

## Inducible T-cell co-stimulatory (ICOS) receptor agonist, feladilimab, alone and in combination with pembrolizumab: results from INDUCE-1 relapsed/refractory melanoma expansion cohorts

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# Disclosure Information

## Michele Maio

I have the following financial relationships to disclose:

Advisor/Consultant for: BMS, Roche, AZ, MSD, Merck, PierreFabre, and Alfasigma

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Employee of: University Hospital of Siena

I will discuss the following off-label use and/or investigational use in my presentation:

*Inducible T-cell co-stimulatory (ICOS) receptor agonist, feladilimab, alone and in combination with pembrolizumab: results from INDUCE-1 relapsed/refractory melanoma expansion cohorts*

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# ICOS Agonist mAb Feladilimab

An investigational immunotherapy for R/R melanoma

Inducible T-cell co-stimulator (ICOS) is a member of the CD28 Ig receptor superfamily, which includes CTLA-4 and PD-1 and has a pivotal role in stimulating T-cell survival and function<sup>1-3</sup>

Feladilimab is a first-in-class humanized IgG4 mAb selected for its agonist activity through the ICOS receptor, with low/no T-cell depleting effects<sup>4</sup>

Metastatic melanoma is an immunotherapy-responsive malignancy, with approved therapies including anti-PD-(L)1 and anti-CTLA-4 agents<sup>5</sup>

- Anti-CTLA-4 agents have been shown to increase ICOS expression; ICOS is a biomarker of increased response and survival in patients with unresectable melanoma and mesothelioma treated with anti-CTLA-4 agents<sup>6,7</sup> (**Table 1**)
- In nonclinical models, antitumor activity of ICOS agonists is enhanced in combination with CTLA-4/PD-1 blockade<sup>4,8-13</sup>

Table 1. CD4<sup>+</sup> ICOS<sup>+</sup> circulating T-cell count following ipilimumab treatment in advanced melanoma<sup>6</sup>

CD4 <sup>+</sup> ICOS <sup>+</sup> T cells, count/ $\mu$ L, mean (range)	Responders (N=6)	Non-responders (N=11)
Baseline	6.7 (1.8–15)	8.1 (0.9–24.0)
Week 7	<b>50.6 (7.0–93.0)</b>	<b>28.6 (1.4–95.0)</b>
Week 12	<b>72.6 (26.0–170)</b>	<b>26.7 (1.3–101.0)</b>
Week 24	17.2 (6.0–34.0)	11.2 (6.0–19.0)

CD, cluster of differentiation; CTLA-4, cytotoxic T-lymphocyte associated protein-4; ICOS, inducible T-cell co-stimulator; Ig, immunoglobulin; mAb, monoclonal antibody; PD-(L)1, programmed cell death protein 1/ligand 1; R/R, relapsed/refractory. 1. Huttloff A, et al. *Nature* 1999;397:263–6; 2. Sharpe AH, et al. *Nat Rev Immunol* 2002;2:116–26; 3. Simpson TR, et al. *Curr Opin Immunol* 2010;22:326–32; 4. Brett S, et al. ESMO 2018 poster presentation: Abstract 1840P; 5. Albittar A, et al. *Adv Exp Med Biol* 2020;1244:51–68; 6. Di Giacomo AM, et al. *Cancer Immunol Immunother* 2013;62:1021–8; 7. Calabró L, et al. *Lancet Oncol* 2013;14:1104–11; 8. Yadavilli S, et al. AACR 2017 poster presentation: Abstract 1637; 9. Coutzac C, et al. AACR 2019 poster presentation: Abstract 2668; 10. Zamarin D, et al. *Nat Commun* 2017;8:14340; 11. Fan X, et al. *J Exp Med* 2014;211:715–25; 12. Waight JD, et al. AACR 2020 poster presentation: Abstract:2220; 13. Waight JD, et al. AACR 2021 poster presentation: Abstract:1849.

# INDUCE-1 Study Design

A phase I study of feladilimab ± pembrolizumab

INDUCE-1 is an open-label, FIH study evaluating the safety, tolerability, pharmacokinetics, pharmacodynamics, and antitumor activity of feladilimab ± pembrolizumab in select advanced solid tumors

## Part 1A: Monotherapy dose escalation

Feladilimab IV Q3W



Multiple selected solid tumors



## Part 1B: Monotherapy expansion†

Randomized 1:1

Feladilimab 0.3 mg/kg (N=21) or  
1 mg/kg (N=18) IV Q3W

Melanoma cohort

## Part 2A: Combination dose escalation\*

Feladilimab IV Q3W +  
pembrolizumab 200 mg IV Q3W



Multiple selected solid tumors



## Part 2B: Combination expansion

Randomized 1:1

Feladilimab 0.3 mg/kg (N=6) or  
1 mg/kg (N=11) IV Q3W +  
pembrolizumab 200 mg IV Q3W

Melanoma cohort

## Melanoma population

- Non-uveal R/R melanoma
- ≤5 lines of systemic therapy
- Prior response or SD if PD-(L)1-experienced
- No prior immunotherapy-related Grade ≥3 toxicities leading to treatment discontinuation‡

## Study endpoints

- Safety: AEs/TRAES/SAEs
- PK/PD
- Efficacy§: ORR, DoR, DCR, OS
- Exploratory biomarker analyses (e.g., ICOS IHC)

Here we report preliminary efficacy, safety, and PK data from the expansion cohorts of feladilimab ± pembrolizumab in R/R melanoma

\*Starting dose of feladilimab two dose levels below Part 1A monotherapy dose deemed safe with PD activity; †for ≤2 years or until disease progression/unacceptable toxicity; ‡prior toxicity to checkpoint inhibitors was acceptable as long as no discontinuation from treatment; §irRECIST for response endpoints, RECISTv1.1 for disease assessments. AE, adverse event; DCR, disease control rate; DoR, duration of response; EC, expansion cohort; FIH, first-in-human; ICOS, inducible T-cell co-stimulator; IHC, immunohistochemistry; IV, intravenous; ORR, overall response rate; OS, overall survival; PD, pharmacodynamics; PD-(L)1, programmed cell death protein 1/ligand 1; PK, pharmacokinetics; Q3W, once every 3 weeks; (ir)RECIST, (immune-related) Response Evaluation Criteria in Solid Tumours; R/R, relapsed/refractory; SAE serious adverse event; SD, stable disease; TRAE, treatment-related adverse event

# Patient Baseline Characteristics

All patients are immune checkpoint inhibitor-experienced

As of 6 November 2020, 39 and 17 patients were enrolled in the monotherapy and combination melanoma ECs, respectively

- mDoF was 8.5 months (range: 1.5–26.1) and 5.2 months (range: 1.5–27.2), respectively

	Monotherapy EC (N=39)	Combination EC* (N=17)
Sex, n (%), female / male	15 (38) / 24 (62)	9 (53) / 8 (47)
Median age, years (range)	52 (25–79)	60 (32–78)
M stage at study entry, n (%)		
M1a	12 (31)	4 (24)
M1b	9 (23)	5 (29)
M1c	17 (44)	7 (41)
M1d	1 (3)	1 (6)
Number of prior LOT in advanced/metastatic setting, n (%)		
0–1	14 (36)	8 (47)
2–3	18 (46)	4 (24)
4–5	7 (18)	5 (29)

	Monotherapy EC (N=39)	Combination EC* (N=17)
Time since last progression, days, median (range) <sup>†</sup>	50 (10–969) <sup>‡</sup>	55 (18–94) <sup>§</sup>
Time since diagnosis, years, median (range) <sup>¶</sup>	3.2 (1.2–10.4) <sup>**</sup>	3.9 (0.7–10.5) <sup>††</sup>
Prior immunotherapy, n (%)		
Anti-PD-(L)1	<b>39 (100)</b>	<b>17 (100)</b>
Anti-CTLA-4	<b>21 (54)</b>	<b>12 (71)</b>
Other <sup>‡‡</sup>	13 (33)	3 (18)
Prior targeted therapy, n (%)		
BRAF inhibitor	7 (18)	3 (17)

\*PD-(L)1-experienced efficacy analysis population N=17 excluded four PD-(L)1-naïve patients; safety population N=21; <sup>†</sup>first dose date to date of last progression + 1; <sup>‡</sup>N=35; <sup>§</sup>N=13; <sup>¶</sup>first dose start date to date of initial diagnosis + 1; <sup>\*\*</sup>N=27; <sup>††</sup>N=12; <sup>‡‡</sup>includes cytokine therapy (i.e., interferon alpha), anti-LAG3, anti-4-1BB, epacadostat, tebentafusp, and T-VEC.

BRAF, B-raf proto-oncogene, serine/threonine kinase; CTLA-4, cytotoxic T-lymphocyte associated protein-4; EC, expansion cohort; LOT, lines of therapy; mDoF, median duration of follow-up; PD-(L)1, programmed cell death protein 1/ligand 1

# Safety: AE Overview

Safety profile is manageable

Feladilimab had a manageable safety profile in both monotherapy and combination ECs

- The majority of TRAEs were Grade 1 or 2
- No Grade 5 TRAEs, with one Grade 5 AE

n, (%)	Monotherapy EC (N=39)	Combination EC* (N=21)
Any AE	36 (92)	21 (100)
TRAEs	22 (56)	15 (71)
Grade ≥3 TRAEs	2 (5)	3 (14)
AEs leading to permanent discontinuation of study treatment	1 (3) <sup>†</sup>	0
AEs leading to dose interruption/delay	10 (26)	5 (24)
Any SAEs	10 (26)	11 (52)
Grade 5 TRAEs	0	0

\*N=21 all-treated safety analyses population, which included four PD-(L)1-naïve patients that were not included in the efficacy population (N=17); <sup>†</sup>AE leading to permanent discontinuation was fast progression and unrelated to study treatment.

AE, adverse event; EC, expansion cohort; SAE, serious adverse event; TRAE, treatment-related adverse event

# Safety: TRAEs Reported in $\geq 2$ Patients

No novel or unexpected toxicities observed

- No added toxicity was observed when feladilimab was used in combination with pembrolizumab
- No novel or unexpected TRAEs were observed
- The numbers of patients with TRAEs was similar between doses evaluated in both monotherapy and combination EC

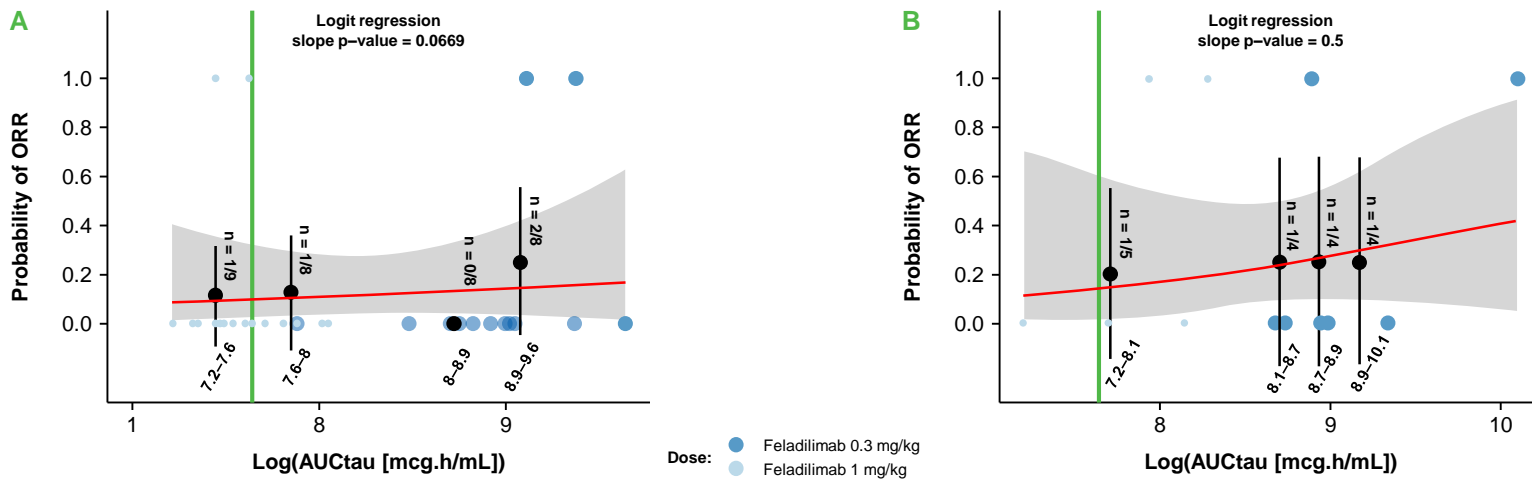
n, (%)	Monotherapy EC (N=39)			Combination EC* (N=21)		
	Grade 1	Grade 2	Grade $\geq 3$	Grade 1	Grade 2	Grade $\geq 3$ <sup>†</sup>
Asthenia	6 (15)	4 (10)	0	2 (10)	1 (5)	0
Pruritus	6 (15)	0	0	2 (10)	0	0
Arthralgia	2 (5)	2 (5)	0	1 (5)	0	0
Decreased appetite	2 (5)	1 (3)	0	1 (5)	0	0
Nausea	3 (8)	1 (3)	0	1 (5)	0	0
Diarrhea	3 (8)	0	0	2 (10)	1 (5)	0
Fatigue	1 (3)	1 (3)	0	2 (10)	0	0
Alanine aminotransferase increased	0	2 (5)	0	1 (5)	1 (5)	1 (5)
Aspartate aminotransferase increased	1 (3)	1 (3)	0	2 (10)	0	1 (5)
Vomiting	2 (5)	0	0	0	0	0
Amylase increased	0	0	0	1 (5)	1 (5)	0

\*N=21 all-treated safety analyses population, which included four PD-(L)1-naïve patients that were not included in the efficacy population (N=17); <sup>†</sup>no Grade 5 TRAEs were reported; TRAEs reported in  $\geq 2$  patients shown.

EC, expansion cohort; TRAE, treatment-related adverse event

- PK of feladilimab was dose proportional between 0.01 to 10 mg/kg as monotherapy and 0.01 to 3 mg/kg as combination therapy, with no difference in PK between monotherapy and combination therapy
- Exposure-ORR relationship analysis confirmed similarity of responses at doses of 0.3 and 1 mg/kg for both monotherapy and combination therapy in the melanoma cohorts

### Regression analysis of exposure-ORR relationship for A) monotherapy EC and B) combination EC\*



\*N=33 for monotherapy EC, N=17 for combination EC (patients for whom a PK sample was available and analyzed); green vertical bars indicate typical value at 24 mg Q3W for an 80 kg patient. Data cutoff prior to that used for safety and efficacy analyses.

AUCtau, area under the curve over dosing interval; EC, expansion cohort; ORR, overall response rate; PK, pharmacokinetics; Q3W, once every 3 weeks



# Efficacy Results

Clinical activity observed in PD-(L)1-experienced efficacy analysis population

	Monotherapy EC (N=39)	Combination EC* (N=17)
<b>Best Overall Response, per irRECIST, n (%)†</b>		
irCR	1 (3)	0
irPR	3 (8)	3 (18)
irSD	10 (26)	6 (35)
irSD≥18 wks	5 (13)	3 (18)
irPD	21 (54)	5 (29)
NE‡	4 (10)	3 (18)
<b>ORR, n (%)</b>	<b>4 (10)</b>	<b>3 (18)</b>
95% CI	(2.9, 24.2)	(3.8, 43.4)
<b>DCR (irCR+irPR+irSD), n (%)</b>	<b>14 (36)</b>	<b>9 (53)</b>
95% CI	(21.2, 52.8)	(27.8, 77.0)
<b>DCR (irCR+irPR+irSD ≥18 wks), n (%)</b>	9 (23)	6 (53)
95% CI	(11.1, 39.3)	(14.2, 61.7)
<b>Median OS, months</b>	10.6	10.8
95% CI	(6.5, 17.1)	(2.9, 24.1)
<b>OS at 6 months</b>	<b>76%</b>	<b>61%</b>
95% CI	(59, 87)	(33, 81)

\*PD-(L)1-experienced efficacy analysis population N=17 excluded four PD-(L)1-naïve patients; safety population N=21; †unconfirmed responses per irRECIST (3/4 responses in monotherapy EC and 3/3 responses in combination EC were confirmed per both irRECIST and RECIST v1.1); ‡includes patients with no disease assessment post-baseline. irCR: disappearance of all lesions in 2 consecutive observations, at least 4 weeks apart. irPR: ≥30% decrease in tumor burden compared to baseline in 2 observations at least 4 weeks apart. irSD: 30% decrease in tumor burden compared to baseline, cannot be established nor 20% increased compared with nadir. irPD: ≥20% increase in tumor burden compared to nadir (at any single time point) in 2 consecutive observations at least 4 weeks apart. In addition, the sum must also demonstrate an absolute increase of at least 5 mm.

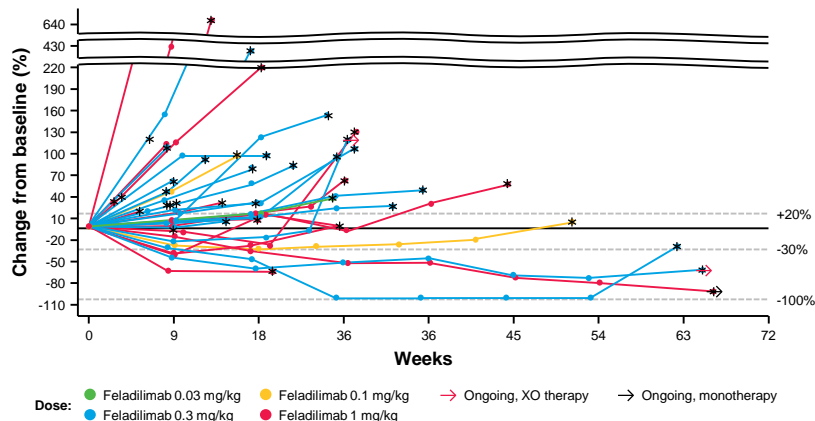
Duration of response for confirmed responders (months): monotherapy (N=3) **6.3, 10.4, 8.9+**; combination (N=3) **8, 8.2, 13.3+**

CI, confidence interval; CR, complete response; DCR, disease control rate; EC, expansion cohort; ir, immune-related; NE, non-evaluable; ORR, overall response rate; OS, overall survival; PD, progressive disease; PD-(L)1, programmed cell death protein 1/ligand 1; PR, partial response; RECIST, Response Evaluation Criteria In Solid Tumors; SD, stable disease; wks, weeks

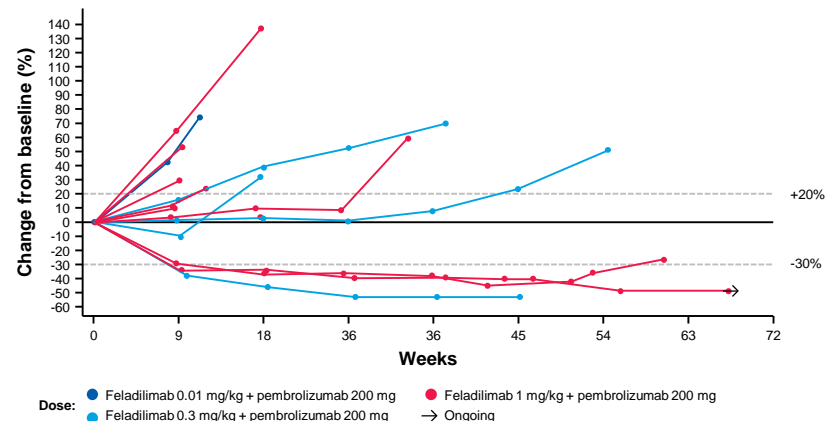
# Depth of Response

Early, deep, and durable responses observed across doses

## Monotherapy cohort†



## Combination cohort†



\* Indicates PD-(L)1 experienced patients in the monotherapy cohort; all patients shown for the combination cohort were PD-(L)1-experienced; † patients from both dose escalation and EC phases included. Dashed lines are guidelines for determining level of response, breaks in y-axis inserted to facilitate data interpretation.

PD-(L)1-experienced patients demonstrated notable responses to feladilimab monotherapy, including

- One CR and three PRs
- 2/10 (20%) patients with stable disease had tumor size reductions (irRECIST) at  $\geq 19\%$

PD-(L)1-experienced patients demonstrated notable responses to feladilimab + pembrolizumab, including

- Three PRs

# Response Rate Per irRECIST

## ORR by BRAF status and prior CTLA-4 experience

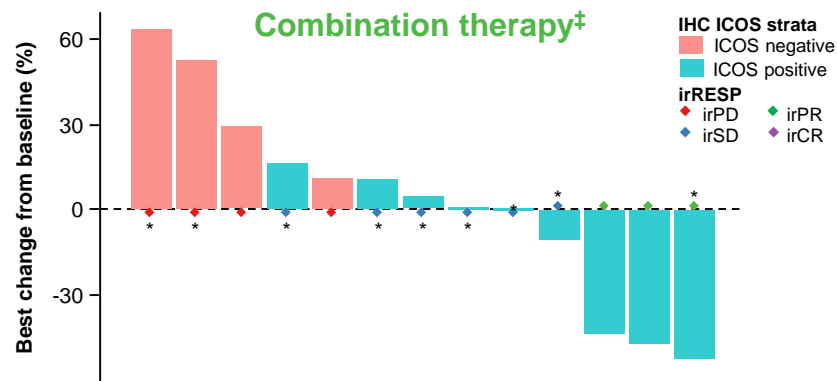
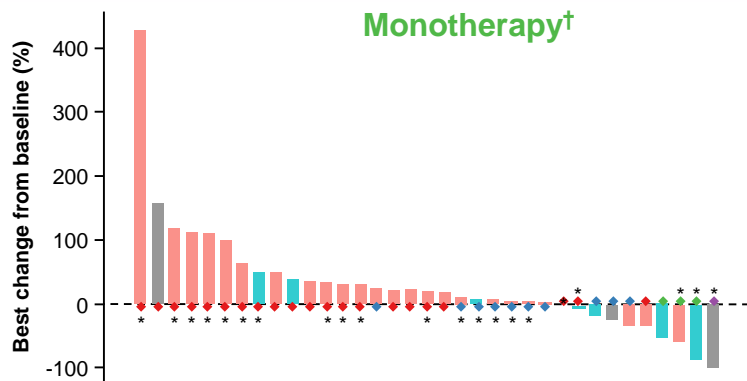
- Higher response rate in CTLA-4 treatment-experienced patients observed with feladilimab monotherapy, when compared to CTLA-4 treatment-naïve patients

ORR, % (n/N)	BRAF mutation-positive	BRAF mutation-negative	CTLA-4 treatment-experienced	CTLA-4 treatment-naïve
Monotherapy EC (N=39)	0 (0/9)	14 (4/29)	14 (3/21)	6 (1/18)
Combination EC* (N=17)	20 (1/5)	17 (1/6)	8 (1/12)	40 (2/5)

\*PD-(L)1-experienced efficacy analysis population N=17 excluded four PD-(L)1-naïve patients; safety population N=21.

# Tumor Response in ICOS-enriched Subcohorts

Higher response rates observed in ICOS positive patients



\*Indicates patients with prior CTLA-4 treatment; †N=35 patients with available tumor change from baseline data; ‡N=13 patients with available tumor change from baseline data.

	ICOS negative	ICOS positive
<b>ORR, % (n/N)</b>	4 (1/27)	29 (2/7)
<b>DCR, % (n/N)</b>	22 (6/27)	57 (4/7)
<b>DoR, range (mo)</b>	N/A	6.3–8.9+

	ICOS negative	ICOS positive
<b>ORR, % (n/N)</b>	0 (0/7)	30 (3/10)
<b>DCR, % (n/N)</b>	14 (1/7)	80 (8/10)
<b>DoR, range (mo)</b>	N/A	8.0–13.3+

## Monotherapy:

- **ORR of 29% and DCR of 57%** in ICOS positive patients
- ORR of 4% and DCR of 22% in ICOS negative patients

## Combination therapy:

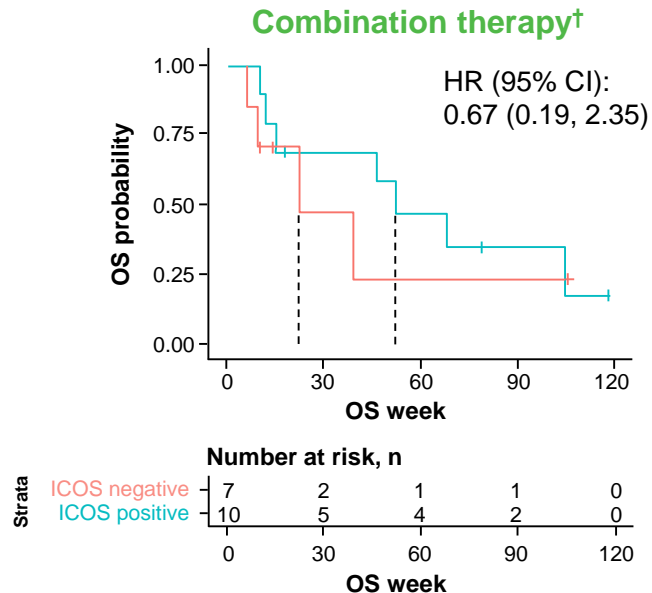
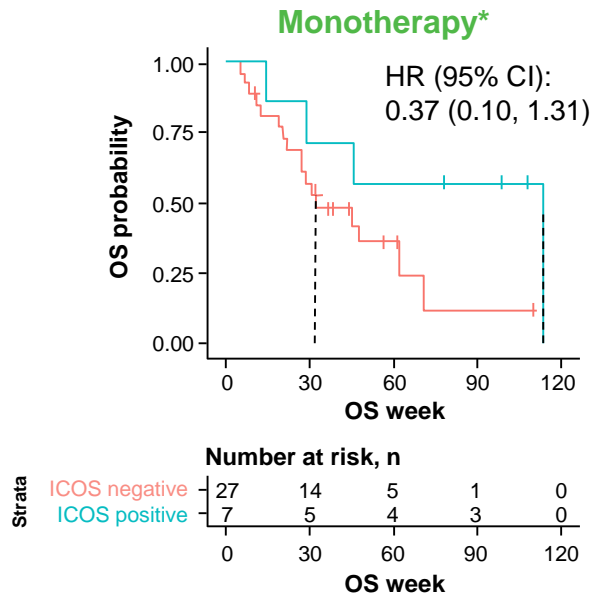
- **ORR of 30% and DCR of 80%** in ICOS positive patients
- ORR of 0% and DCR of 14% in ICOS negative expression patients

CTLA-4, cytotoxic T-lymphocyte associated protein-4; DCR, disease control rate; DoR, duration of response; ICOS, inducible T-cell co-stimulator; IHC, immunohistochemistry; irCR, immune-related complete response; irPD, immune-related progressive disease; irPR, immune-related partial response; irRESP, immune-related Response Evaluation Criteria In Solid Tumors response; irSD, immune-related stable disease; mo, months; N/A, not available; ORR, overall response rate; PD-(L)1, programmed cell death protein 1/ligand 1

# Overall Survival in ICOS-enriched Subcohorts

Improved overall survival observed in ICOS positive patients

There were 63% and 33% reductions in risk of death in the ICOS positive expression population in the monotherapy and combination therapy cohorts, respectively, when compared to the ICOS negative population



\*N=34 patients with available ICOS IHC data; †N=17 patients with available ICOS IHC data.

# Patient Case Study

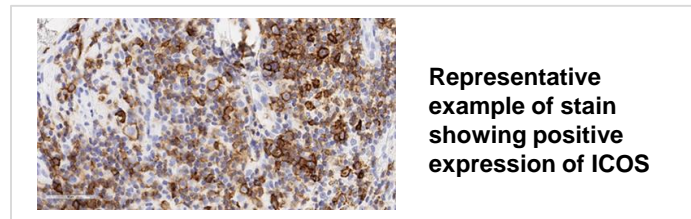
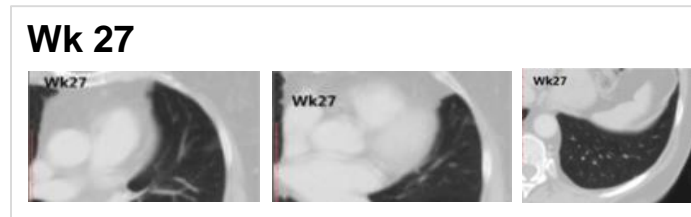
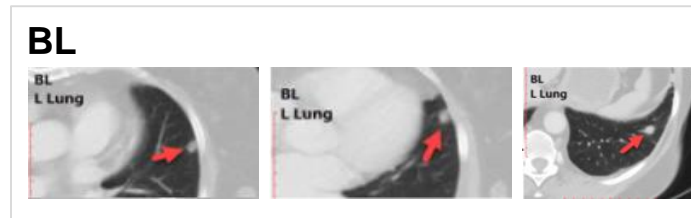
Patient achieved CR with feladilimab monotherapy

## 68-year-old female

Disease	<ul style="list-style-type: none"> <li>Initial diagnosis (Apr 2017): Stage III melanoma; mutation (BRAF, K/NRAS, cKIT, EGFR) negative</li> <li>Metastatic diagnosis (Apr 2018)</li> <li>Last progression (Jan 2019)</li> </ul>
Prior treatment	<ol style="list-style-type: none"> <li>Surgery (primary resection; May 2017; June 2017; Aug 2018)</li> <li>Pembrolizumab (May–Oct 2018) <ul style="list-style-type: none"> <li>BOR of SD* prior to PD</li> </ul> </li> <li>Ipilimumab/nivolumab (Nov 2018–Jan 2019) <ul style="list-style-type: none"> <li>BOR of SD* prior to PD</li> </ul> </li> </ol>
Study treatment	Feladilimab 0.3 mg/kg; Mar 2019–Jul 2020
Best overall response	Confirmed CR

\*Patient achieved PD per RECIST (v1.1).

TL <sub>Wk1–54</sub>	BL	Wk 9	Wk 18	Wk 27	Wk 36–54
Lung, left	11	8	6	0	0
SOD (mm)	11	8	6	0	0
% change from BL	N/A	–27	–46	–100	–100



# Conclusions



Feladilimab monotherapy and feladilimab in combination with pembrolizumab, had a **manageable safety profile in R/R melanoma**



**Responses at doses** of 0.3 and 1 mg/kg for both monotherapy and combination therapy **were comparable** as confirmed by exposure-ORR relationship analysis



Feladilimab demonstrated clinical activity as both monotherapy and in combination with pembrolizumab in heavily pre-treated, PD-(L)1-experienced patients with R/R melanoma; there was **no apparent increase in overall survival** with combining feladilimab and pembrolizumab in a limited sample set



**Feladilimab is the first ICOS agonist with reported single-agent activity in immune checkpoint inhibitor-experienced R/R melanoma, supporting ICOS as a therapeutic target**

- **Early, deep, and durable responses** were observed **across doses** in both monotherapy and combination therapy cohorts
- In a limited sample size, monotherapy **ORR** was **29%** in **biomarker-enriched (ICOS positive)** subcohorts, versus **10%** in **all-comers**
- Feladilimab monotherapy in the biomarker-enriched subcohort is currently accruing and will be evaluated further



Feladilimab is currently under evaluation for the treatment of advanced solid tumors in combination with other therapies in the ongoing pivotal adaptive phase 2/3 studies INDUCE-3 (NCT04128696) and INDUCE-4 (NCT04428333)

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# Co-author Disclosures

- **JSW** has received consultancy fees from Merck, Genentech, AstraZeneca (AZ), Pfizer, Regeneron, GlaxoSmithKline (GSK), Alkermes, Novartis, Celldex, Incyte, and EMD Serono and advisory fees from BMS, holds stocks/shares in CytoMx, Biond, and Immunimax, has held advisory roles for Celldex, CytomX, Incyte, Evaxion Biotech, Biond, Protean, CV6 Therapeutics, and Sellas, is named on a patent filed by Moffitt Cancer Center for an ipilimumab biomarker and a tumor-infiltrating lymphocyte growth method and a patent filed by Biodesix for a PD-1 biomarker, and his institution has received research funding from BMS, Merck, GSK, Novartis, Moderna, and AZ.
- **MVV** has held advisory/consultancy roles for Debiopharm, Roche, and TFS and has received travel/accommodations/expenses from Roche and Merck-Serono.
- **FLO** has no conflicts of interest to disclose.
- **VM** is an employee of START, has had advisory/consultancy roles for Merck, BMS, Bayer, and Janssen Oncology, has held a speaker bureau role for Bayer, reports travel/accommodations/expenses from Sanofi/Regeneron, has provided expert testimony for Medscape/Bayer and Nanobiotix, reports a relationship of other nature with BMS, and reports research funding from AbbVie, ACEA Biosciences, AdaptImmune, Amgen, AZ, Bayer, BeiGene, BMS, Boehringer Ingelheim, Celgene, Eisai, E-therapeutics, GSK, Janssen, Menarini, Merck, Nanobiotix, Novartis, Pfizer, PharmaMar, PsiOxus Therapeutics, Puma Biotechnology, Regeneron, Rigon TEC, Roche, Sanofi, Sierra Oncology, Synthron, Taiho Pharmaceutical, Takeda, Tesaro, and Transgene.
- **OH** has received institutional research funding from, and held advisory, consultancy and speaker bureau roles at BMS, Novartis, Pfizer, and Sanofi/Regeneron, has received institutional research funding and held advisory and consultancy roles for Aduro, Akeso, Amgen, BioAtla, Genentech, GSK, Immunocore, Idera, Incyte, Merck, NextCure, Seagen, and Zelluna, and has held advisory and consultancy roles for Tempus, Janssen and BeiGene.
- **JT** has held advisory/consultancy roles for BMS, Boehringer, MSD, and Bayer, held speakers' bureau roles for BMS, AZ, Bayer, and MSD and has received research funding from MSD and AZ.
- **MC** is an employee of Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Kenilworth, NJ, USA and holds stocks/shares in Merck & Co., Inc., Kenilworth, NJ, USA.
- **MBalas** and **CH** are employees of GSK.
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- **MBallas** is an employee of and holds stocks/shares in GSK and holds stocks/shares in BMS and AZ.
- **AH** is an employee of, holds stocks/shares in and patents/royalties/IP in GSK, has had leadership roles at and owns stocks/shares in Imugene, and is a board member at Sabin Institute and Cancer Research Institute.
- **AI** has held advisory/consultancy roles for, received honoraria from, and received research funding from Roche and Bayer, has had an advisory/consultancy role for and received honoraria from Daiichi Sankyo, Epizyme, and Lilly, has had a consultancy/advisory role for Immune Design, received honoraria from Novartis and Ipsen and reports research funding from AZ/MedImmune, BMS, PharmaMar, MSD Oncology and Merck Serono.