Unleashing the Targeted Power of ADCs

H.C Wainwright Global Life Sciences Conference

April 8, 2019

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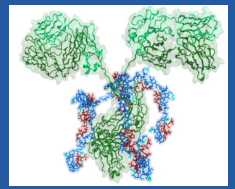
Forward-looking statements generally can be identified by terms such as “expects,” “anticipates,” “believes,” “could,” “seeks,” “estimates,” “intends,” “may,” “plans,” “potential,” “predicts,” “projects,” “should,” “will,” “would” or similar expressions and the negatives of those terms. The Company’s 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 Annual Report on Form 10-K filed on March 8, 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 Company

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

- Validated NaPi2b target
- First-in-class potential
- On track to achieve POC in 2019



Robust Discovery Effort Matching Target to Appropriate Platform

- Plan to disclose next clinical candidate in 2H 2019

Four Differentiated, Proprietary ADC Platforms

- Dolaflexin
- Dolasynthen
- Alkymer
- Immunosynthen

Wholly-owned Assets and Partnering Opportunities

- Product candidates and platform collaborations

Leadership Team

Highly Experienced in Oncology and Business

Management Team

Anna Protopapas
Chief Executive Officer

Takeda MILLENNIUM THE TAKEDA ONCOLOGY COMPANY

Eva Jack
Chief Business Officer

pulmatrix
MedImmune
AstraZeneca

Michael Kaufman Ph.D.
Senior Vice President, CMC

MERCK Be well
Takeda MILLENNIUM THE TAKEDA ONCOLOGY COMPANY
Biogen

Timothy Lowinger, Ph.D.
Chief Scientific Officer

BAYER Bayer

David Spellman
Chief Financial Officer

VERTEX
Takeda MILLENNIUM THE TAKEDA ONCOLOGY COMPANY

Dirk Huebner, M.D.
Chief Medical Officer

Bristol-Myers Squibb
Takeda MILLENNIUM THE TAKEDA ONCOLOGY COMPANY
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Roche
BOSTON BIOMEDICAL Sumitomo Dainippon Pharma Global Oncology

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Director

Celgene

Anna Protopapas
Director

Takeda MILLENNIUM THE TAKEDA ONCOLOGY COMPANY

Dolaflexin

Platform Incorporated Into XMT-1536

Mersana THERAPEUTICS

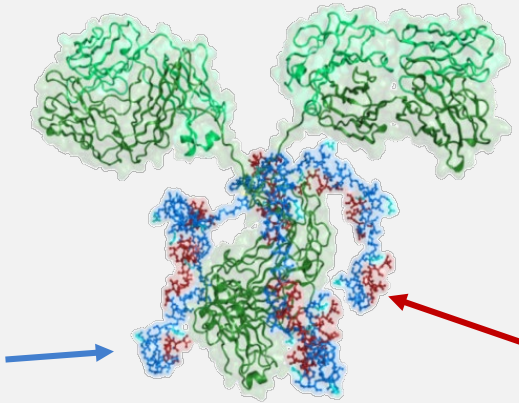
Novel Dolaflexin Platform Technology

Designed to Expand Therapeutic Index vs Other ADC Platforms

Significantly Higher Drug to Antibody Ratio (DAR)

Fleximer® Polymer

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



DolaLock Payload

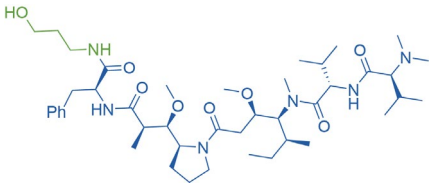
- Controlled bystander effect for **greater efficacy and tolerability**

Proprietary Auristatin DolaLock Payload with Unique Pharmacology

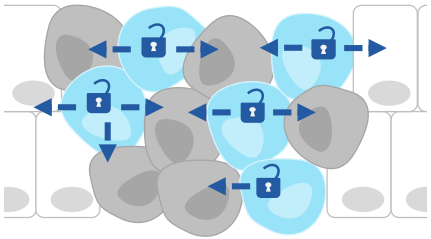
DolaLock is Designed to Enhance Efficacy and Tolerability

Auristatin F-HPA (AF-HPA)

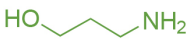
Capable of Bystander Killing for greater efficacy



Initial release after internalization in antigen expressing cell. Initial release product highly potent and freely cell permeable



Metabolic Conversion in Tumor Cell

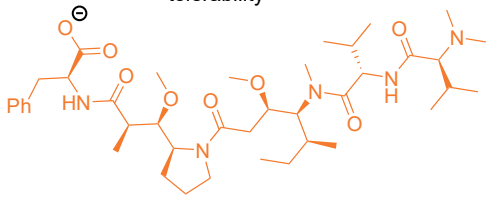


Legend

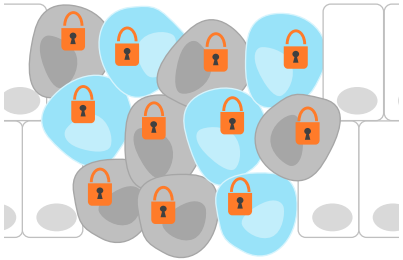
- Antigen +
- Antigen -

Auristatin F (AF)

No Bystander Killing; Not a Pgp substrate; High intracellular potency with high systemic tolerability



Non cell permeable
Active metabolite – highly potent and trapped in tumor; improved systemic tolerability

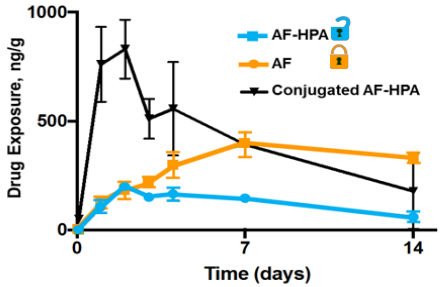


Presented at the AACR, Chicago, 2018, Abstract No.754

DolaLock Provides Prolonged Tumor Exposure and Improves Tolerability

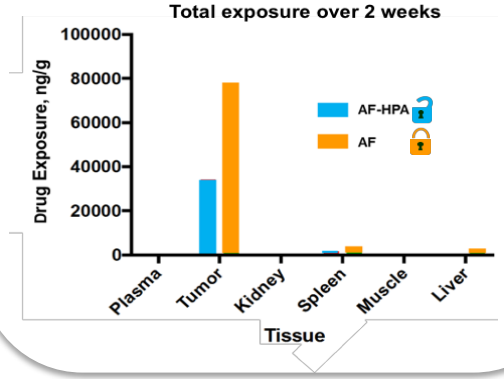
Tumor Exposure

after single dose to tumor-bearing mice

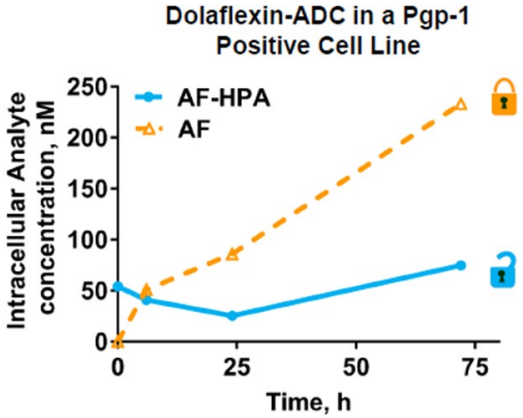


Tissue Exposure (AUC)

after single dose to tumor-bearing mice

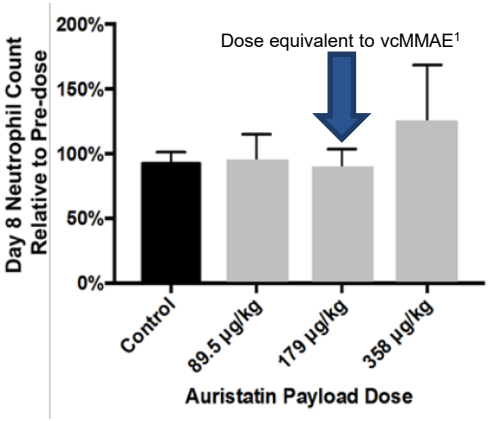


AF Is Not a Substrate of Pgp-1 Drug Efflux Pump



Neutrophil Count

after single dose to non-human primates



No neutropenia even at doses twice that at which vcMMAE causes fatal neutropenia and sepsis[1]

[1]Lin *et al. Clin. Can. Res.* 2015, 5139-50 cf. Mersana internal results

XMT-1536

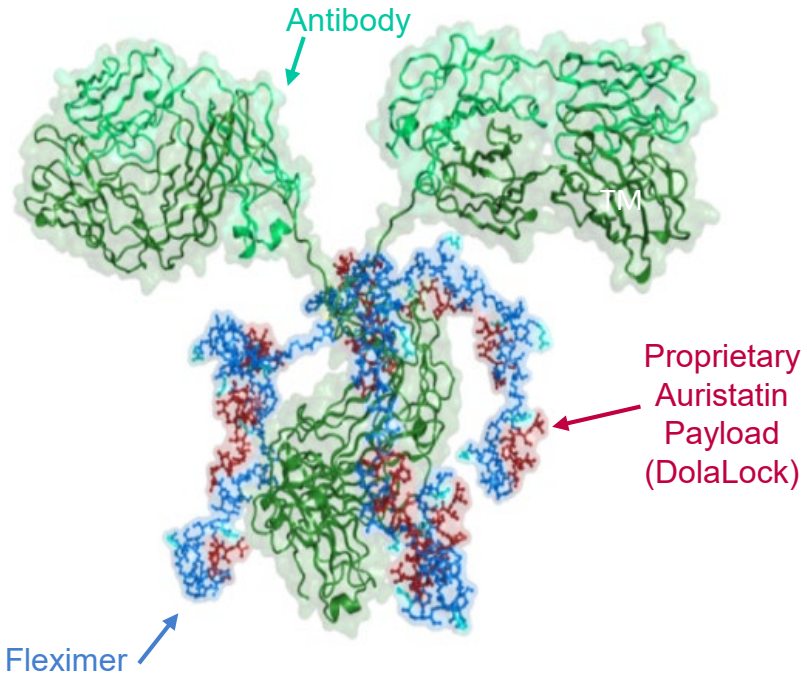
NaPi2b Targeted Therapy
Designed to Enhance Efficacy and Tolerability

Mersana
THERAPEUTICS

XMT-1536: A Dolaflexin ADC Targeting NaPi2b

First-in-class Molecule, Target Expressed in Cancer Types with High Unmet Medical Need

- **Validated Drug Target**
  - Transmembrane sodium-phosphate transporter
  - Expressed in 87% of NSCLC adenocarcinoma, 96% of serous ovarian adenocarcinoma, 91% of papillary thyroid carcinoma[1]
  - Limited normal tissue expression
- **In-licensed Novel anti-NaPi2b Antibody**
- **Mersana Retains Full Global Rights[2]**

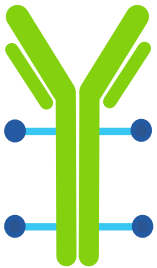


[1] Lin *et al, Clin Cancer Res* 2015, 21:5139-5150;
[2] Excluding Brazil

XMT-1536 is a First-in-Class Opportunity for a Clinically Validated Target

Lifastuzumab vedotin

Genentech-developed ADC using Seattle Genetics vc-MMAE platform



- Pre-clinical and clinical tolerability limited by vc-MMAE toxicity
- No significant target-related toxicity in either ovarian or lung patients
- ~40% overall response rate (ORR) in ovarian cancer in Phase 1; low NSCLC ORR in Phase 1
- Ovarian cancer Phase 2 with positive trends on all efficacy endpoints
- Development discontinued by Genentech

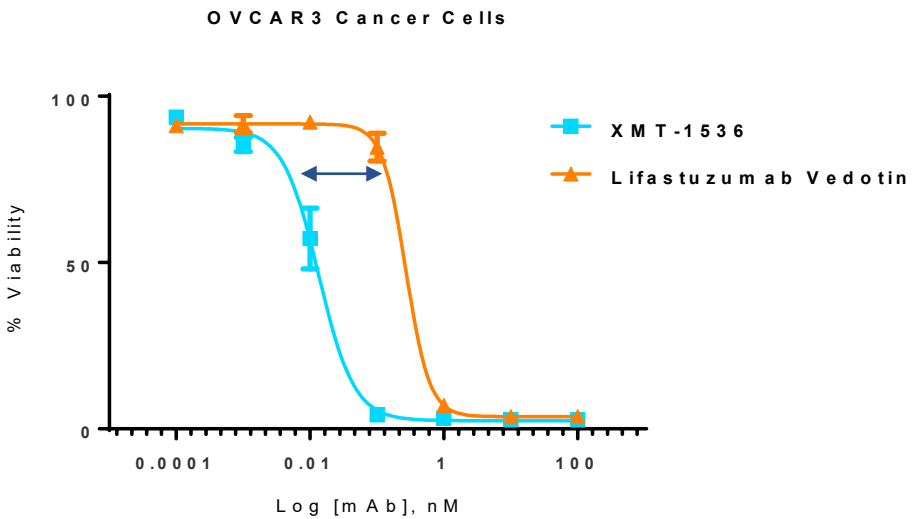
→ Appropriate target for ADC development but need for better tolerated platform

→ Evidence of efficacy but need for more potent platform

→ First-in-class opportunity for XMT-1536

Banerjee et al. Ann Oncol. 2018 Apr 1;29(4):917-923

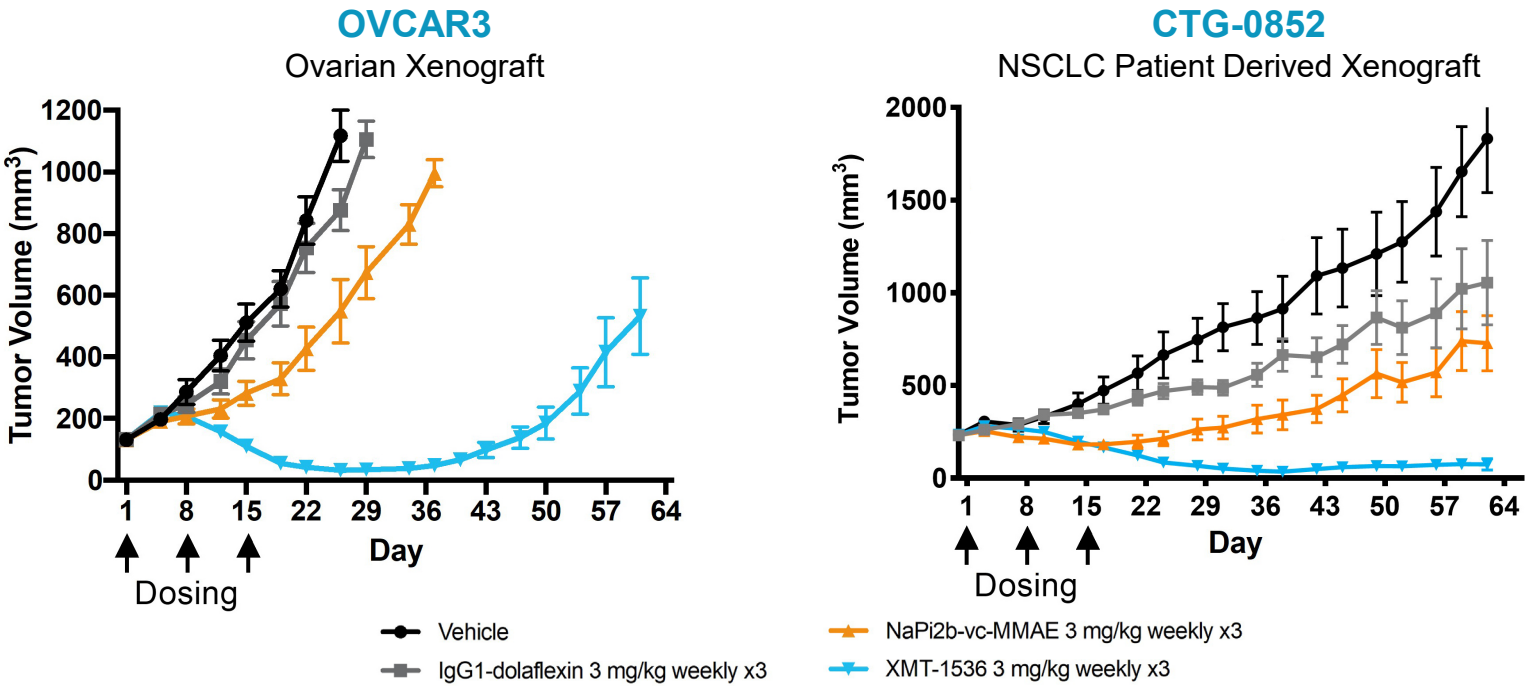
XMT-1536 is More Potent than Lifastuzumab Vedotin on a Payload and Antibody Basis



Potency: Direct Comparison

	IC50 *by Payload*	IC50 *by Antibody*
XMT-1536	0.13 nM	0.013 nM
Lifastuzumab vedotin	0.95 nM	0.27 nM
Increased Potency of XMT-1536	**7-fold** *by payload*	**20-fold** *by antibody*

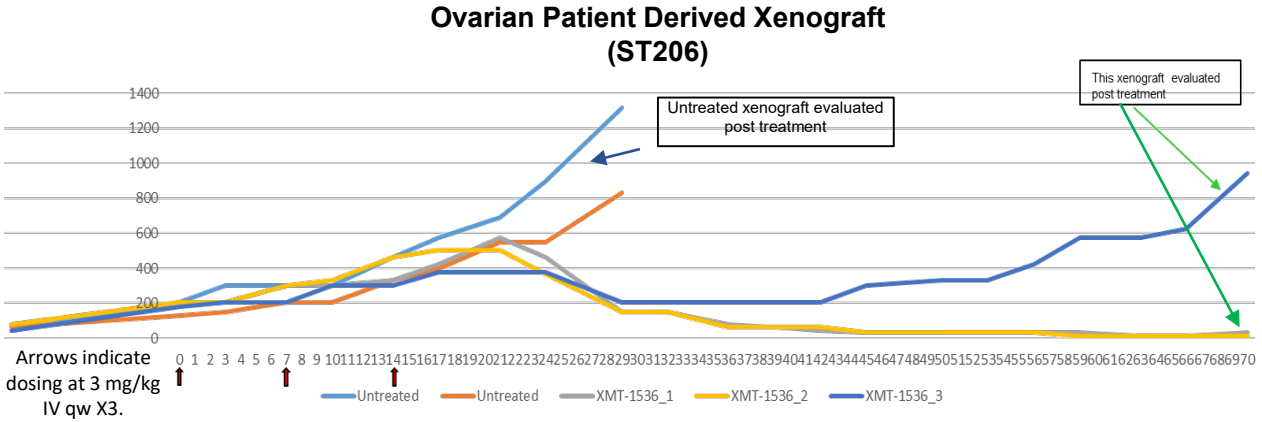
XMT-1536 Data Show Improved Efficacy to Genentech ADC in Head to Head Preclinical Studies



Comparing results from non-human primate toxicology studies, XMT-1536 exhibited a 1.5-fold higher HNSTD (payload dose) than lifastuzumab vedotin[1]

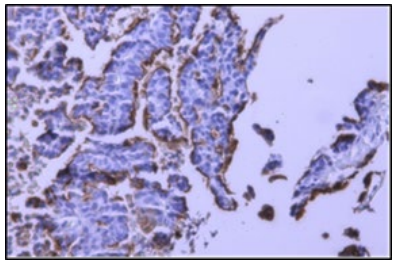
[1]Lin *et al. Clin. Can. Res.* 2015, 5139-50 cf. Mersana internal results

XMT-1536 Preclinical Studies Suggest NaPi2b Expression Retained Post Treatment

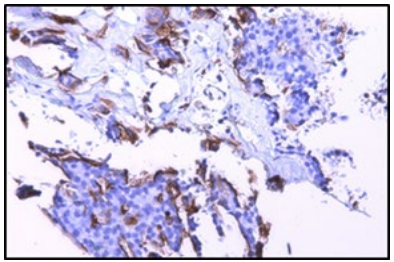


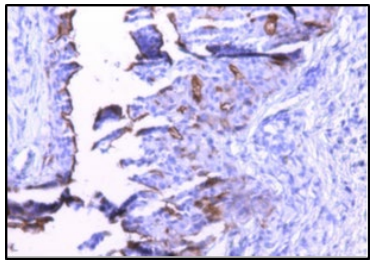
Tissue samples obtained from treated xenograft with delayed growth, treated xenograft with near CR and untreated xenograft

NaPi2b Expression Untreated



NaPi2b Expression Post treatment

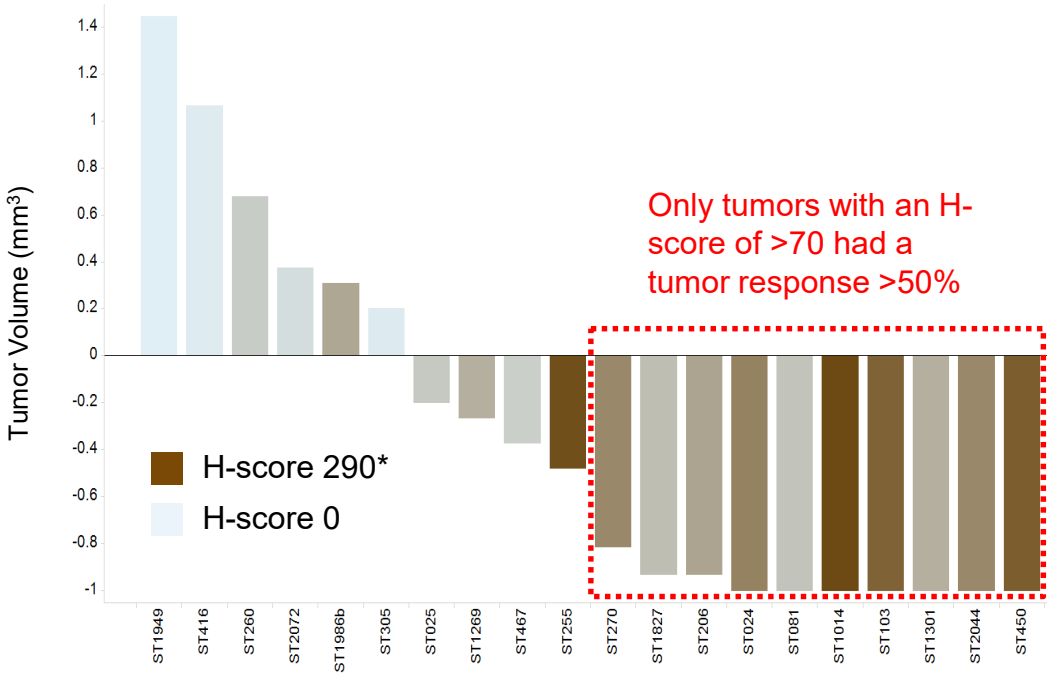




NaPi2b expression levels remained similar to untreated in both post treatment xenografts examined

R. Mosher et al, AACR-NCI-EORTC International Conference, October 2017

NaPi2b Expression Levels Have Been Predictive of Response to XMT-1536 in Ovarian Cancer Patient Derived Models



- Proprietary research assay validated and used for retrospective evaluation of patients
- Preclinical data demonstrate NaPi2b expression highly correlated with response
- ~60% of ovarian cancer patients estimated to have NaPi2b expression with H-score >70, associated with deep responses in PDX models

R. Mosher et al, AACR-NCI-EORTC International Conference, October 2017

*Semi-quantitative measure of antigen expression; ranges from 0-300

XMT-1536: Targeting NaPi2b Addresses Two Areas of Significant Unmet Clinical Need

	Ovarian Cancer	Non Small Cell Lung Cancer (NSCLC)
Incidence (U.S.)	~24,000[1]	~189,000[4]
Deaths Per Year (U.S.)	~14,000[2]	~ 132,000[5]
Frontline SOC	Debulking surgery plus systemic chemotherapy	PD1 + chemotherapy
Area of Unmet Need	Resistant to platinum based therapy	Following PD1 + platinum treatment failure
Target Population Treatment Options	(Platinum Resistant OC) Single agent chemotherapy, e.g. PLD, weekly Paclitaxel, Topotecan, Gemcitabine, PARP	(2nd Line NSCLC Adenocarcinoma) Docetaxel, Premetrexed, Gemcitabine, or Docetaxel + Ramucirumab
Approximate Treatment Outcome	ORR ~10-20%[3] med PFS ~ 3-4 mos[3] med OS ~12 mos[3]	ORR ~10-20%[3] med PFS ~ 3–4.5 mos[3] med OS ~ 8-10 mos[3]

[1]Based on CancerMPact® Patient Metrics for US, Western Europe, and Japan, accessed in March 2018.
[2]https://cancerstatisticscenter.cancer.org/#!/
[3]Hanna et al. JCO 2004 & Garon, Lancet 2014 & Pujade, JCO 2014 & Gordon, JCO 2001 & Rose, Gynecol Oncol 2003 & Sehouli, JCO 2011 & Mutch, JCO 2007 & Ferrandina, JCO 2008.
[4]Globoscan 2012 & SEER.
[5]Estimate based on 85% NSCLC incidence and total lung cancer death cases in the US in 2017 of 155900 deaths

XMT-1536 Dose Escalation Ongoing

Target to Complete Dose Escalation and Initiate Dose Expansion Cohorts in 2Q 2019

2018 / 1H 2019 | **2Q 2019** | **2H 2019 / 1H 2020**

Dose Escalation: 3 week dosing		
	mAb Dose, mg/ m^2	mAb Dose, mg/ kg
DL4	20.0	*0.54*
DL5	30.0	*0.81*
DL6	40.0	*1.08*
Completed		

Dose Escalation: 4 week dosing		
	mAb Dose, mg/ m^2	mAb Dose, mg/ kg
DL4-A	20.0	*0.54*
DL5-A	30.0	*0.81*
DL6-A	36.0	*0.97*
Further Dose Escalation		

Phase 1 Dose Escalation

- Ongoing in ovarian and lung cancers and certain rare tumors (endometrial, papillary renal, papillary thyroid and salivary duct)
- No pre-selection for NaPi2b expression; retrospective testing based on archival tissue

2Q 2019 Anticipated Milestones

Establish Recommended Go Forward Dose & Regimen

Report Dose Escalation Data

Initiate Expansion Cohorts

- Platinum-resistant ovarian cancer
- NSCLC Adenocarcinoma in PD1 failure

Execute on Expansion Studies

Dolaflexin Safety Profile Easily Monitored; High Consistency between Early Clinical and Preclinical Data

Current Clinical Study Data Show:

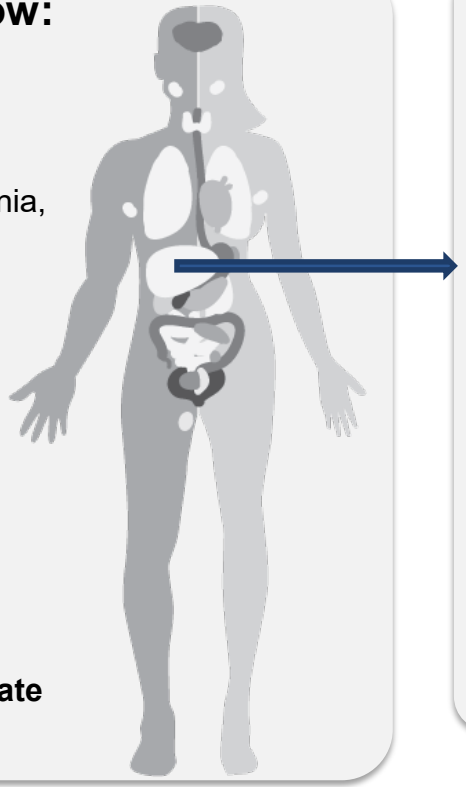
No observations of toxicities associated with other ADC platforms to date

- No evidence of clinically relevant neutropenia, neuropathy, ocular toxicity or pneumonitis

Dolaflexin Platform Characteristics

- Favorable PK profile
- Highly stable in circulation
- Transient AST[1] elevations that can be clinically monitored and managed with dose and regimen modifications

No observation of on-target toxicities to date



Preclinical Studies Demonstrate Depletion of Kupffer Cells Results in Transient AST Elevations

- Kupffer cells are involved in AST clearance; transient elevation is consistent with a change in clearance kinetics by hypertrophy of Kupffer cells in liver
- Transient elevations of AST were observed preclinically in animals and were not associated with hepatic necrosis based on histopathology
- AST elevations peak at day 8 and return to baseline by next dose and as Kupffer cells recover

[1]AST: Aspartate aminotransferase; Also known as serum glutamic oxaloacetic transaminase (SGOT)

XMT-1536 Conclusions and Path Forward

XMT-1536

- First-in-class molecule addressing unmet needs
- Lifastuzumab Vedotin provides clinical validation of 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
- 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
- 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

Mersana THERAPEUTICS

Dolaflexin	Dolasynthen	Alkymer	Immunosynthen
• High DAR • Potential to increase efficacy against low expressing antigens • DolaLock payload	• Precise DAR • Enables homogeneous ADCs • DolaLock payload	• Designed to broaden addressable indications • Alkylating payload	• Designed for localized and controlled harnessing of the immune system • Immunostimulatory payload

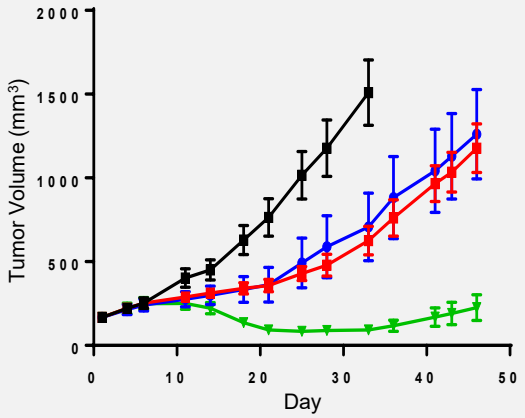
Proprietary platforms to address broad unmet patient needs

Dolasynthen: Precise Control to Create Optimal ADC

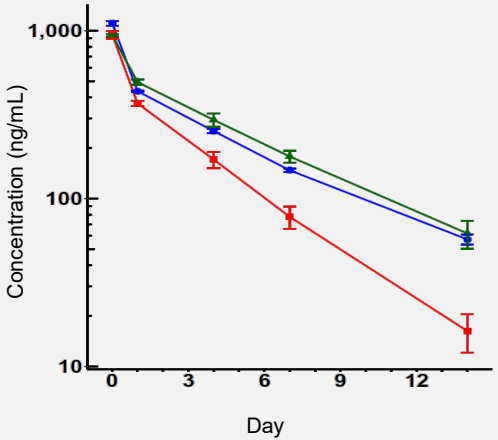
Critical Attributes Matched to Antibody and Target

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

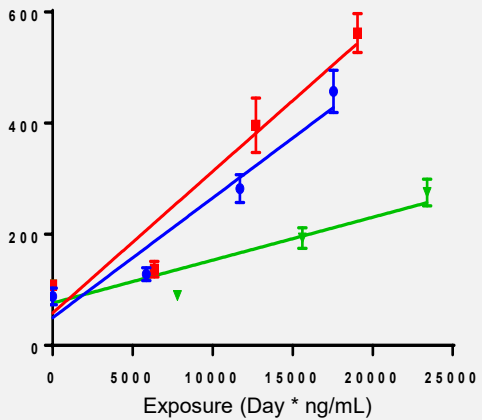
Anti-Tumor Efficacy



Pharmacokinetics



Tolerability Parameter



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

Corporate Summary

Key 2019 Goals & Milestones

XMT-1536	• Select go forward dose and initiate expansion cohorts in 2Q 2019 • Planning to report Phase 1 dose escalation data in 2Q 2019
ADC Candidate	• Planning to disclose next clinical candidate in 2H 2019
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	Undisclosed			
Others	Undisclosed			

$70M in cash* as of Q4 2018; $~98M in gross proceeds from March 2019 financing extends cash runway into at least mid-2021

*Cash, cash equivalents and marketable securities as of December 31, 2018

Unleashing the Targeted Power of ADCs