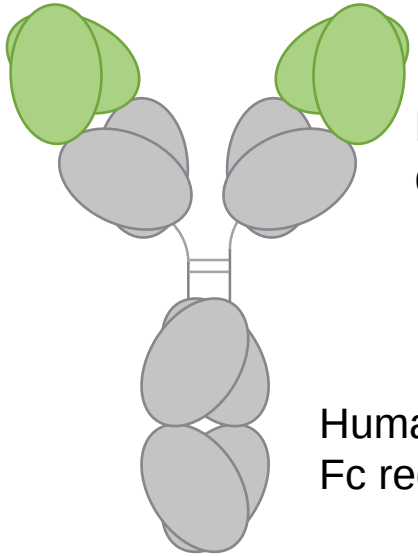
FPA154 (anti-GITR): Increased Valency Leads to Stronger Activation Versus Conventional Antibodies

Conventional Antibody

Two GITR binding sites

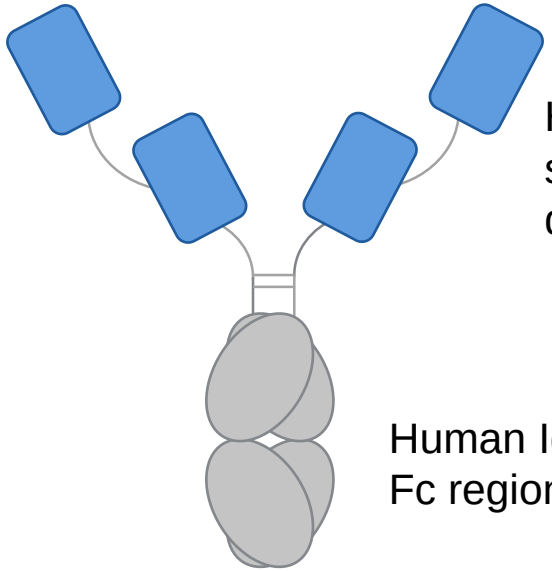


Fab variable domains

Human IgG1 Fc region

FPA154

Four GITR binding sites



Humanized sdAb variable domains

Human IgG1 Fc region

Designed for improved CD8 T cell agonistic activity with potent Treg depletion activity

Potential 2018 IND

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Cabiralizumab/OPDIVO® Combination Trial in Multiple Tumor Settings Remains on Track

PHASE 1a

Initiated
Sept 2015

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

- **Cabiralizumab Monotherapy**
- **Cabiralizumab + *OPDIVO®***

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

- **Cabiralizumab Monotherapy**
- **Cabiralizumab + *OPDIVO®***

PHASE 1b
Cabiralizumab + *OPDIVO®*

Initiated
October 2016

- **LUNG (NSCLC)** Anti-PD-1 Naïve
- **LUNG (NSCLC)** *Anti-PD-1 Resistant*
- **HEAD & NECK**
- **PANCREATIC**
- **RENAL**
- **OVARIAN**
- **GLIOBLASTOMA**

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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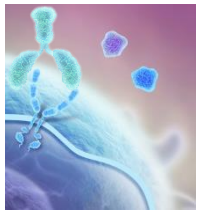
Cabiralizumab Immuno-Oncology Highlights



- An investigational antibody that inhibits CSF1R
- Advanced the Phase 1b portion of immunotherapy clinical trial in combination with PD-1 immune checkpoint inhibitor, OPDIVO® (nivolumab), in multiple tumor types
  - non-small cell lung
  - head and neck
  - pancreatic
  - glioblastoma
  - renal cell carcinoma
  - ovarian
- Expect to complete Phase 1b enrollment in 2H17
  - Phase 1a/1b trial expected to enroll ~280 patients
- Five Prime and BMS plan to present initial clinical trial data at the SITC meeting in November

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Cabiralizumab: Current Five Prime-Sponsored Phase 2 Trial in PVNS

Phase 2: ~ 30 patients

Initiated Phase 2
May 2016

Completed Enrollment
April 2017

Study Objectives

- Objective response
- Pain
- Range of motion

Seeking regulatory agency guidance on pivotal trial

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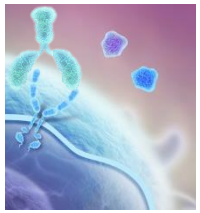
Cabiralizumab PVNS Highlights



- Disclosed initial clinical trial data at ASCO 2017
  - Efficacy: Demonstrated clinical benefit by MRI and improvement in pain and function
  - Safety: Most frequent AEs were CK elevation, periorbital edema, pruritis
- Future Plans
  - Enrolling additional patients to evaluate a less frequent dosing schedule and to provide additional data to support a pivotal trial
  - Adding pain as an inclusion criterion

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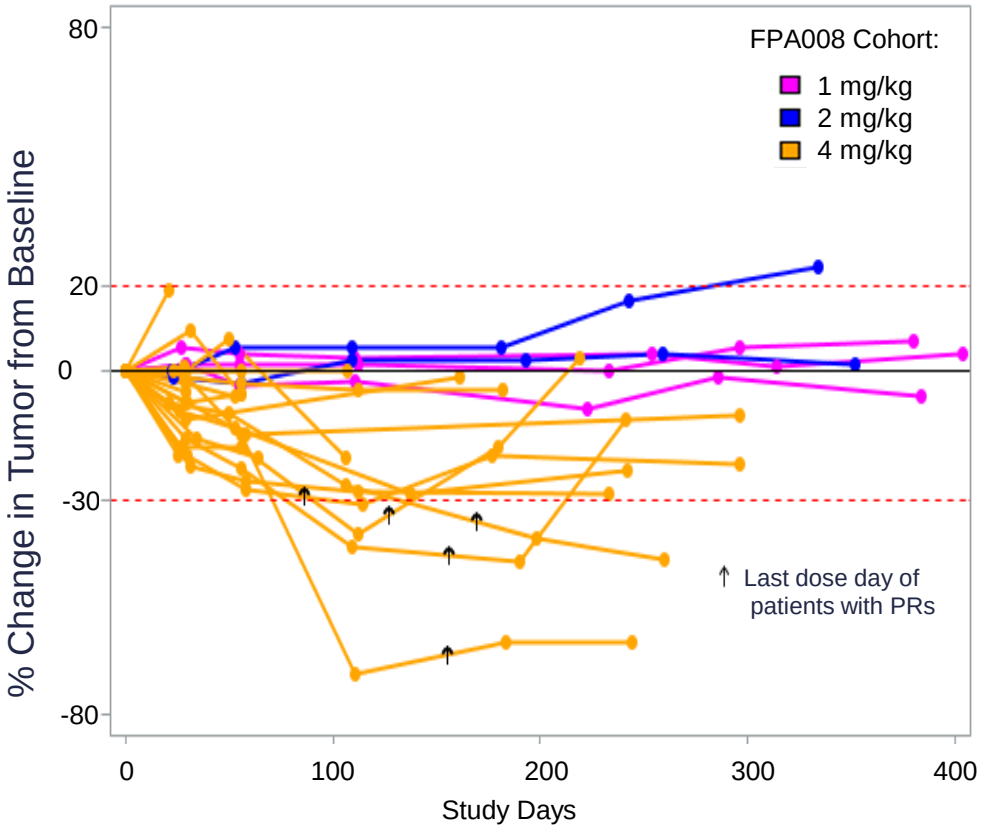
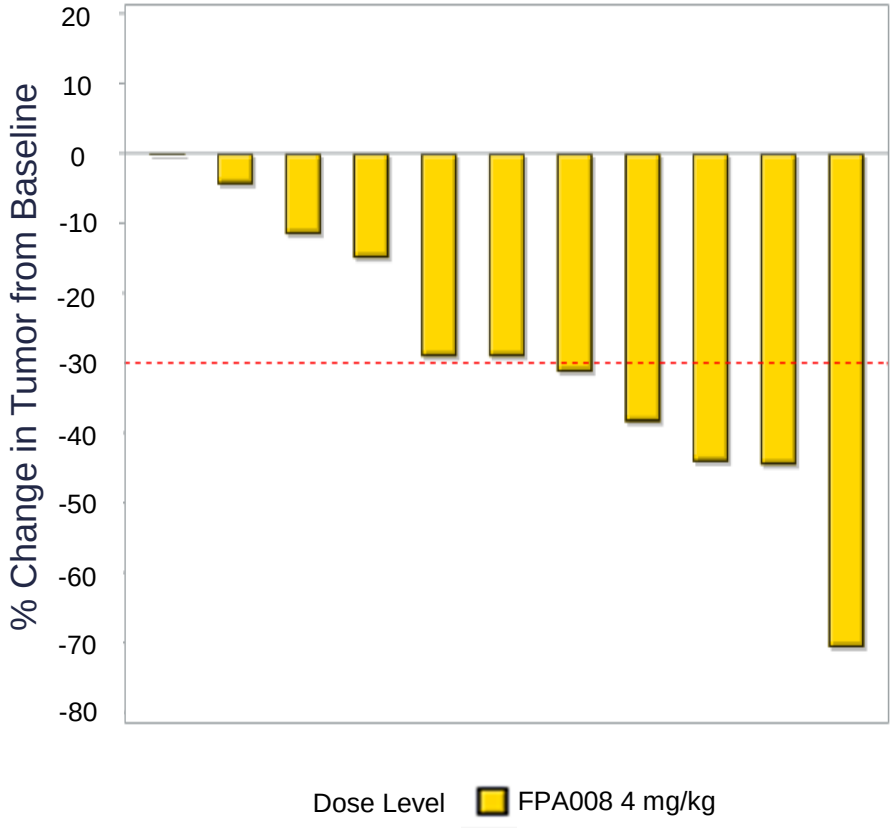
Preliminary Data from ASCO:
5 of 11 PVNS Patients at the 4 mg/kg Dose Had a PR by MRI (4 Confirmed)*

Dose dependent response



Most patients enrolled at the 4 mg/kg dose experienced tumor reduction



In addition, pain/function improved in both responders and non-responders by Ogilvie-Harris score

* ASCO 2017 Sankhala *et al.*

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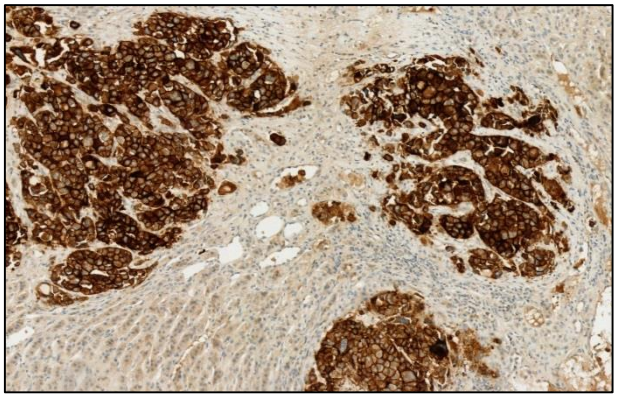
Ongoing Phase 1 Study of FPA144

Monotherapy, 15 mg/kg every two weeks, FGFR2b+ by IHC

Metastatic gastric or GEJ cancer –
up to 30 patients with high FGFR2b expression

Metastatic bladder cancer -
up to 30 patients with FGFR2b expression

IHC staining of gastric cancer sample with proprietary IHC antibody:



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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FPA144 Highlights

- An isoform-selective antibody in development as a targeted immuno-therapy for tumors that overexpress FGFR2b
- Disclosed updated gastric cancer clinical trial data at ASCO
  - Efficacy: Demonstrated monotherapy activity in heavily pretreated patients
  - Safety: Well tolerated
- Launched a Phase 1 gastric cancer trial in Japan; pursuing China strategy
- Preparing for a Phase 1 safety trial in combination with chemotherapy to begin by the end of 2017
- Planning for a global registrational Phase 3 clinical trial of FPA144 in combination with chemotherapy as a front-line gastric cancer therapy
- Advanced the Phase 1 monotherapy trial in patients with bladder cancer

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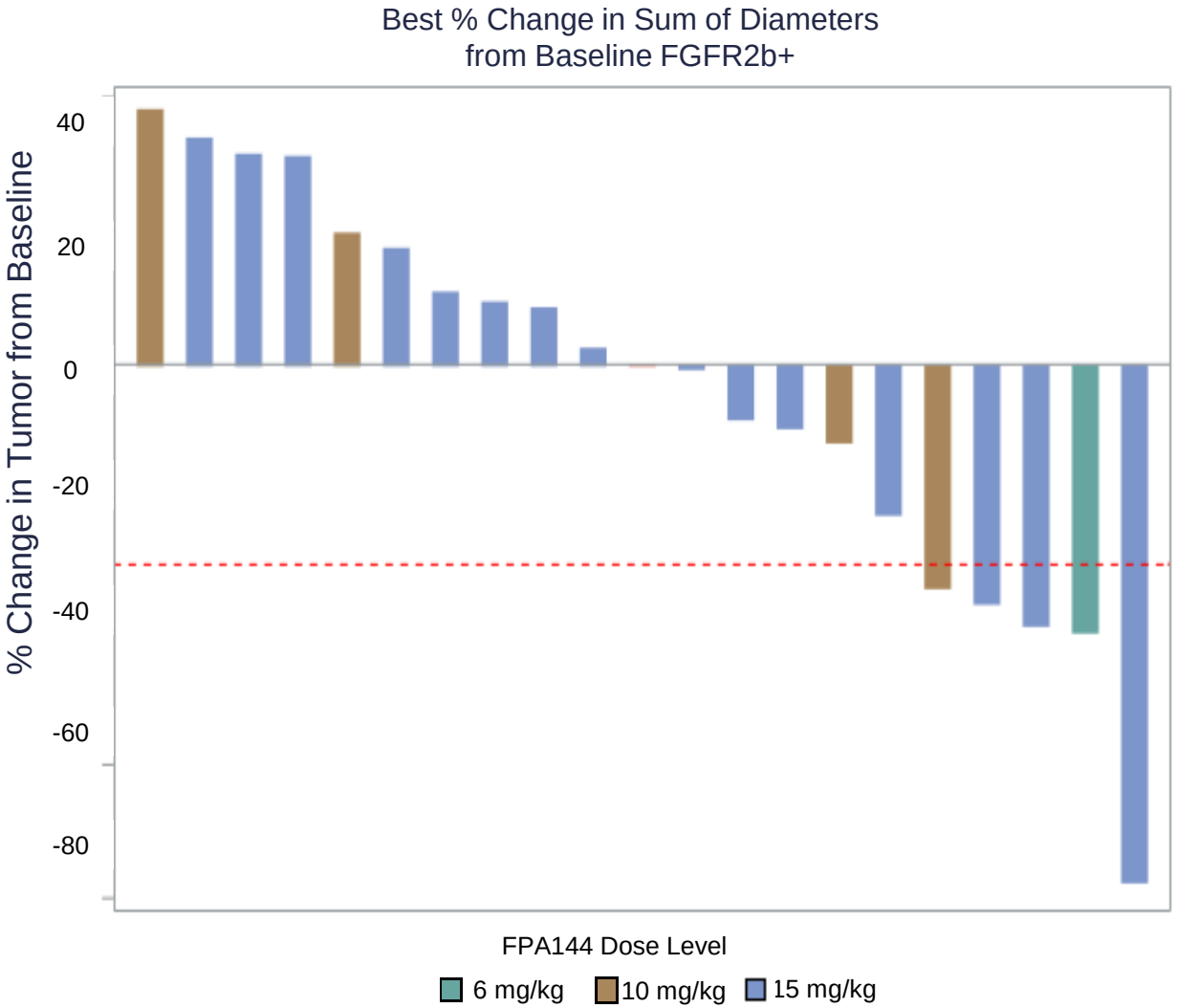
FPA144 Demonstrates Monotherapy Activity in Heavily Pre-treated Patients with FGFR2b+ Gastric Cancer*



Including patients enrolled into Part 2 (Cohort A), as well as 6 patients in Part 1B

- High number of prior therapies (Median = 3)
- Objective Response Rate: 19.0% (n=21)
- Disease Control Rate: 57.1%
- Median Duration of Response = 15.4 weeks

* ASCO 2017 Catenacci *et al*

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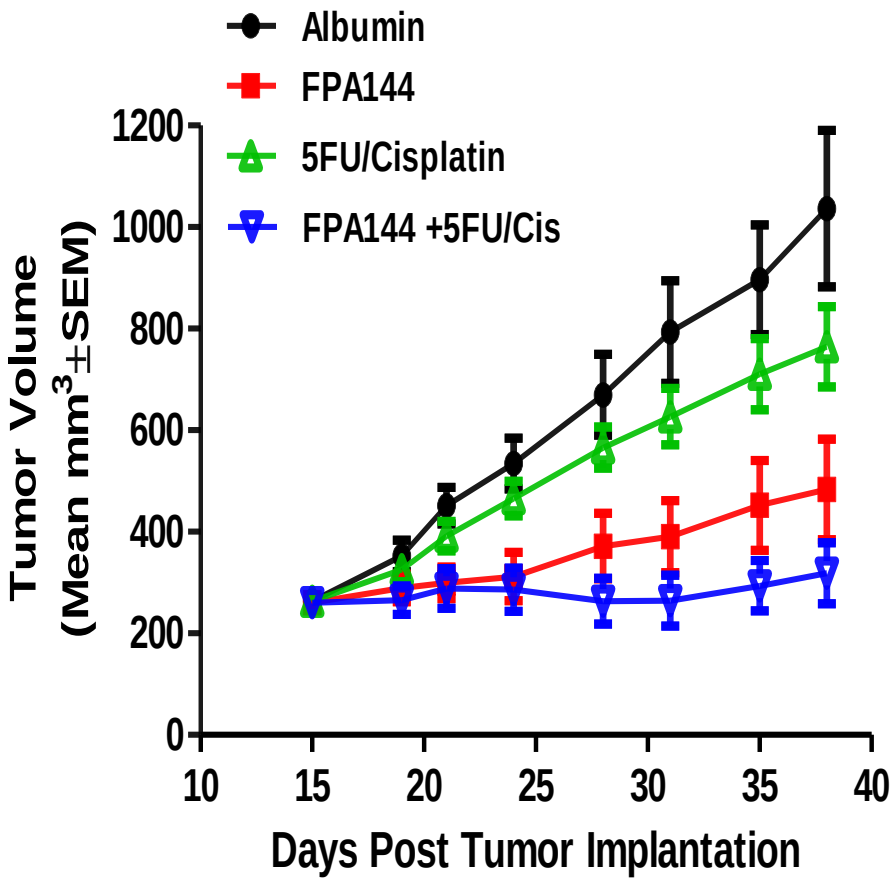
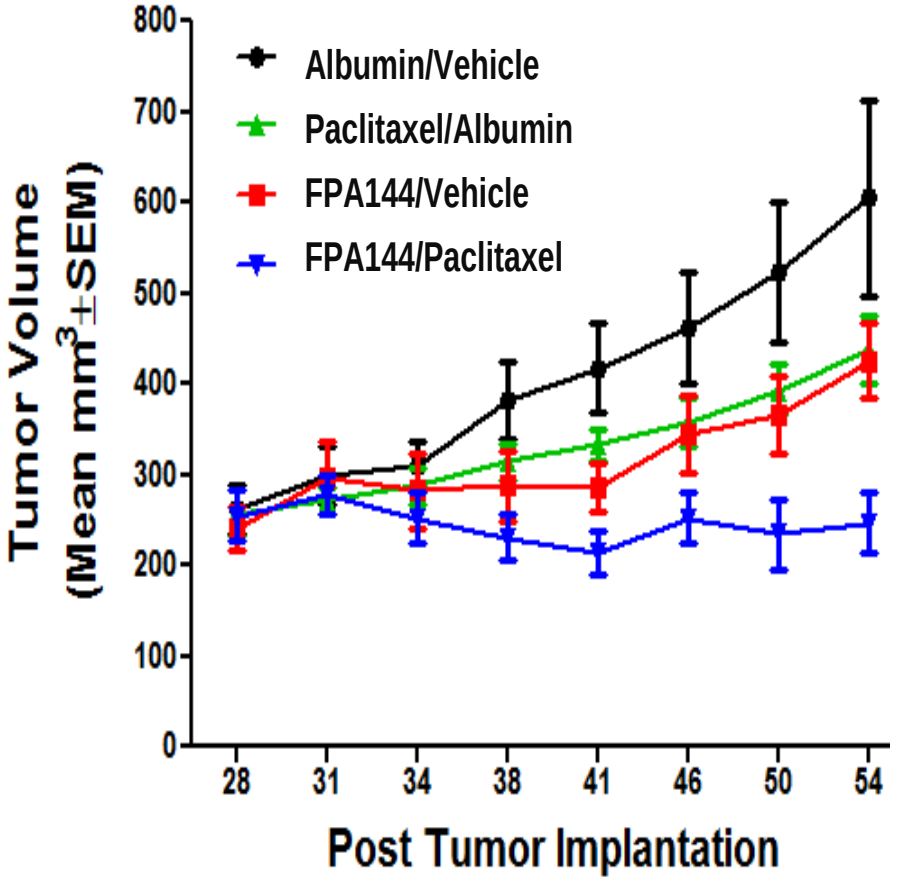
FPA144 Has Additive Activity with Chemotherapy in Pre-clinical Gastric Cancer Models

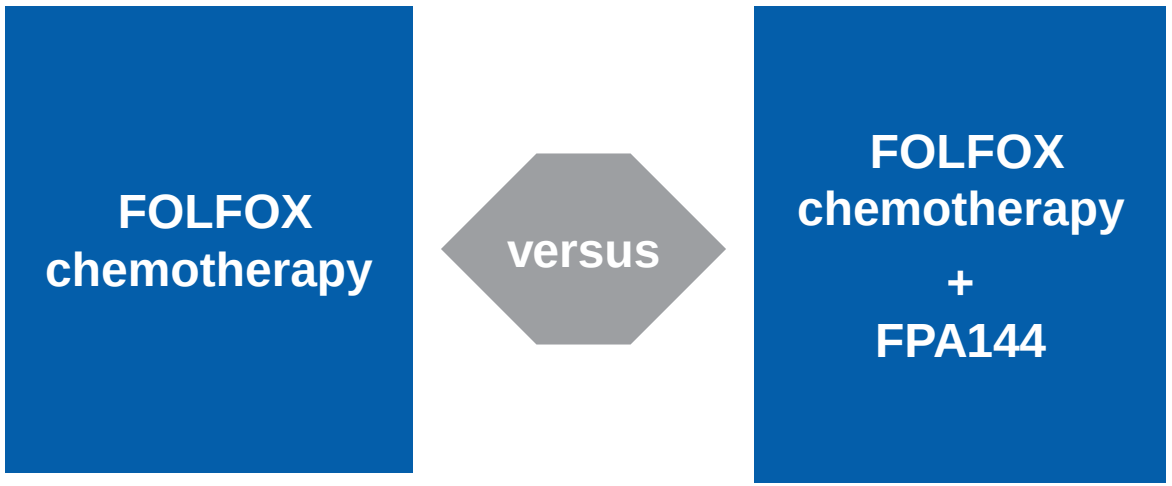




* From Abigael T. Gemo, et al., AACR, April 2014

Pivotal Trial Planning for FPA144 for Front-Line Treatment of FGFR2b+ Gastric Cancer

- Select biomarker positive patients by ctDNA (blood-based) or IHC (tumor sample) tests
- Will seek regulatory guidance this year on a registration-enabling pivotal trial plan
- Likely a randomized, controlled trial, for example:



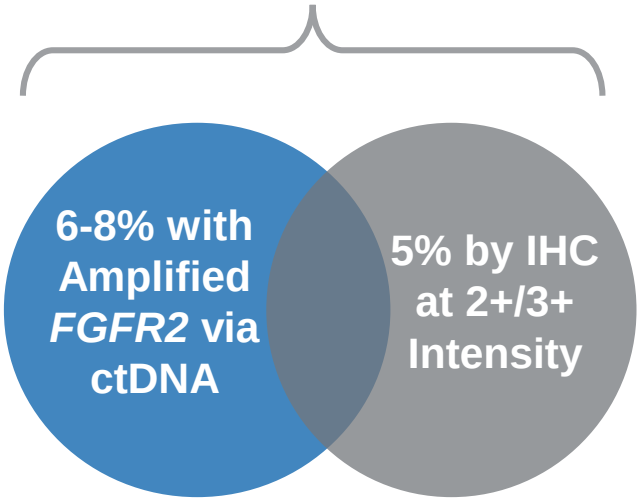
Study Objectives

- PFS
- OS
- ORR

Companion Diagnostic Strategy for Front-Line Gastric Cancer:
Select Patients Based on Protein Overexpression or Gene Amplification

- *FGFR2* gene amplification and FGFR2b protein overexpression correlate with reduced survival
- Can detect gene amplification in circulating tumor DNA and protein overexpression by IHC
- Tumor heterogeneity: metastases may be positive for FGFR2b when primary tumor is not; metastasis correlates with lethality

~10% of gastric cancer patients likely to be positive by either companion diagnostic



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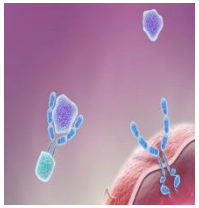
FP-1039 Highlights



- A protein drug designed to block FGF signaling
- Mesothelioma often overexpresses FGF-2, and FP-1039 blocks FGF-2
- GSK completed enrollment of 25 previously untreated malignant pleural mesothelioma patients in combination with pemetrexed/cisplatin
- Updated clinical trial data accepted as an oral presentation at the ESMO 2017 Congress in September

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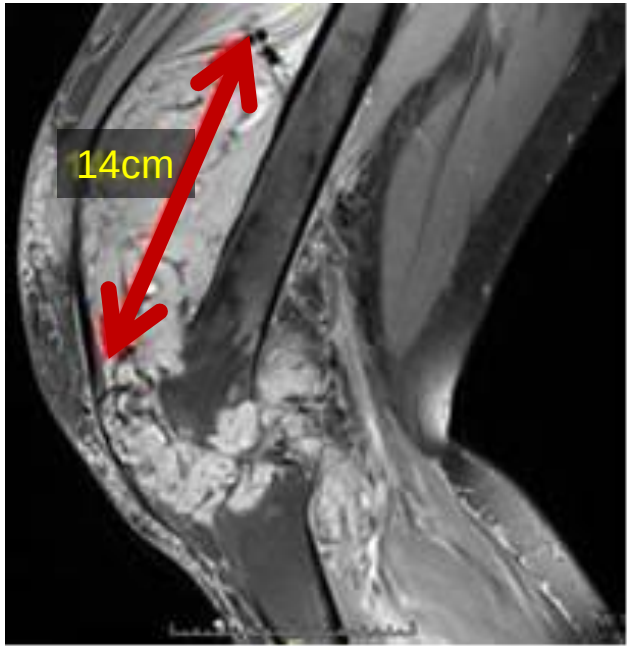
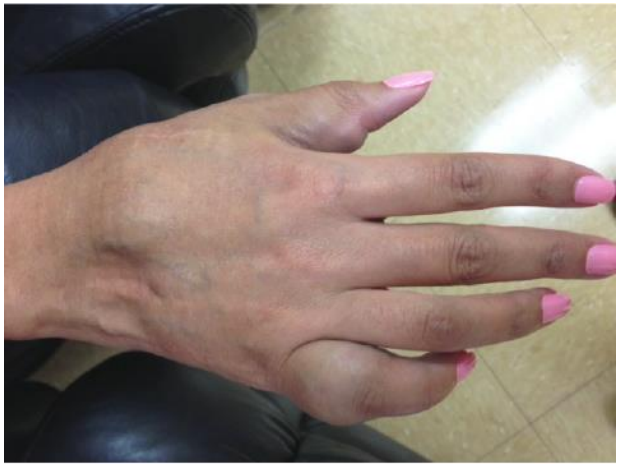
Cabiralizumab in Pigmented Villonodular Synovitis (PVNS) – Attractive Market for Five Prime

- A CSF-1-driven locally aggressive tumor of the joint
- Patients usually diagnosed young – often a life-long disease
- Symptoms: pain, lack of mobility, swelling, fatigue and disfigurement
- No approved therapies
- Cabiralizumab has orphan drug designation
  - ~25,000 patient prevalence in the U.S for the diffuse form

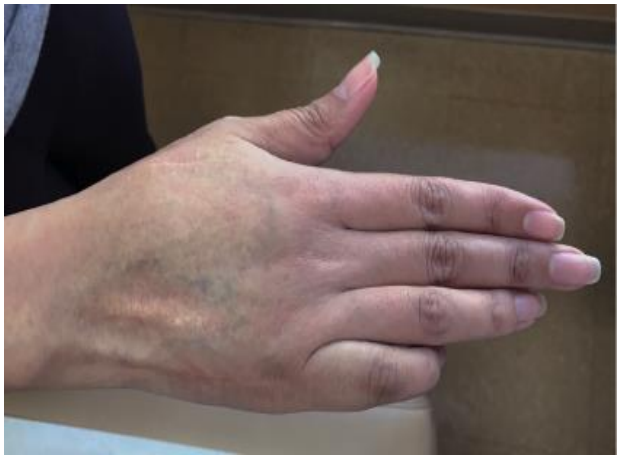


PVNS Market Research – Encouraging Patient and Physician Feedback

- Patients diagnosed by orthopedists or orthopedic oncologists before referral to medical oncologists
- Surgery is currently the only treatment for PVNS, but patients often progress after
- Recent preliminary research study[1] results:
  - Patients and physicians are enthusiastic about a potential injectable treatment to delay or prevent repeat surgery
  - Oncologists found cabira's potential efficacy profile in PVNS attractive
  - Oncologists didn't cite any major barriers to prescribing, especially given lack of currently approved drugs



Before treatment[2]



After 5 cabiralizumab doses at 4 mg/kg

1. FPRX Market Research of ~50 patients and physicians
2. ASCO 2017 data presentation; 29-year-old female with PVNS treated with cabiralizumab

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Clinical Development Strategy is to Move FPA144 into Front-Line Treatment of FGFR2b+ Gastric Cancer

Estimated Incidence of Addressable Metastatic Gastric and GE Junction Adenocarcinoma Patients

	US[1]	EU5*[1]	Japan[1]	China (urban) Estimated[2]
1st line patients	16,630	38,700	72,800	163,800
Treatment eligible (10% FGFR2b+)	1,663	3,870	7,280	16,380

- Global pricing for recently launched biologics range ~$6,500 to >$14,000/month[2]
- Median PFS of FOLFOX alone in front-line gastric cancer treatment: 6 - 7 months[3]

***EU5 = France, Germany, Italy, Spain, UK**

1. Decision Resources Group, *Market Forecast Assumptions – Gastric Cancer*, October 2016
2. GlobalData 2015
3. ASCO 2014

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Summary of Cash and Cash Guidance

CASH, CASH EQUIVALENTS & MARKETABLE SECURITIES

$350.7 million as of June 30, 2017

FY 2017 ESTIMATED NET CASH USED IN OPERATIONS

<$120 million

ESTIMATED CASH, CASH EQUIVALENTS & MARKETABLE SECURITIES

Estimate ending 2017 with slightly less than $300 million

SHARES OUTSTANDING

28.8 million (as of June 30, 2017)

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Summary of Financial Results

(as of June 30, 2017; In Millions Except Per Share Amounts)

	2Q17	2Q16	YTD 2017	YTD 2016
Revenue	$7.8	$9.2	$18.0	$15.7
R&D	$41.7	$22.2	$75.5	41.0
G&A	$9.4	$8.1	$19.8	$16.2
Net (loss)	($44.3)	($13.1)	($77.7)	($26.2)
LPS Basic & Diluted	($1.58)	$(0.49)	($2.79)	($0.98)

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2017 News Flow and Anticipated Milestones

Cabiralizumab

Bristol-Myers Squibb

Multiple I-O Tumor Settings

- Expect to complete Phase 1b (7 settings) enrollment 2H17
- Plan to announce initial data at SITC

PVNS (Monotherapy)

- Enrolling additional patients to refine the dosing schedule
- Seek regulatory agency guidance on pivotal trial

FPA144 Gastric Cancer

- Preparing for Phase 1 chemo combination trial to begin by the end of 2017
- Planning for a global registrational front-line chemo combination trial

FP-1039 Mesothelioma

- Oral presentation on updated clinical trial data at ESMO

Research

- 1 IND filing planned by 4Q17; 2 potential 2018 INDs
- FPA150 (B7-H4 antibody) oral poster discussion at ESMO
- FPT155 (CD80-Fc) abstract submitted to AACR-NCI-EORTC

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Thank You

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