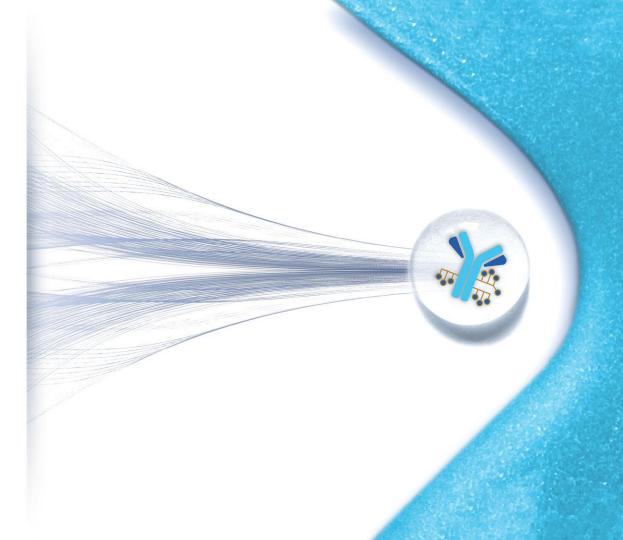


Accelerating ADC Innovation

...because patients are waiting



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This presentation contains "forward-looking" statements and information within the meaning of the Private Securities Litigation Reform Act of 1995. These statements may be identified by words such as "aims," "anticipates," "believes," "could," "estimates," "expects," "forecasts," "goal," "intends," "may," "plans," "possible," "potential," "seeks," "will" and variations of these words or similar expressions, although not all forward-looking statements contain these words. Forward-looking statements in this presentation include, but are not limited to, statements regarding Mersana Therapeutics, Inc.'s ("Mersana") business strategy and vision; the therapeutic potential of Mersana's product candidates; the potential of Mersana's platforms and technology; the design, progression and timing of its clinical trials, including Mersana's UPLIFT, UP-NEXT and UPGRADE clinical trials and anticipated clinical trials of XMT-1660 and XMT-2056; the timing and availability of data from Mersana's current or anticipated trials; the potential benefits of Mersana's existing or any future collaboration; the ability of Mersana's current and planned clinical trials to generate registration-enabling and/or supportive data; and Mersana's expectations regarding future clinical trial results based on preclinical and clinical data achieved to date.

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Mersana Strategic Vision: Build ADC Leadership from Discovery to Commercial



Build UpRi into a Foundational Medicine in Ovarian Cancer

- UPLIFT
- UP-NEXT
- UPGRADE

Build Out Pipeline of Highly Impactful Cancer Medicines

- XMT-1660
- XMT-2056

- Build Innovation and Scientific Leadership in ADCs
- XMT-2068
- XMT-2175
- New Innovations & Additional Molecules

- Build Mersana with Top Talent and Strategic Partners
- Boston Globe 2021 Top Places to Work
- Janssen Collaboration

...because patients are waiting

Mersana Today: Leader in ADC Innovation



Platforms Serve as Efficient Product Engines

	Platform Proprietary Payload		Candidates/ Partners	Differentiators
	Dolaflexin High DAR (~10)	DolaLock Controlled Bystander Effect	UpRi	 Clinically validated platform POC demonstrated with UpRi; clinically meaningful responses, including CRs Differentiated tolerability profile without observed severe neutropenia, peripheral neuropathy or ocular toxicities Not a P-gp substrate
	Dolasynthen Precise DAR (2-24)	DolaLock Controlled Bystander Effect	XMT-1660 Janssen	 Customizable DAR Homogeneous ADCs Same DolaLock payload as UpRi; designed to have differentiated efficacy/tolerability
(A) ₄ ————(A) ₄	Immunosynthen Precise DAR (8)	ImmunoLock Non-Cell Permeable STING Agonist	XMT-2056 XMT-2068 XMT-2175	 Targeted stimulation of innate immune system Designed to provide antibody-dependent delivery to tumor and tumor-resident immune cells ("1-2 punch") Preclinical data demonstrate potential for wide therapeutic index across multiple targets

DAR = Drug-to-antibody ratio

Upifitamab Rilsodotin (UpRi): Building a Foundational Medicine in Ovarian Cancer



Platform	ADC Program	Target	Indication	Discovery	Preclinical	P1 Dose Escalation	P1 Proof of Concept	P2/Pivotal	P3
			Platinum-Resistant Ovarian Cancer	UPLIFT Single-Arm Registrational Trial					
Dolaflexin	Upifitamab Rilsodotin (UpRi)*	NaPi2b	Platinum-Sensitive Ovarian Cancer	UPGRADE Phase 1-2 Combo					
	()		Recurrent Platinum- Sensitive Ovarian Cancer Maintenance	UP-NEXT Phase 3 – Initiate Patient Screening in Q2 2022					
Dolasynthen	XMT-1660	B7-H4	Multiple Solid Tumors						
	XMT-2056	HER2	Multiple Solid Tumors						
Immunosynthen	XMT-2068	Tumor-Associated Antigen	Undisclosed						
	XMT-2175	Tumor-Associated Antigen	Undisclosed						
	Collaborators:								
Dolasynthen	Janssen T	Multiple	Undisclosed						
Deletterin	EMD **	Multiple	Undisclosed)			
Dolaflexin	(ASANA BIOSCIENCES	5T4	Undisclosed						

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**EMD Serono is an affiliate of Merck KGaA

UpRi: Potential to Become a Foundational Medicine in Ovarian Cancer



UpRi

Profile*

Meaningful and Durable Activity in Heavily-Pretreated Patients

34% ORR across dose levels in NaPi2b high patients with DOR of 5 months

NaPi2b High in 2/3 of Ovarian
Cancer Patients

Robust, predictive, reproducible assay to identify most likely UpRi responders

<u>Differentiated Tolerability Profile</u>

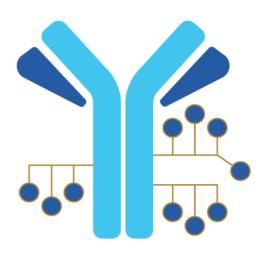
No severe (grade ≥ 3) neutropenia, ocular toxicity or peripheral neuropathy observed

<u>Dose Optimized for Ongoing</u>
<u>UPLIFT Registrational Trial</u>

Robust efficacy and favorable tolerability profile observed at 36mg/m² dose

NaPi2b: Highly Expressed in Approximately Two-Thirds of Ovarian Cancers





Upifitamab Rilsodotin (UpRi) First-in-Class Dolaflexin ADC Targeting NaPi2b

- NaPi2b is broadly expressed in ovarian cancer, with limited expression in healthy tissues
- NaPi2b is a stable lineage marker (not an oncogene) that transports phosphate into the cell
- Initial clinical validation of target by Genentech MMAE ADC in era before introduction of bevacizumab and PARP
 - Genentech ADC not developable with platinum due to overlapping severe neutropenia and neuropathy

Consistent Patient Demographics and Disease Characteristics in Both Dose Groups



		All Dose Levels (N=97)	Dose Group 36 (n=29)	Dose Group 43 (n=66)
Median Age, years (range)		68 (33, 87)	66 (33, 85)	69 (38, 87)
Baseline ECOG PS, n (%)	0	33 (34)	6 (21)	27 (41)
baselille Ecoo Fo, ii (70)	1	64 (66)	23 (79)	39 (59)
Median Baseline BSA, m ² (range)		1.82 (1.34, 2.78)	2.12 (1.58, 2.30)	1.77 (1.34, 2.02)
	Ovarian	72 (74)	22 (76)	48 (73)
Primary Tumor Type, n (%)	Fallopian Tube	15 (15)	2 (7)	13 (20)
	Primary Peritoneal	8 (8)	5 (17)	3 (5)
Prior Lines of Therapy, n (%)	1–3	65 (67)	21 (72)	42 (64)
	4+ ^a	32 (33)	8 (28)	24 (36)
Dui Th (0/)	Bevacizumab	68 (70)	17 (59)	49 (74)
Prior Therapy, n (%)	PARPi	57 (59)	13 (45)	43 (65)
	0–3 mos	34 (35)	11 (38)	22 (33)
Nations from Interval by (0/)	>3–6 mos	46 (47)	14 (48)	31 (47)
Platinum-free Interval,⁵ n (%)	>6 mos ^c	10 (10)	2 (7)	8 (12)
	Unknown ^d	7 (7)	2 (7)	5 (8)
	Yes	15 (15)	3 (10)	11 (17)
BRCA1/2 Mutation, n (%)	No	65 (67)	21 (72)	43 (65)
, ,	Unknown ^e	17 (18)	5 (17)	12 (18)
	Determined	78 (80)	24 (83)	52 (79)
InDiah Evangasian by TDS in (0/)	High (TPS≥75)	50 (64)	18 (75)	32 (62)
NaPi2b Expression by TPS, n (%)	Low (TPS <75)	28 (36)	6 (25)	20 (38)
	Not Yet Determinedf	19 (20)	5 (17)	14 (21)

Data cut: June 10, 2021. Two patients received <30 mg/m² and therefore were not included in either dose group.

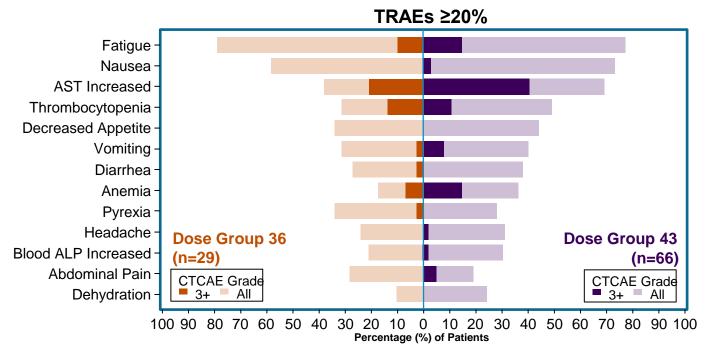
BSA, body surface area; BRCA1/2, breast cancer susceptibility gene 1 or 2; ECOG, Eastern Cooperative Oncology Group; NaPi2b, sodium-dependent phosphate transport protein 2B; PARPi, poly (ADP-ribose) polymerase inhibitor; PS, performance status; TPS, tumor proportion score.

Richardson et. all SGO 2022 (https://www.mersana.com/wp-content/uploads/2022/03/SGO-2022-Abstract-76-UpRi-Oral-Presentation.pdf)

^a Three patients enrolled with 5 prior lines of systemic therapy. ^b Platinum-free interval defined as the time between the last cycle of most recent platinum-containing regimen and evidence of disease progression; determined from treatment dates and/or clinic notes. ^c All patients had received 4 or 5 lines of prior therapy. ^d Treatment dates missing/not provided; unable to determine. ^e BRCA1/2 mutation status not available/not reported. ^f NaPi2b expression not yet determined or tissue unavailable.

Dose Group 36 Had a More Favorable Safety Profile Compared to Dose Group 43





- No severe ocular toxicity, neutropenia, or peripheral neuropathy in either dose group
- 4 (14%) patients had treatment-related SAEs in Dose Group 36 vs 18 (27%) in Dose Group 43
- Lower frequencies and lower grade pneumonitis occurred in Dose Group 36 (with no Grade 3+) vs Dose Group 43^a
- Fewer treatment-related discontinuations, including those before first scan, in Dose Group 36

Data cut: June 10, 2021. Analysis with 95 patients. Two patients received <30 mg/m2 and therefore were not included in either dose group.

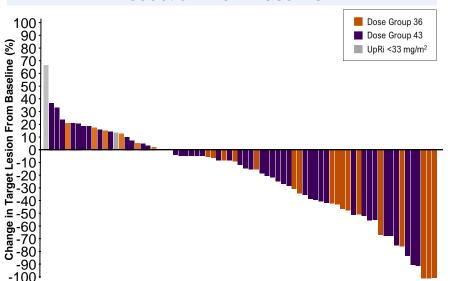
^aDose Group 36 pneumonitis: Grade 1–2 (n=2), Grade 3+ (n=0); Dose Group 43 pneumonitis: Grade 1–2 (n=5), Grade 3+ (n=4).

AE, adverse event; ALP, alkaline phosphatase; AST, aspartate aminotransferase; CTCAE, Common Terminology Criteria for Adverse Events; SAE, serious adverse event; TRAE, treatment-related adverse event; UpRi, upifitamab rilsodotin.

Promising Activity Demonstrated in Heavily Pre-Treated Ovarian Cancer, Particularly at 36 mg/m² Dose and in NaPi2b-High Population







Median DoR in Patients (all dose levels) with NaPi2b-High Ovarian Cancer = ~5 Months^b

		All Dose Levels	Dose Group 36	Dose Group 43	
	N	38	16	22	
	ORR, n (%)	13 (34)	7 (44)	6 (27)	
NaPi2b-High (TPS ≥75)	CR, n (%)	2 (5)	2 (13)	0	
	PR, n (%)	11 (29)	5 (31)	6 (27)	
	DCR, n (%)	33 (87)	12 (75)	21 (95)	
	N	75	25	48	
All NaPi2b Levels	ORR, n (%)	17 (23)	9 (36)	8 (17)	
	CR, n (%)	2 (3)	2 (8)	0	
	PR, n (%)	15 (20)	7 (28)	8 (17)	
	DCR, n (%)	54 (72)	18 (72)	35 (73)	

On an intent to treat (ITT) basis in dose group 36, ORR was 39% in the NaPi2b high population

Data cut: June 10, 2021. Analysis with 73 evaluable patients. Two patients excluded as post-baseline tumor measurement shows "Not Measurable", yet "PD" was assigned by investigator in response dataset. There were 22 unevaluable patients: 4 in Dose Group 36, 2 patient withdrawals (1 enrolled in hospice), 2 patient deaths; 18 in Dose Group 43, 5 patient withdrawals, 1 clinical progression, 3 due to adverse events, 8 deaths, 1 had not reached first scan.

**Data cut: June 10, 2021. Two patients received <30 mg/m2 and therefore were not included in either dose group. All responses are confirmed. There were 75 evaluable patients. Of 4 unevaluable patients in Dose Group 36, 2 were NaPi2b-high; of 18 unevaluable in Dose Group 43, 10 were NaPi2b-high.

CR, complete response. DCR, disease control rate; DoR, duration of response; NaPi2b, sodium-dependent phosphate transport protein 2B; ORR, overall response rate; PR, partial response; TPS, tumor proportion score; UpRi, upifitamab rilsodotin. Richardson et. all SGO 2022 (https://www.mersana.com/wp-content/uploads/2022/03/SGO-2022-Abstract-76-UpRi-Oral-Presentation.pdf)

Comprehensive Development Plan to Build UpRi as a Foundational Medicine in Ovarian Cancer



Frontline Therapy

Future Development

Platinum-Sensitive Recurrence

UPGRADE

Maintenance

UP-NEXT

Platinum-Resistant Recurrence

UPLIFT

- 22,000 newly diagnosed ovarian cancer patients annually¹
- Plus, fallopian tube and primary peritoneal cancers treated in the same algorithm
- 80% relapse following frontline therapy
- Limited therapeutic options beyond platinumbased regimens
- PARP inhibitor efficacy limited outside of BRCAmut/HRD+ setting
- NaPi2b broadly expressed in ovarian cancer, with two-thirds of patients having high expression

UPLIFT: Designed to Establish UpRi as the Standard of Care in Platinum-Resistant Ovarian Cancer (PROC)



Frontline Therapy

Future Development

Platinum-Sensitive Recurrence

UPGRADE

Maintenance

UP-NEXT

Platinum-Resistant Recurrence

UPLIFT

- 14,000 deaths per year in the U.S. primarily at the platinum-resistant stage of the disease
- Standard of care is single agent chemotherapy with limited efficacy and significant toxicity
- ORR 12%, DOR <4 mos, PFS ~3-4 mos, OS <12 mos
- UpRi has the potential to deliver meaningful clinical benefit
- Potential registration of UpRi in PROC represents a substantial market opportunity

UPLIFT Design: Single-Arm Registrational Trial in Platinum-Resistant Ovarian Cancer



Patient Population:

Enrolling Regardless of NaPi2b Expression

Inclusion Criteria:
Platinum-Resistant Ovarian Cancer
1 – 4 Prior Lines
Regardless of Baseline Peripheral Neuropathy

Exclusion Criteria:

1 – 2 Prior Lines Bevacizumab-naïve
Primary Platinum-Refractory Disease

UpRi Dose:

 $36 \text{ mg/m}^2 \text{ up to a max of } \sim 80 \text{ mg}$

Primary Endpoint:

Confirmed ORR in high NaPi2b ($N = \sim 100$)

Key Secondary Endpoint:

Confirmed ORR in overall population (N = up to ~180, including 100 high NaPi2b)

Other Secondary Endpoints:

- Duration of response
- Safety

Enrollment Criteria Provide the Potential for UpRi to Benefit a Broad Group of Platinum-Resistant Ovarian Cancer Patients

UP-NEXT: Designed to Establish UpRi as the Preferred Agent for Maintenance Therapy in Recurrent Platinum-Sensitive OC



Frontline Therapy

Future Development

Platinum-Sensitive Recurrence

UPGRADI

Maintenance

UP-NEXT

Platinum-Resistant Recurrence

UPLIF

 UP-NEXT targets 3 patient groups with high unmet need post chemotherapy induction

Responders who have been previously treated with PARPi and/or bevacizumab and have no standard of care

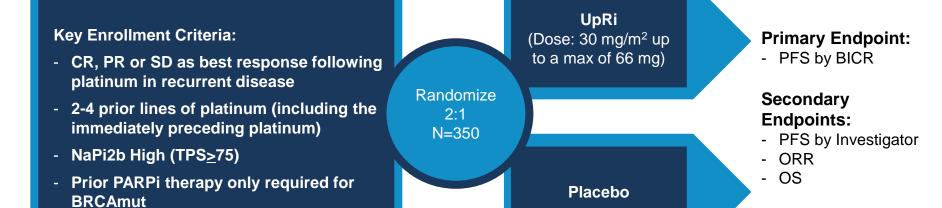
Responders who are not offered maintenance because benefit-risk of current options is not favorable

Patients with stable disease who have no approved treatment options

 UP-NEXT has the potential to address the needs of a broader ovarian cancer population compared to UPLIFT, given its focus on earlier line patients

UP-NEXT Design: Phase 3 Study of UpRi Monotherapy Maintenance vs Placebo in Recurrent Platinum-Sensitive OC





Informed by FDA Feedback and CHMP Scientific Advice;
Plan to Initiate Patient Screening in Q2 2022

UP-NEXT Trial: GOG-3049

UPGRADE (Phase 1/2): Combination of UpRi with Platinum has Potential to Establish a New Standard of Care



Frontline Therapy Platinum-**UPGRADE** Sensitive Recurrence **Maintenance** Platinum-Resistant Recurrence

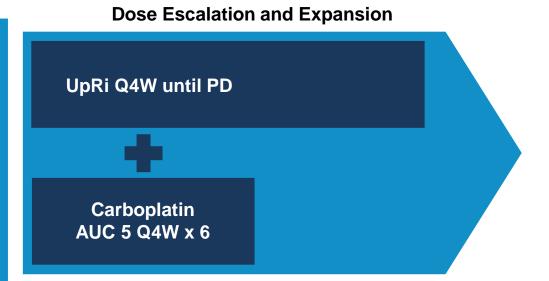
- Combination of platinum and taxane is the standard of care in platinum-sensitive disease; used in multiple lines until disease progression
 - Limited to 6 cycles due to toxicities (e.g., alopecia, neuropathy, neutropenia)
- Replacing taxane with UpRi, a targeted and generally well-tolerated agent, could potentially:
 - Minimize toxicities
 - Allow for continued treatment with UpRi after completing platinum
 - Improve and prolong clinical benefit
- PARP inhibitors and other agents have not been able to combine with platinum due to overlapping toxicities

UPGRADE Design: Phase 1/2 UpRi Combination in Platinum-Sensitive Ovarian Cancer



Key Enrollment Criteria:

- Recurrent, platinum-sensitive high-grade serous carcinoma, 1-2 prior platinum-based regimes
- Tissue for retrospective assessment of NaPi2b expression
- RECIST measurable disease
- ECOG PS = 0-1



UpRi Has the Potential for Deeper and Longer Treatment Durations Based on Lower Toxicities Observed to Date

Dolasynthen Candidate Expected to Enter the Clinic in Mid-2022



Platform	ADC Program	Target	Indication	Discovery	Preclinical	P1 Dose Escalation	P1 Proof of Concept	P2/Pivotal	P3	
			Platinum-Resistant Ovarian Cancer	UPLIFT Sin	UPLIFT Single-Arm Registrational Trial					
Dolaflexin	Upifitamab Rilsodotin (UpRi)*	NaPi2b	Platinum-Sensitive Ovarian Cancer	UPGRADE Phase 1-2 Combo						
	Tallocadail (Optia)		Recurrent Platinum- Sensitive Ovarian Cancer Maintenance	UP-NEXT Phase 3 – Initiate Patient Screening in Q2 2022						
Dolasynthen	XMT-1660	B7-H4	Multiple Solid Tumors							
	XMT-2056	HER2	Multiple Solid Tumors)				
Immunosynthen	XMT-2068	Tumor-Associated Antigen	Undisclosed							
	XMT-2175	Tumor-Associated Antigen	Undisclosed							
	Collaborators:									
Dolasynthen	Janssen T	Multiple	Undisclosed							
Deleflerin	EMD ** Serono	Multiple	Undisclosed)				
Dolaflexin	() ASANA BIOSCIENCES	5T4	Undisclosed							

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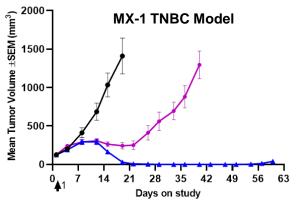
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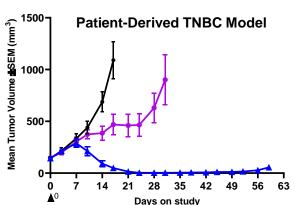
XMT-1660: A First-in-Class Dolasynthen ADC Targeting B7-H4



B7-H4 is a Target Well Suited for a DolaLock ADC

- Selectively expressed on tumors in major indications with high unmet medical need
 - Breast, endometrial, ovarian cancers
- Site-specific DAR 6 selected based on optimal therapeutic index in pre-clinical studies
- Leveraging DolaLock payload with controlled bystander effect
 - Clinical experience to date has demonstrated no association with severe neutropenia, peripheral neuropathy or ocular toxicities
 - Not a P-gp substrate







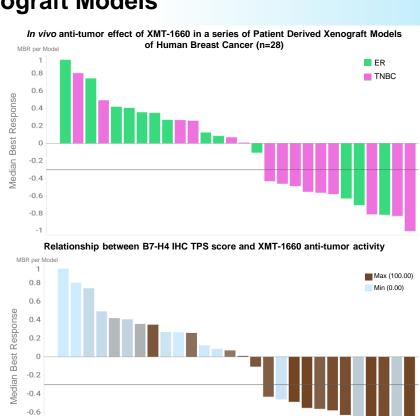


Vehicle

Single Dose of XMT-1660 Demonstrates Anti-Tumor Effect Correlated with B7-H4 Expression in Breast Cancer Xenograft Models



- XMT-1660 induced responses in:
 - Triple-negative breast cancer (TNBC) and estrogen receptor positive (ER+) breast cancer xenograft models after a single dose
 - Previously treated tumor models
- Relationship was seen between XMT-1660 efficacy and B7-H4 expression by tumor proportion score (TPS)
- XMT-1660 expected to enter Phase 1 development in mid-2022



First Immunosynthen Candidate Expected to Enter the Clinic in Mid-2022



Platform	ADC Program	Target	Indication	Discovery	Preclinical	P1 Dose Escalation	P1 Proof of Concept	P2/Pivotal	P3		
			Platinum-Resistant Ovarian Cancer	UPLIFT Single-Arm Registrational Trial							
Dolaflexin	Upifitamab Rilsodotin (UpRi)*	NaPi2b	Platinum-Sensitive Ovarian Cancer	UPGRADE Phase 1-2 Combo							
Niloddolin (opin)			Recurrent Platinum- Sensitive Ovarian Cancer Maintenance	UP-NEXT F	Phase 3 – Init	iate Patient Sc	reening in Q2	2022			
Dolasynthen	XMT-1660	B7-H4	Multiple Solid Tumors								
	XMT-2056	HER2	Multiple Solid Tumors)					
Immunosynthen	XMT-2068	Tumor-Associated Antigen	Undisclosed								
	XMT-2175	Tumor-Associated Antigen	Undisclosed								
	Collaborators:										
Dolasynthen	Janssen T	Multiple	Undisclosed								
Delefferin	EMD **	Multiple	Undisclosed)					
Dolaflexin	() ASANA BIOSCIENCES	5T4	Undisclosed								

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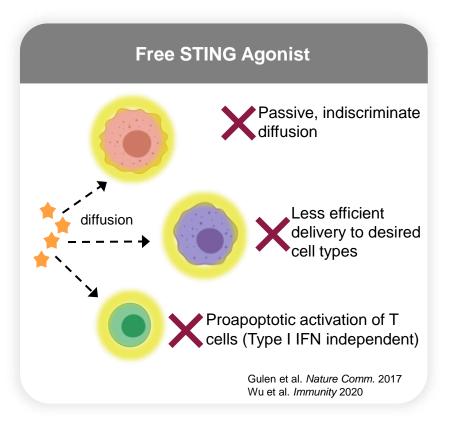
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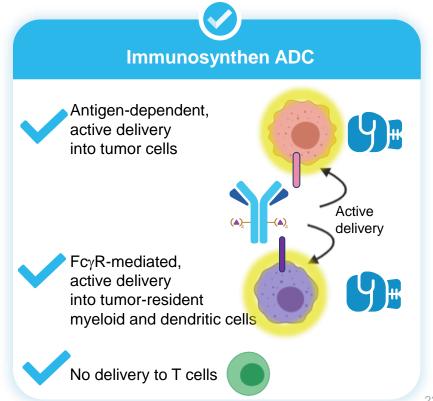
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STING: A Fundamental Pathway Leading to Innate Immune Activation in Both Tumor Cells and Tumor-Resident Immune Cells – a "One-Two Punch"



Localization of STING Activation Via a Targeted ADC is Designed to Increase Potency and Decrease Systemic Toxicity

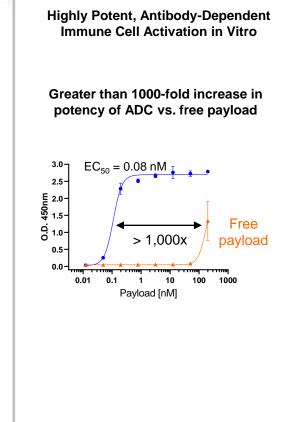


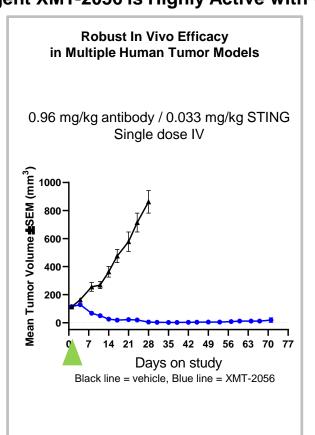


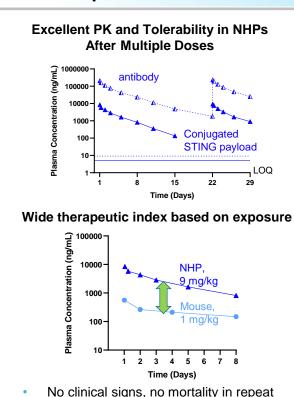
First Immunosynthen Candidate: XMT-2056 Targeting HER2



Preclinical Data Show Single Agent XMT-2056 is Highly Active with Wide Therapeutic Index





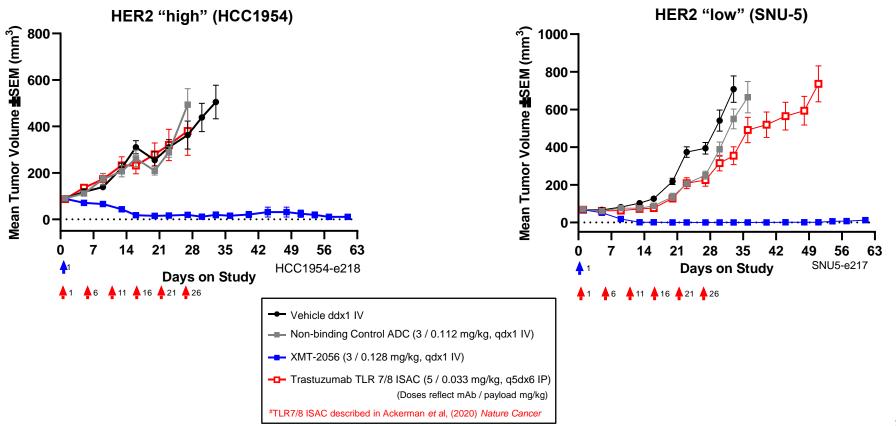


- No adverse changes in clinical pathology
- No adverse findings in histopathology

dose studies

XMT-2056 Efficacy is Superior to Trastuzumab-TLR7/8 ADC in Both HER2 High and Low Preclinical Models

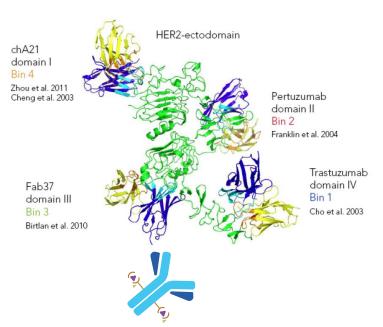


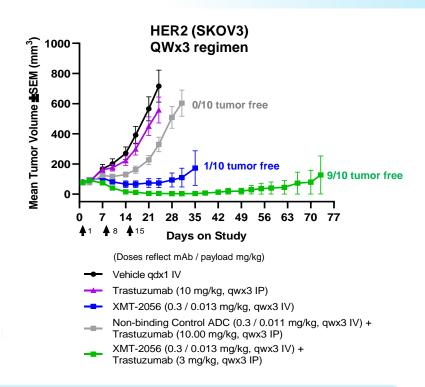


XMT-2056 Targets a Novel HER2 Epitope Distinct from Trastuzumab and Pertuzumab, Allowing for Combinability



XMT-2056 Binds to a Novel Epitope





XMT-2056 Offers a Potentially Differentiated and Complementary Approach to the Treatment of HER2-Expressing Tumors

Strategic Partnerships Leveraging ADC Plaforms



Platform	ADC Program	Target	Indication	Discovery	Preclinical	P1 Dose Escalation	P1 Proof of Concept	P2/Pivotal	P3	
			Platinum-Resistant Ovarian Cancer	UPLIFT Single-Arm Registrational Trial						
Dolaflexin	Upifitamab Rilsodotin (UpRi)*	NaPi2b	Platinum-Sensitive Ovarian Cancer	UPGRADE Phase 1-2 Combo						
raisocouri (optu)			Recurrent Platinum- Sensitive Ovarian Cancer Maintenance	UP-NEXT Phase 3 – Initiate Patient Screening in Q2 202				2022		
Dolasynthen	XMT-1660	B7-H4	Multiple Solid Tumors							
	XMT-2056	HER2	Multiple Solid Tumors)				
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	XMT-2175	Tumor-Associated Antigen	Undisclosed							
	Collaborators:									
Dolasynthen	Janssen T	Multiple	Undisclosed							
Dolaflexin	EMD ** Serono	Multiple	Undisclosed							
Dolaliexin	() ASANA BIOSCIENCES	5T4	Undisclosed							

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Building Mersana with Strategic Partners



February 3, 2022

Mersana Therapeutics
Announces Research
Collaboration and License
Agreement with Janssen to
Advance Novel AntibodyDrug Conjugates



2022 Goals and Anticipated Milestones



Upifitamab Rilsodotin (UpRi)	 Q2 2022: Initiate patient screening UP-NEXT Phase 3 trial of UpRi monotherapy maintenance in recurrent platinum-sensitive ovarian cancer Q3 2022: Complete enrollment in UPLIFT single-arm registrational trial in platinum-resistant ovarian cancer Q4 2022: Report interim data from UPGRADE combination dose escalation umbrella trial in platinum-sensitive ovarian cancer
XMT-1660	Mid-2022: Initiate Phase 1 dose escalation trial
XMT-2056	Mid-2022: Initiate Phase 1 dose escalation trial
Corporate	 ✓ Janssen collaboration Proactively evaluate potential for other collaborations that maximize value

2025: ADC Leadership from Discovery to Commercial and Opportunity to Benefit Patients and Stockholders



Mersana Today

Mersana Vision for 2025

<u>Build</u> <u>UpRi</u>

PATIENTS

Leading patient share in Platinum-Resistant OC and launching into Platinum-Sensitive OC

2 <u>Build Out</u> <u>Pipeline</u>

PIPELINE

5 first-in-class molecules advanced in the clinic

3 <u>Build</u> <u>Innovation</u>

PLATFORMS AS PRODUCT ENGINES

New molecules advanced and **c**ontinued leadership at the forefront of ADC science

Build Mersana

Partnerships & People

Recognized partner and employer of choice in ADCs



Accelerating ADC Innovation

...because patients are waiting

