Unleashing the Targeted Power of ADCs

Jefferies 2019 Global Healthcare Conference

June 6, 2019

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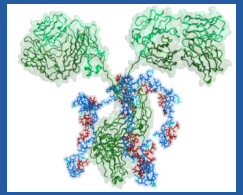
Forward-looking statements generally can be identified by terms such as “expects,” “anticipates,” “believes,” “could,” “seeks,” “estimates,” “intends,” “may,” “plans,” “potential,” “predicts,” “projects,” “should,” “will,” “would” or similar expressions and the negatives of those terms. The Company’s operations involve risks and uncertainties, many of which are outside its control, and any one of which, or combination of which, could materially affect its results of operations and whether the forward-looking statements ultimately prove to be correct. Factors that may materially affect the Company’s results of operations and whether these forward-looking statements prove to be correct include, among other things, that preclinical testing may not be predictive of the results or success of ongoing or later preclinical or clinical trials, that the development of the Company’s product candidates and new platforms will take longer and/or cost more than planned and that the identification of new product candidates will take longer than planned, as well as those listed in our Quarterly Report on Form 10-Q filed on May 9, 2019, with the Securities and Exchange Commission (“SEC”) and subsequent SEC filings. Except as required by law, the Company assumes no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in the forward-looking statements, even if new information becomes available in the future.

Copies of the Company’s Quarterly Report on Form 10-Q and our other SEC filings are available by visiting EDGAR on the SEC website at http://www.sec.gov.

Building a Leading ADC Oncology Company

XMT-1536 – Lead Asset in Proof-of-Concept (POC) Development

- Validated NaPi2b target
- First-in-class potential
- Encouraging Phase 1 dose data seen to date
- Planning to dose patients in Phase 1 dose expansion in 3Q19



Robust Discovery Effort Matching Target to Appropriate Platform

- Plan to disclose next clinical candidate in 4Q 2019

Four Differentiated, Proprietary ADC Platforms

- Dolaflexin
- Dolasynthen
- Alkymer
- Immunosynthen

Wholly-owned Assets and Partnering Opportunities

- Product candidates and platform collaborations

Dolaflexin

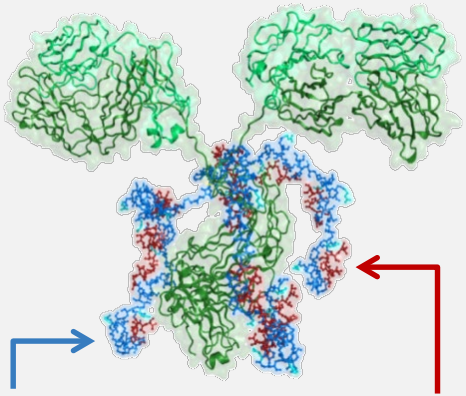
Platform Incorporated Into XMT-1536

Mersana THERAPEUTICS

Novel Dolaflexin Platform Technology

Designed to Expand Therapeutic Index vs Other ADC Platforms

High Drug to Antibody Ratio (DAR)



Fleximer® Polymer

- High DAR
- Optimal PK and drug-like properties
- Efficacy - against low antigen expressing tumors

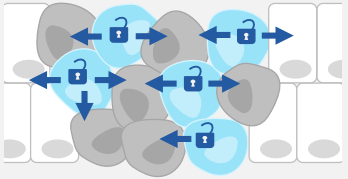
DolaLock Payload

- Controlled bystander effect for **greater efficacy and tolerability**

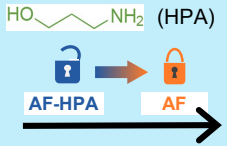
DolaLock is Designed to Enhance Efficacy and Tolerability

Auristatin F-HPA (AF-HPA*)

- Released in target cell
- Cell permeable: capable of bystander killing
- Pgp substrate

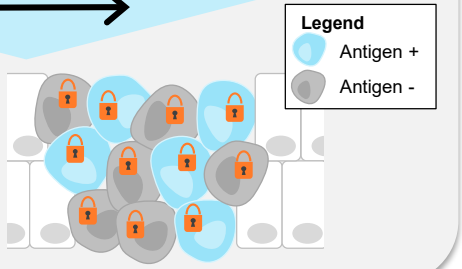


Metabolic Conversion in Tumor Cell



Auristatin F (AF)

- Generated intracellularly
- Not cell permeable
- Not a Pgp substrate



*HPA = hydroxypropionic acid

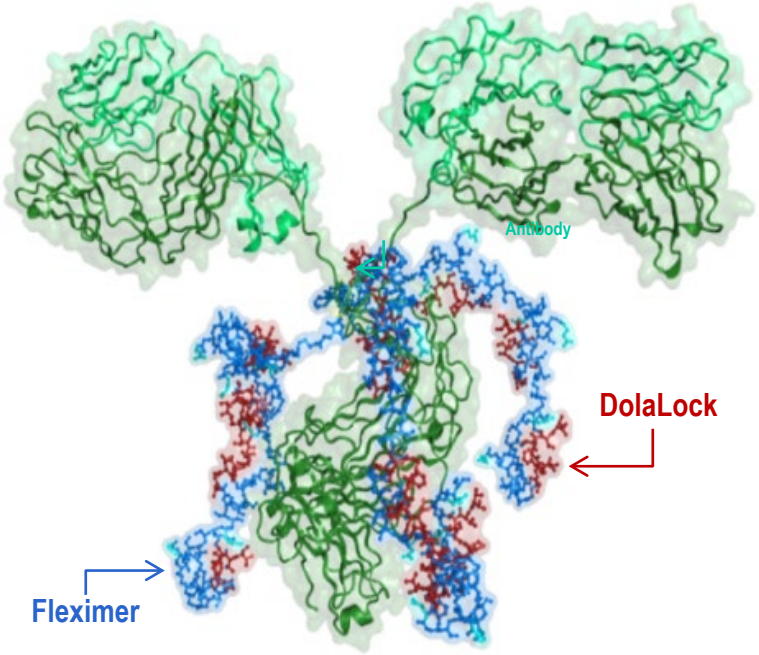
XMT-1536

NaPi2b Targeted Therapy
Designed to Enhance Efficacy and Tolerability

Mersana
THERAPEUTICS

XMT-1536: A Dolaflexin ADC Targeting NaPi2b

First-in-class opportunity for a clinically validated target



- First-in-class, wholly-owned asset[1]
- Clinically validated target
- NaPi2b is broadly expressed in Ovarian Cancer and NSCLC adenocarcinoma – two areas with significant unmet medical need
- Strong XMT-1536 preclinical data show improved efficacy and tolerability versus other ADC Platforms
- Preclinically validated proprietary IHC research assay for evaluation of patient expression

[1] Excluding Brazil

Single Agent Activity in Platinum-Resistant Ovarian Cancer Based on Literature Review

Drug	Prior Lines of Therapy	ORR	PFS/TTP* Months	OS Months
Paclitaxel	1-2	13-37%	3.3-8	9-15
Topotecan	1	17-28%	3.1-5.3	10-14
Oxaliplatin	1-2	16%	2.8	10
PLD	1-2	8-20%	2.1-5.8	8-19
Gemcitabine	1-2	9-29%	3.6-4.7	12-13
Treosulfan	1	16%	2.9	10

*Time to progression

Ten Bokkel Huinink JCO 1997, Rosenberg P Acta Oncol. 2002, Piccart MJ JCO 2000, Gordon AN JCO 2001, Ferrandina G JCO 2008, Meier W Gynecol Oncol. 2009, Mutch DG JCO 2007, Vergote I Int J Gynecol Cancer 2010, Monk BJ JCO 2010, Pignata S Lancet Oncol

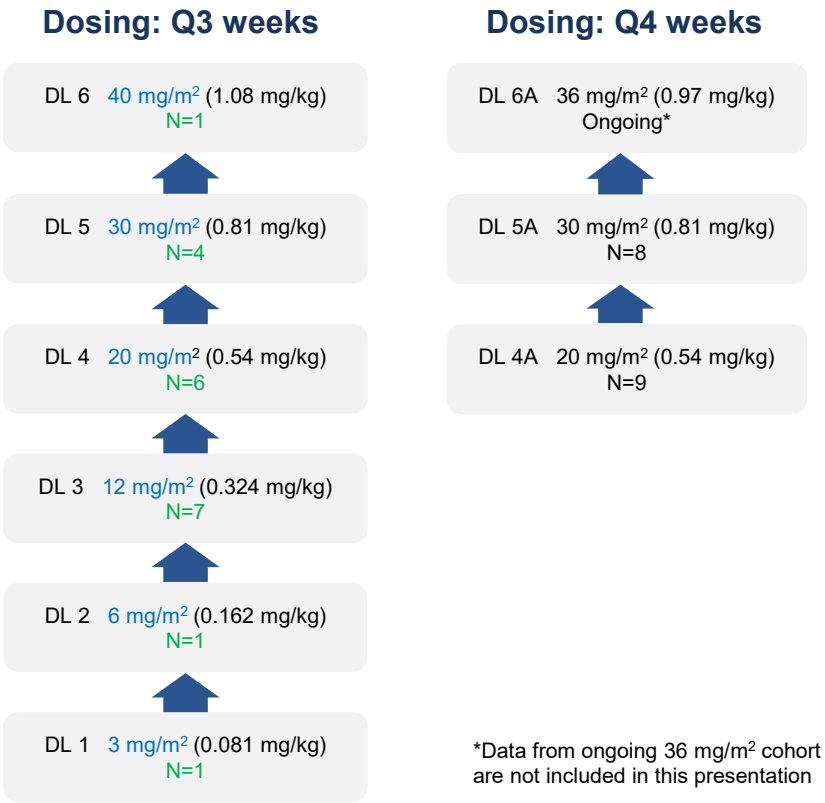
Responses Progressively Decline with Increasing Number of Treatment Lines in Ovarian Cancer

	Line of Therapy*					
	2nd	3rd	4th	5th	6th	7th
ORR %	26-34%	12-20%	3-17%	5-11%	0-8%	0%
DCR %	59%	16-45%	9-33%	9-44%	0-23%	0-20%
	XMT-1536 Dose Level ≥30 mg/m^2 Lines of Therapy: Median 5 (3-8)					
ORR %				28%		
DCR %				71%		

* Calculated according to P.J.Hoskins; Nhu Le, Gynecologic Oncology 2005; I. Bruchim et al, EJOGRB 2013

XMT-1536 Phase 1 Dose Escalation Study Design

- **Patient population:** patients with ovarian epithelial, non-squamous lung, endometrial, papillary renal, salivary duct, or papillary thyroid cancers, progressing after standard treatments
- **Dosing:** XMT-1536 administered IV initially every 3 weeks, amended to every 4 weeks, until disease progression or unacceptable toxicity
- **Escalation design:** single-patient cohorts for first two dose levels, followed by a standard "3 + 3" design with option for 4th patient at each dose level
- **Assessments:** standard assessments including AEs, concomitant medications, safety labs, PK, anti-drug antibodies (ADA)



*Data from ongoing 36 mg/m^2 cohort are not included in this presentation

ClinicalTrials.gov: NCT03319628

Patient Characteristics

(N = 37)		
Age (years)	Median (range)	64 (39-93)
Sex – N (%)	Female Male	32 (86) 5 (14)
ECOG performance status – N (%)	0 1	11 (30) 26 (70)
Tumor type – N (%)	Ovarian, fallopian tube, or primary peritoneal NSCLC Endometrial Papillary renal Salivary duct	22 (59) 4 (11) 8 (22) 2 (5) 1 (3)
Prior lines of therapy for metastatic disease (N=37)	Median (range)	4 (1-13)
Prior lines of therapy, ovarian cancer only (N = 22)	Median (range)	5 (1-11)

XMT-1536 Treatment was Well-Tolerated with Most AE's Grade 1-2

As of May 10, 2019

Treatment-Related Adverse Events in ≥10% of Patients

N = 37	N (%)			
Preferred Term	**Grade 1**	**Grade 2**	**Grade 3**	**Total**
Nausea	12 (32)	2 (5)	0	14 (38)
Fatigue	4 (11)	7 (19)	0	11 (30)
Headache	5 (14)	5 (14)	0	10 (27)
Aspartate aminotransferase (AST) increased	3 (8)	2 (5)	4 (11)	9 (24)
Decreased appetite	1 (3)	6 (16)	0	7 (19)
Blood alkaline phosphatase increased	6 (16)	0	0	6 (16)
Vomiting	4 (11)	1 (3)	0	5 (14)
Gamma-glutamyltransferase (GGT) increased	3 (8)	1 (3)	0	4 (11)
Myalgia	3 (8)	0	1(3)	4 (11)
Pyrexia	3 (8)	1 (3)	0	4 (11)

Safety:

- No Grade 4 or 5 treatment-related adverse events (TRAEs)
- Low rate of toxicities associated with microtubule-targeting agents or other ADC platforms, such as neutropenia, ocular toxicities, or peripheral neuropathy

XMT-1536 Ovarian Cancer and NSCLC Adenocarcinoma Patient Duration on Study

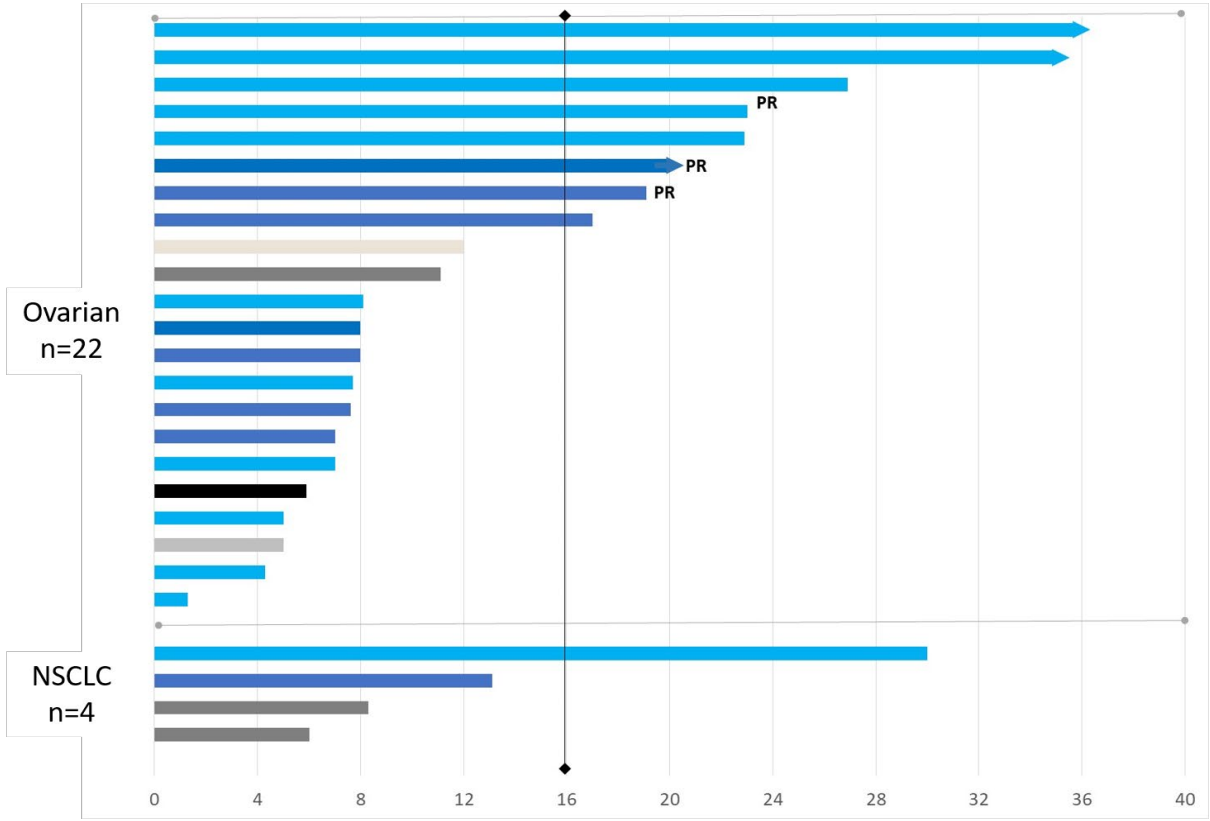
As of May 10, 2019

All Completed Dose Levels
OC and NSCLC Patients, N=26

n=1	3 mg/m^2 Dose Level 1
n=1	6 mg/m^2 Dose Level 2
n=3	12 mg/m^2 Dose Level 3
n=12	20 mg/m^2 Dose Levels 4 & 4A
n=8	30 mg/m^2 Dose Levels 5 & 5A
n=1	40 mg/m^2 Dose Level 6

Ongoing →

Partial Remission = **PR**



Outcome Response Evaluable Population

As of May 10, 2019

Outcomes in Ovarian Cancer (OC) & Non-small Cell Lung Cancer NSCLC	All OC	All NSCLC	OC ≥20 mg/m^2	NSCLC ≥20 mg/m^2	OC + NSCLC ≥20 mg/m^2	OC ≥30 mg/m^2
N	19	3	16	2	18	7
PR*	3 (16%)	0 (0%)	3 (19%)	0 (0%)	3 (17%)	2 (28%)
SD*	8 (42%)	2 (67%)	6 (38%)	2 (100%)	8 (44%)	3 (43%)
DCR (PR + SD)	11 (58%)	2 (67%)	9 (57%)	2 (100%)	11 (61%)	5 (71%)
Treatment duration >16 weeks	8 (42%)	1 (33%)	8 (50%)	1 (50%)	9 (50%)	3 (43%)
PD*	8 (42%)	1 (33%)	7 (43%)	0 (0%)	7 (39%)	2 (28%)

- Based on objective responses and duration of treatment
- Clinical activity was observed at doses of 20 mg/m^2 and higher

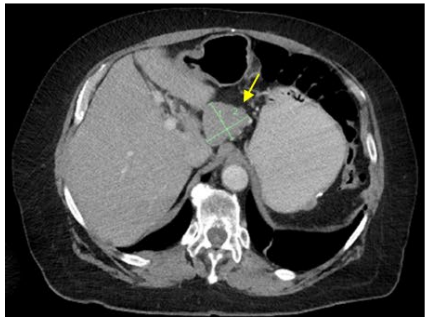
*As measured by RECIST, version 1.1

Ovarian Cancer Patient with Confirmed PR at Cycle 3

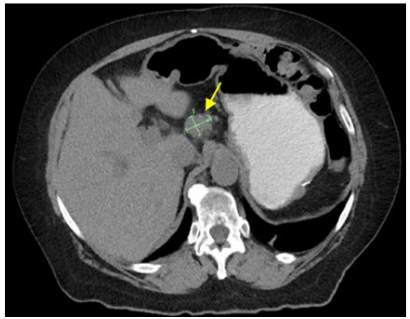
- 70-year-old woman with platinum-resistant high-grade serous ovarian cancer treated at DL 4A (20 mg/m^2)
- 11 prior lines of therapy, with progression on most recent therapy of cyclophosphamide and bevacizumab
- Target lesions of perihepatic and mid-abdominal metastases, 52 and 42 mm respectively
- Decrease of 40% in diameter of target lesions at the end of Cycle 2 (4-week cycles) and 75% at the end of Cycle 3

Lesion 1

Baseline

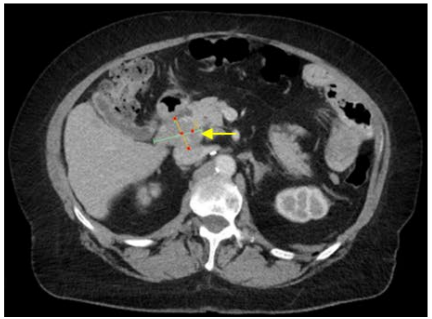


Cycle 3

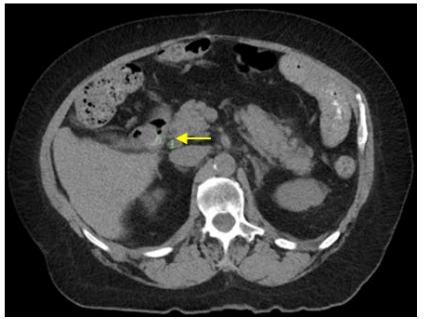


Lesion 2

Baseline



Cycle 3



XMT-1536 Phase 1 Study Status

Target to Complete Dose Escalation and Dose Patients in Expansion Cohorts in 3Q 2019

XMT-1536 Phase 1 Dose Escalation Ongoing

- Dosing patients at 36 mg/m^2 dose on Q4W schedule
- Determine go forward dose (36 mg/m^2 vs. 30 mg/m^2)

3Q 2019 Anticipated Milestone: 1st Expansion Patient Dosed

Expansion Study: Platinum-Resistant Ovarian Cancer

Eligibility criteria:

- High-grade serous histology
- 1-3 prior lines of therapy
- Platinum ineligible
- Archived tumor and fresh biopsy (if medically feasible)

Expansion Study: NSCLC Adenocarcinoma

Eligibility criteria:

- Adenocarcinoma histology
- Prior treatment with a platinum doublet and PD-1/L1 inhibitor
- No additional prior treatment with cytotoxics or immunotherapy
- Prior TKIs for patients with targetable abnormalities
- Archived tumor and fresh biopsy (if medically feasible)

XMT-1536 Conclusions

XMT-1536

- First-in-class molecule addressing unmet needs
- Clinically validated target
- Preclinical data demonstrate greater efficacy, improved tolerability and prolonged exposure in tumor

Dose Escalation: Defining a Go Forward Dose

- Dose escalation data to date indicate good tolerability; MTD has not been reached
- Promising clinical activity observed in heavily pretreated, unselected patients at 20 mg/m^2 and above
- Findings to date support primary objective of moving into expansion cohorts upon dose selection

Dose Expansion: Defining Profile of XMT-1536

- Expansion cohorts to focus on more homogenous patient cohorts in ovarian cancer and NSCLC adenocarcinoma; planning to dose patients 3Q 2019
- Design to facilitate understanding of efficacy, duration of response and correlation with NaPi2b expression

ADC Platforms

Leveraging Our ADC Platforms to Generate a Differentiated Pipeline of ADCs

Mersana THERAPEUTICS

Using Highly Differentiated ADC Platforms to Create a Pipeline of Clinically Meaningful Candidates

DolaLock Payload

Dolaflexin

- DAR ~12
- Controlled heterogeneity
- Fleximer-based scaffold

Dolasynthen

- Precise DAR, 2-24
- Enables fully homogeneous ADCs
- Modular Synthemer scaffold

Alkymer

- Designed to broaden addressable indications
- DNA-alkylating payload – broad applicability to many tumor types

Immunosynthen

- Designed for systemic administration and tolerability
- Targeted, localized stimulation of the immune system

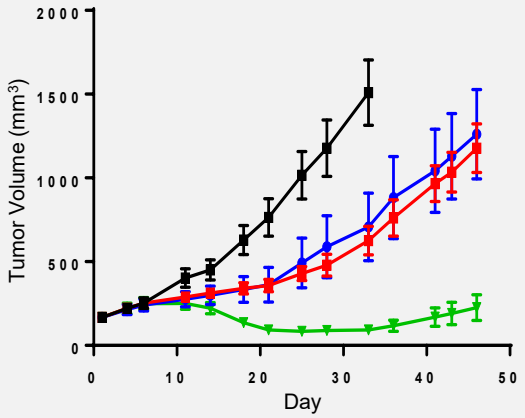
Proprietary platforms to address broad unmet patient needs

Dolasynthen: Precise Control to Create Optimal ADC

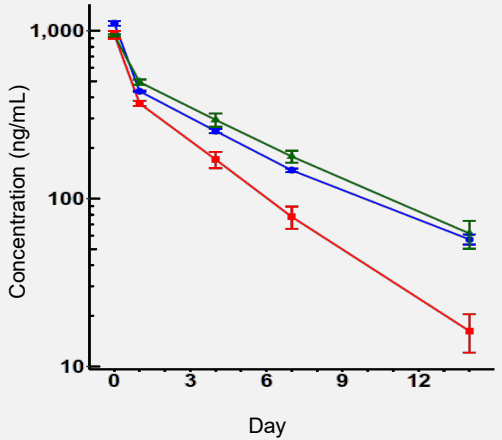
Critical Attributes Matched to Antibody and Target

Antibody | Bioconjugation Site / Technology | Aqueous solubility | Charge balance | Drug load per scaffold | DolaLock AF-HPA

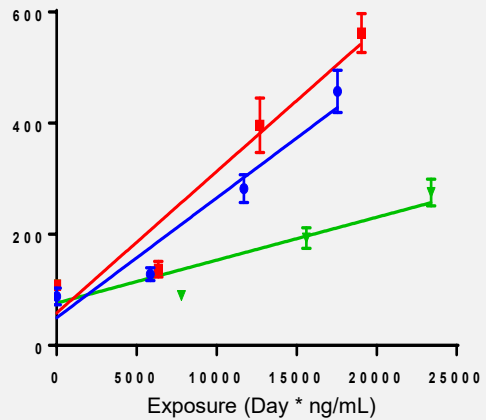
Anti-Tumor Efficacy



Pharmacokinetics



Tolerability Parameter



Vehicle | Dolasynthen ADC 1 | Dolasynthen ADC 2 | Dolasynthen ADC 3

Corporate Summary

Key 2019 Accomplishments & Milestones

XMT-1536	• Reported interim Phase 1 dose escalation data in 2Q 2019 • Planning to select dose and dose patients in the expansion portion of the Phase 1 study in 3Q 2019
ADC Candidate	• In preclinical development; planning to disclose next clinical candidate in 4Q 2019 • Targeting the filing of IND in 1H 2020
R&D	• Continue to leverage our proprietary, differentiated platforms to build a robust pipeline of ADC candidates • Disclose progress on platforms and programs at scientific meetings throughout 2019
Corporate	• Proactively evaluate potential for strategic collaborations that maximize the value of Mersana's pipeline and platforms • Continue to recruit and retain top talent and maintain a culture focused on scientific excellence, execution and patient needs

Robust Pipeline Focused on Clinically Meaningful Cancer Therapies

	Target	Discovery	Preclinical Development	Phase 1
Preclinical/Clinical Pipeline:				
XMT-1536	NaPi2b			
ASANA BioSciences	5T4			
EMD Serono	Multiple Undisclosed			
Discovery Pipeline:				
1H 2020 IND	Undisclosed			
Immunosynthen ADC	Undisclosed			
Others	Undisclosed			

$137M in cash* as of 1Q 2019; expect to fund operation into at least mid-2021

*Cash, cash equivalents and marketable securities as of March 31, 2019

Unleashing the Targeted Power of ADCs