Idera Pharmaceuticals
September 2018 Corporate Update

Forward Looking Statements and Other Important Cautions

- This presentation contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. All statements, other than statements of historical fact, included or incorporated in this presentation, including statements regarding our strategy, future operations, collaborations, intellectual property, cash resources, financial position, future revenues, projected costs, prospects, plans, and objectives of management, are forward-looking statements. The words "believes," "anticipates," "estimates," "plans," "expects," "intends," "may," "could," "should," "potential," "likely," "projects," "continue," "will," and "would" and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. We cannot guarantee that we will actually achieve the plans, intentions or expectations disclosed in our forward-looking statements and you should not place undue reliance on these forward-looking statements. There are a number of important factors that could cause our actual results to differ materially from those indicated or implied by our forward-looking statements. Factors that may cause such a difference include: whether interim results from a clinical trial will be predictive of the final results of the trial, whether results obtained in preclinical studies and clinical trials will be indicative of the results that will be generated in future clinical trials, including in clinical trials in different disease indications; whether products based on our technology will advance into or through the clinical trial process on a timely basis or at all and receive approval from the United States Food and Drug Administration or equivalent foreign regulatory agencies; whether, if our products receive approval, they will be successfully distributed and marketed; and such other important factors as are set forth under the caption "Risk Factors" in the Company's Annual Report and on Form 10-K for the period ended December 31, 2017 and on Form 10-Q for the period ended June 30, 2018. The forward-looking statements contained in this presentation reflect our current views with respect to future events, and we assume no obligation to update any forward-looking statements except as required by applicable law.

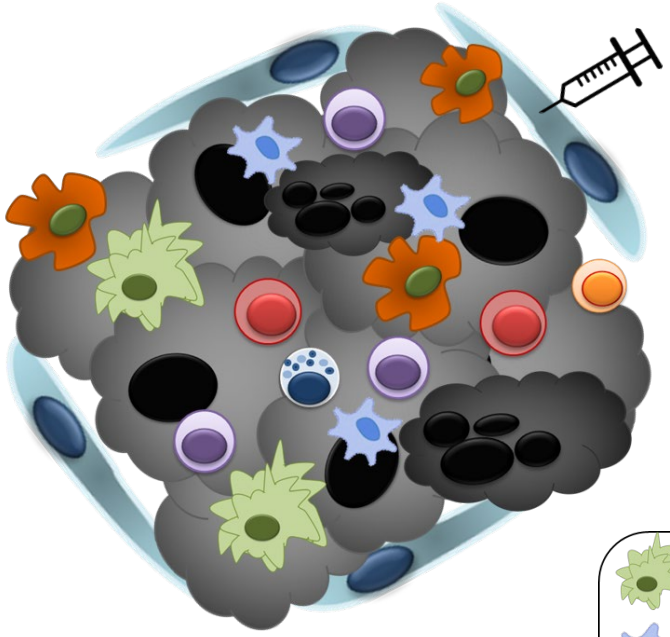
Injecting a New Approach to Advancing Cancer Immunotherapy

Activating the Immune Response with TLR9 Agonist

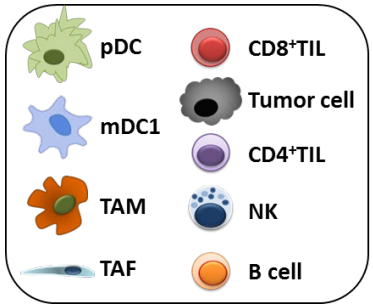
Current State of Immunotherapy in Melanoma

- Anti-PD-1 therapy is standard of care in all patients in 1L metastatic setting, and moving into adjuvant
- **Treatment options following failure of first line anti-PD-1 therapy in melanoma are very limited**
- **The overall response rate (ORR) to ipilimumab following progression on pembrolizumab is only 13%, and not all responses are durable (Long, 2016)**
- In presence of liver metastasis, pembrolizumab was associated with reduced response and shortened PFS (Tumeh, 2017)

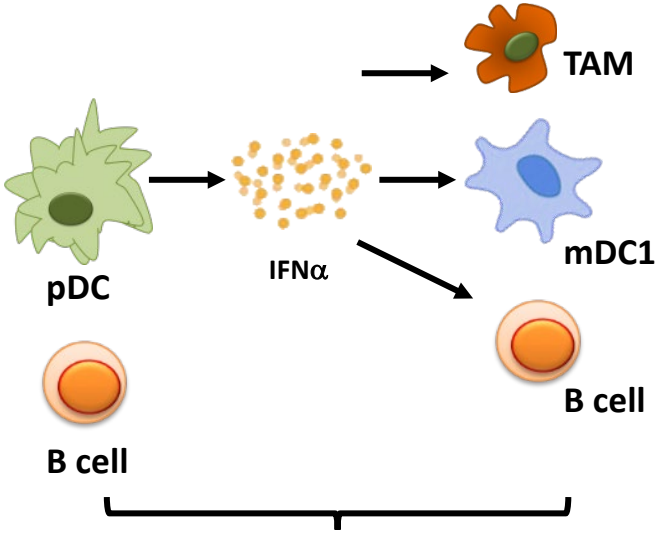
Tumor Microenvironment Modulation Potential Key to Significantly Advancing I/O Outcomes



Intratumoral administration of IMO-2125

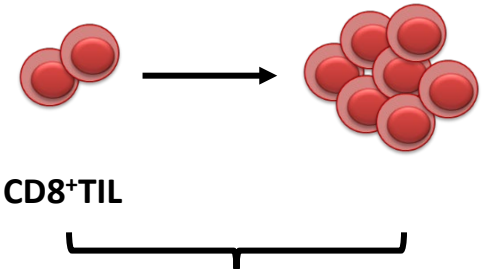


1. TLR9 induction of IFNα and APC maturation



Activation of APCs to improve T-cell priming

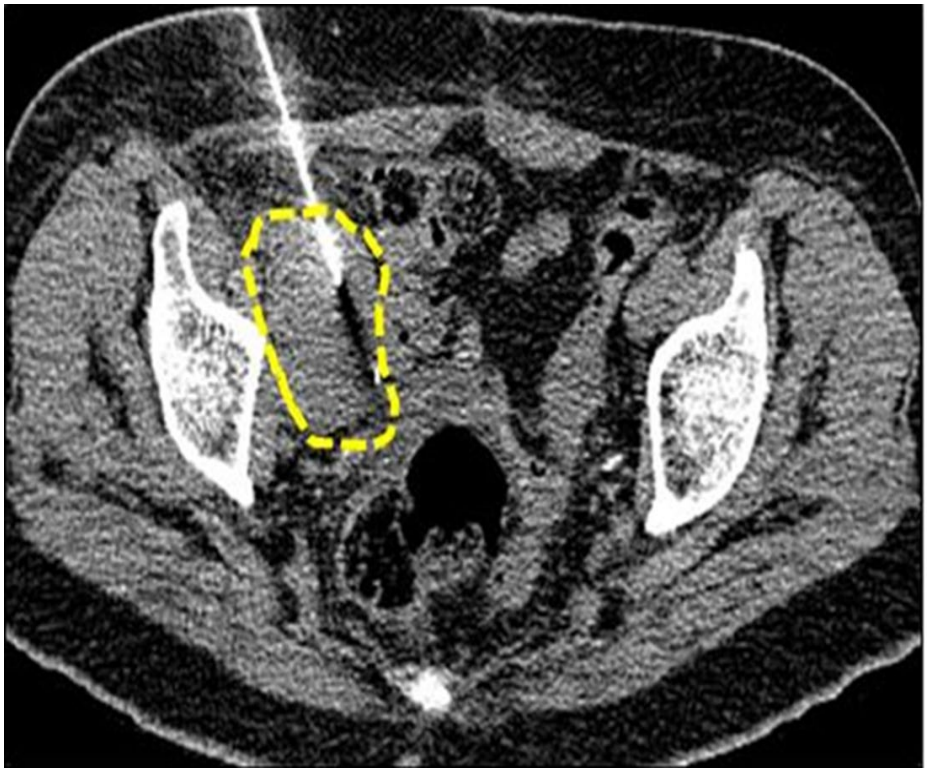
2. TIL Activation and Proliferation



Improved antigen presentation results in TIL activation and proliferation

Key Attributes of Tilsotolimod

- Stimulator of innate and adaptive immunity
- Convenient administration:
  - Non-infectious
  - No need for a device (e.g. electroporation)
- **Can be administered to deep lesions or viscera (with radiology guidance)**
  - **Key for refractory patients**
- Single site of injection
  - Total duration of Rx is 6 months for IMO + ipilimumab combination



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Tilsotolimod Clinical Trials

FDA Fast Track Designation in anti PD-refractory melanoma, with ipilimumab

Study	IMO-2125	Indication	Ph 1	Ph 2	Ph 3
204	+ ipilimumab	PD-1 R/R melanoma			
204	+ pembrolizumab	PD-1 R/R melanoma			
301*	+ ipilimumab	PD-1 R/R melanoma			
RST-001	Single agent	Refractory solid tumors			

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Patients only require Tilsotolimod therapy for up through week 29

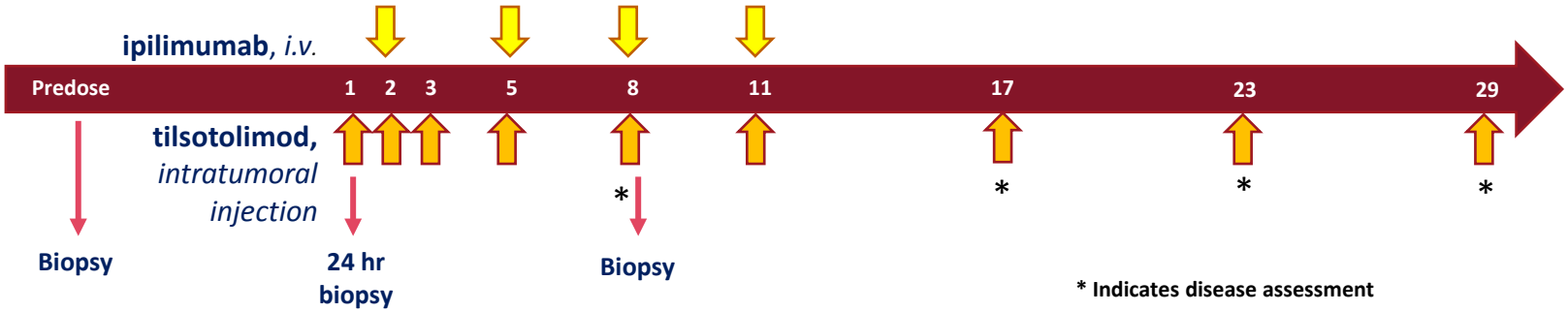
Patients:	Adults with unresectable or metastatic melanoma

- Radiologic (RECIST v1.1) or symptomatic progression on or after a PD-1 inhibitor
- ≥21d from most recent aPD-1
- Prior ipilimumab allowed
- BRAFwt: 2 lines systemic therapy
- $BRAF^{V600}$: 3 lines systemic therapy
- Ocular melanoma excluded

Phase 1 dose-finding (n=18)
tilsotolimod (4, 8, 16, 32 mg) + ipilimumab
DOSE SELECTION COMPLETED

↓

Phase 2 (n ≈ 60)
tilsotolimod 8mg + ipilimumab
OPEN



Illuminate 204 patient and baseline disease characteristics

Characteristic	N = 26 (%)	Prior Treatment	N = 26 (%)
Median Age (range)	**68.5 (39, 91)**	**Any previous PD-1 inhibitor***	**26 (100%)**
ECOG PS 0	16 (66.7%)	CTLA-4 inhibitor	6 (23.1%)
Mucosal	2 (7.7%)	PD-1 inhibitor monotherapy	17 (65.4%)
Elevated LDH	9 (34.6%)	CTLA-4 + PD-1 combo	5 (19.2%)
$BRAF^{V600}$ mutation	11 (42.3%)	Other PD-1 combo	8 (30.8%)
Stage IV **M1c**	**23 (88.5%)** **11 (42.3%)**	BRAFi	1 (3.8%)
Brain metastasis	3 (11.5%)	MEKi	1 (3.8%)

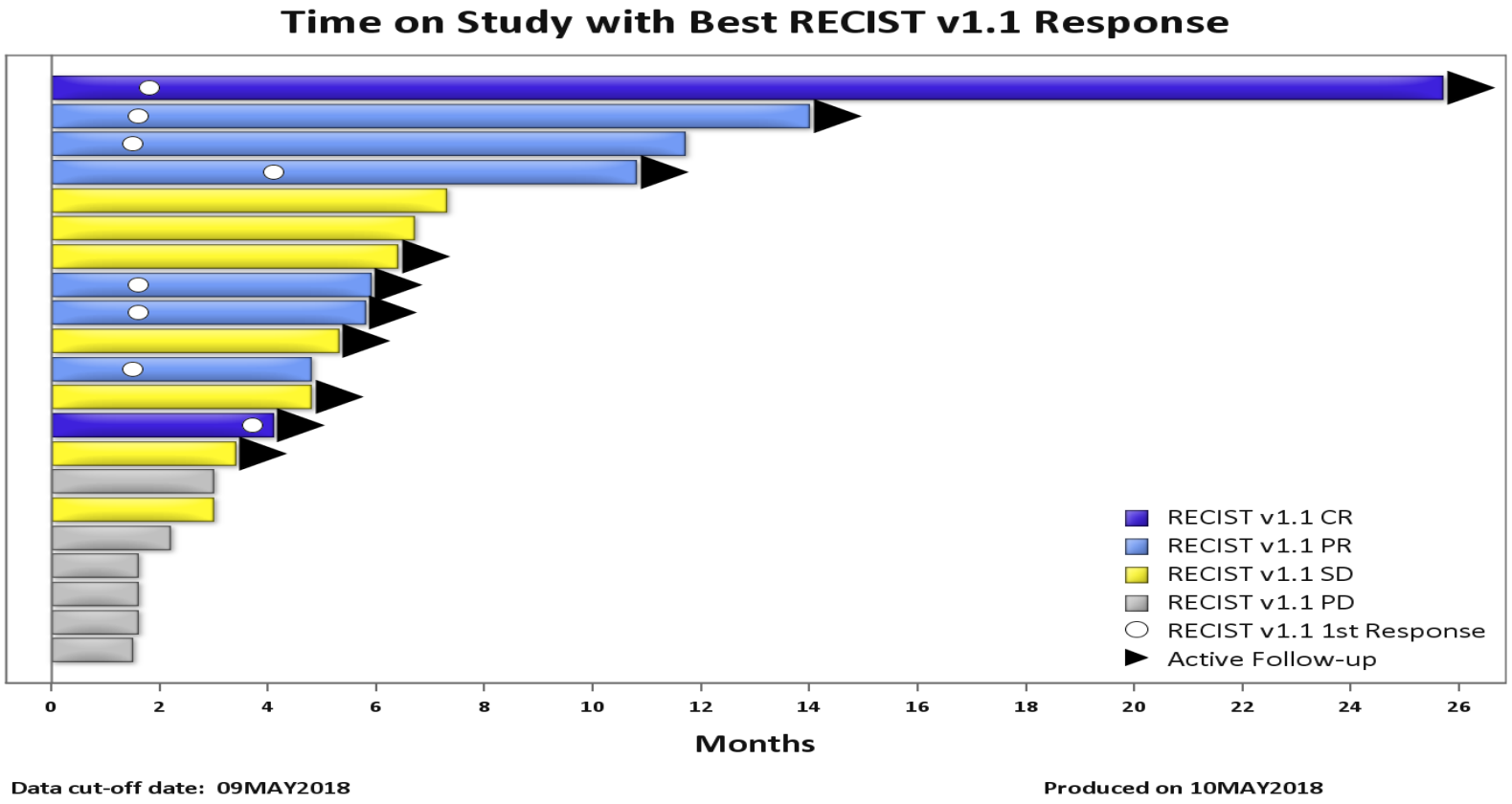
*PD-1 refractory requirement added May 2016

ILLUMINATE-204 safety analysis

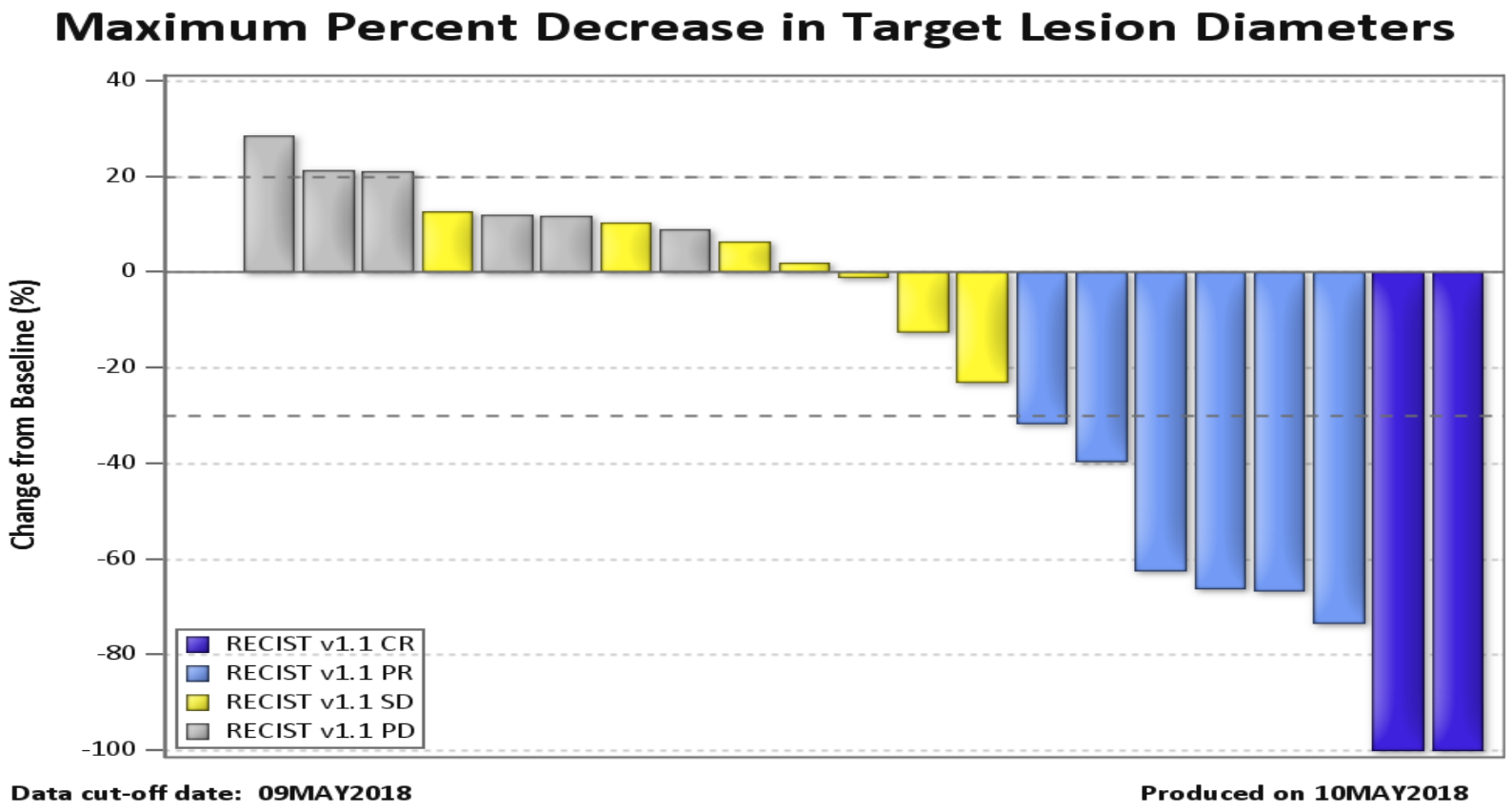
Safety Analysis	Subjects treated with tilsotolimod + ipilimumab (N=26)
At Least One AE	25 (96.2%)
At Least One Serious AE	9 (34.6%)
At Least One Grade ≥3 AE	13 (50.0%)
AE Leading to tilsotolimod Withdrawn	2 (7.7%)
AE Leading to Study Discontinuation	**0 (0.0%)**
Death	**0 (0.0%)**
Maximum Severity[1]	
Grade 1	2 (7.7%)
Grade 2	10 (38.5%)
Grade 3	11 (42.3%)
Grade 4	2 (7.7%)
Grade 5	0 (0.0%)
Relationship to Study Drugs	
Related	22 (84.6%)
Unrelated	3 (11.5%)

Safety population (n=26 as of 9 April 2018)

RECIST v1.1 Objective Response Rate: 38.1%; Disease Control Rate: 71.4%



Deep Responses Observed



Best overall response

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	tilsotolimod + ipilimumab (N=21)[1]
	Response Rate
Best Overall Tumor Response	
Complete Response (CR)	2 of 21 (9.5%)[2]
Partial Response (PR)	6 of 21 (28.6%)
Stable Disease (SD)	7 of 21 (33.3%)
Progressive Disease (PD)	6 of 21 (28.6%)
Overall Response Rate (CR, uCR, or PR)	8 of 21 (38.1%)
Disease Control Rate (CR, PR, or SD)	15 of 21 (71.4%)

As of 9 May 2018

[1] 21 of 26 subjects had a least 1 post-baseline disease assessment at time of data cut
[2] One CR unconfirmed

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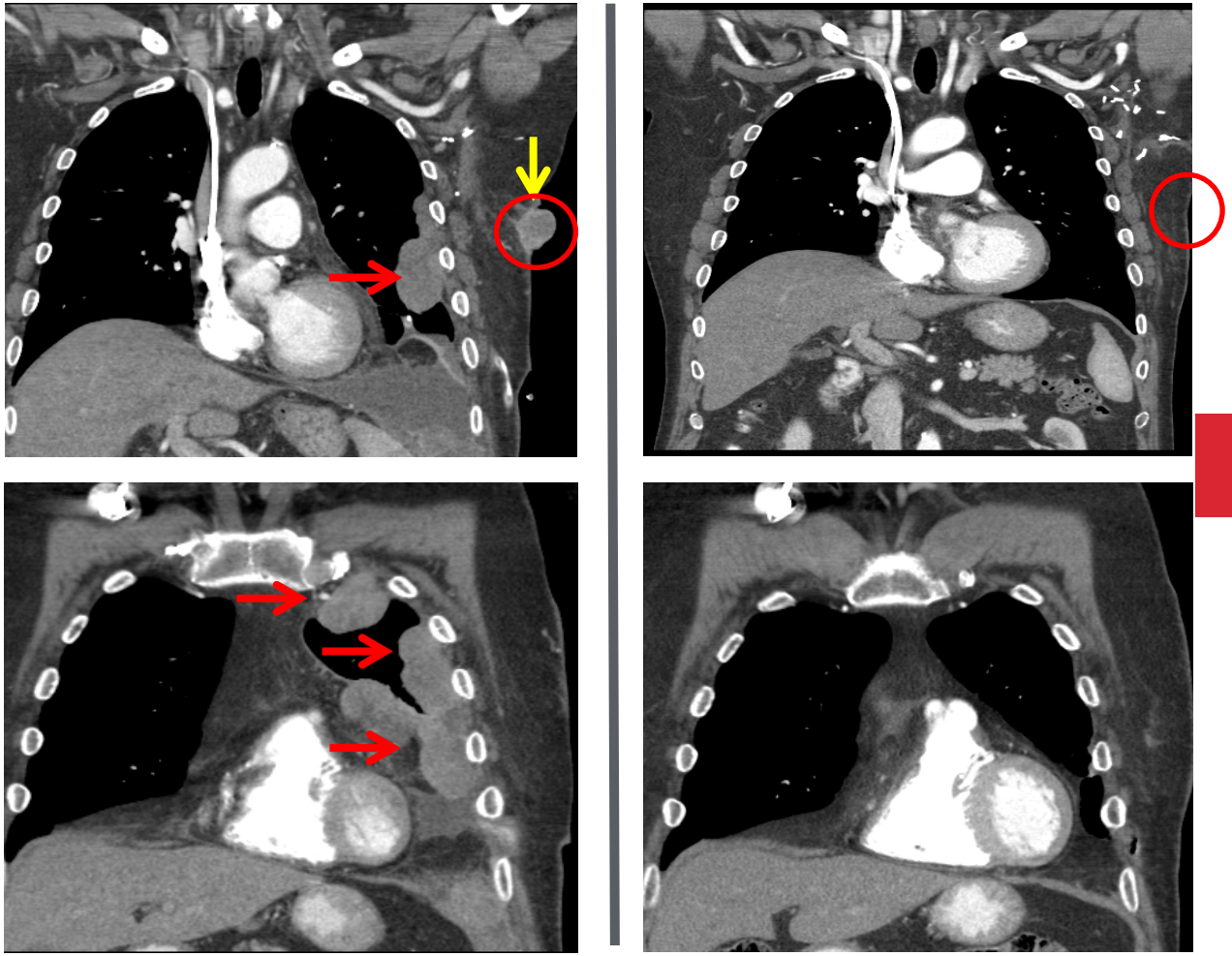
Patient 004 Remains a CR since May 2016



Pre-Therapy 03/2016

Post-Therapy 08/2016

Injected Lesion

Distant Lesions

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IMO-2125 Clinical Trials
2125-MEL-301

Phase 3 Trial Design

Unresectable or metastatic melanoma w/ confirmed radiologic progression on or after a PD-1 inhibitor:

- **≥21d from most recent aPD-1 and no intervening systemic Tx**
- **No prior ipi (except adjuvant)**
- **Ocular melanoma excluded**

N~300

Ipilimumab 3 mg/kg Q3wks for 4 doses

No cross-over

Ipilimumab (same, beginning wk 2)
+
intratumoral IMO-2125,
wks 1, 2, 3, 5, 8, 11, 16, 20, 24

1^0 endpoint family:
- OS
- ORR (RECIST v1.1)

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IMO-2125 Clinical Trials

2125-MEL-301

- Agreement with FDA and MHRA on design and path forward for regular and accelerated approval (one study)
- Fast Track Designation Granted by U.S. FDA in Q4 2017
- Trial initiated Q1 2018
- Global trial (US, Can, EU, Aus)
  - ~300 patients
  - ~80 sites planned (26 sites open for enrollment)

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IMO-2125 Clinical Trials

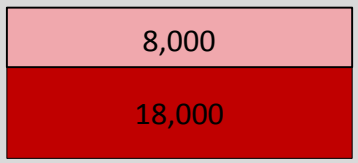
Growth/Partnering Opportunities

INTRODUCE

Unresectable metastatic melanoma

- High unmet need in anti-PD1-refractory patients
- Peak year sales estimate > $500 million

Est. U.S. addressable patient population at 2025[1]

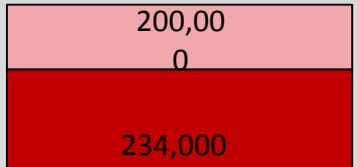


EXPAND

Emerging I/O addressable tumors

- Moderate response to cornerstone anti-PD1
- Increasing number of approved settings

Est. U.S. addressable patient population at 2025[1,2]



TRANSFORM

"Cold" tumors unaddressable with current I/O

- Significant opportunity in tumors with:
  - Low mutation load
  - Low dendritic cell infiltration
- Bioinformatics research ongoing to identify attractive tumor targets

[1] Proprietary Idera Commercial Research
[2] NSCLC, head and neck, colorectal, bladder and gastric

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IMO-2125 Clinical Trials

2125-RST-101

Monotherapy Trial Refractory Solid Tumors - Update

- Objective:
  - Assess safety and efficacy as monotherapy
  - Hypothesis generating for other solid tumors and/or combinations
- Expectations:
  - Based on MOA, would expect little to no efficacy in the absence of CPI combination
- Several interesting observations have been generated with several patients experience periods of SD
- Next Steps:
  - Completing last cohort of dose escalation
  - Collecting and analyzing translational data

Post-Q2 Financials

- Improved capital and cost structure
  - Execution of reverse stock split
  - Consolidated of company into Exton, PA

- Ended Q2 2018 with $94 million
  - Expected cash runway into 1st Quarter of 2020
  - Upcoming Milestones:
    - ESMO 2018 (October)
    - Full ILLUMINATE 204 Data Mid-2019
    - Beyond Melanoma Expansion Activities