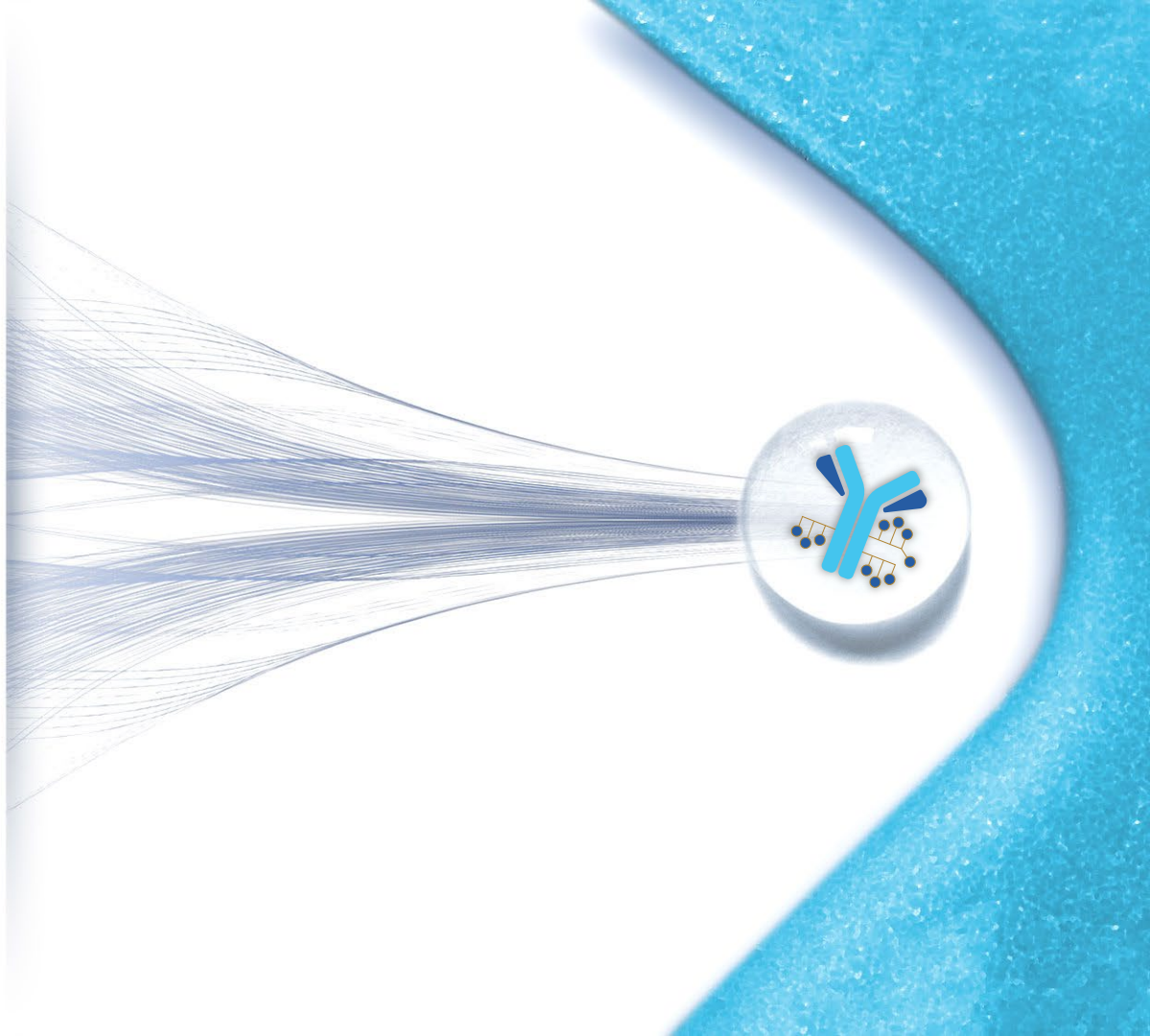
Mersana THERAPEUTICS

Accelerating ADC Innovation

…because patients are waiting

Virtual Analyst & Investor Day
January 5, 2021



Legal Disclaimer

This presentation contains “forward-looking” statements within the meaning of federal securities laws. These forward-looking statements are not statements of historical facts and are based on management’s beliefs and assumptions and on information currently available to management. Forward-looking statements include information concerning Mersana Therapeutics, Inc.’s (the “Company’s”) business strategy and the design, progression and timing of its clinical trials, the ability of the single-arm UPLIFT cohort to enable registration, expectations regarding future clinical trial results based on data achieved to date, and the sufficiency of the Company’s cash on hand.

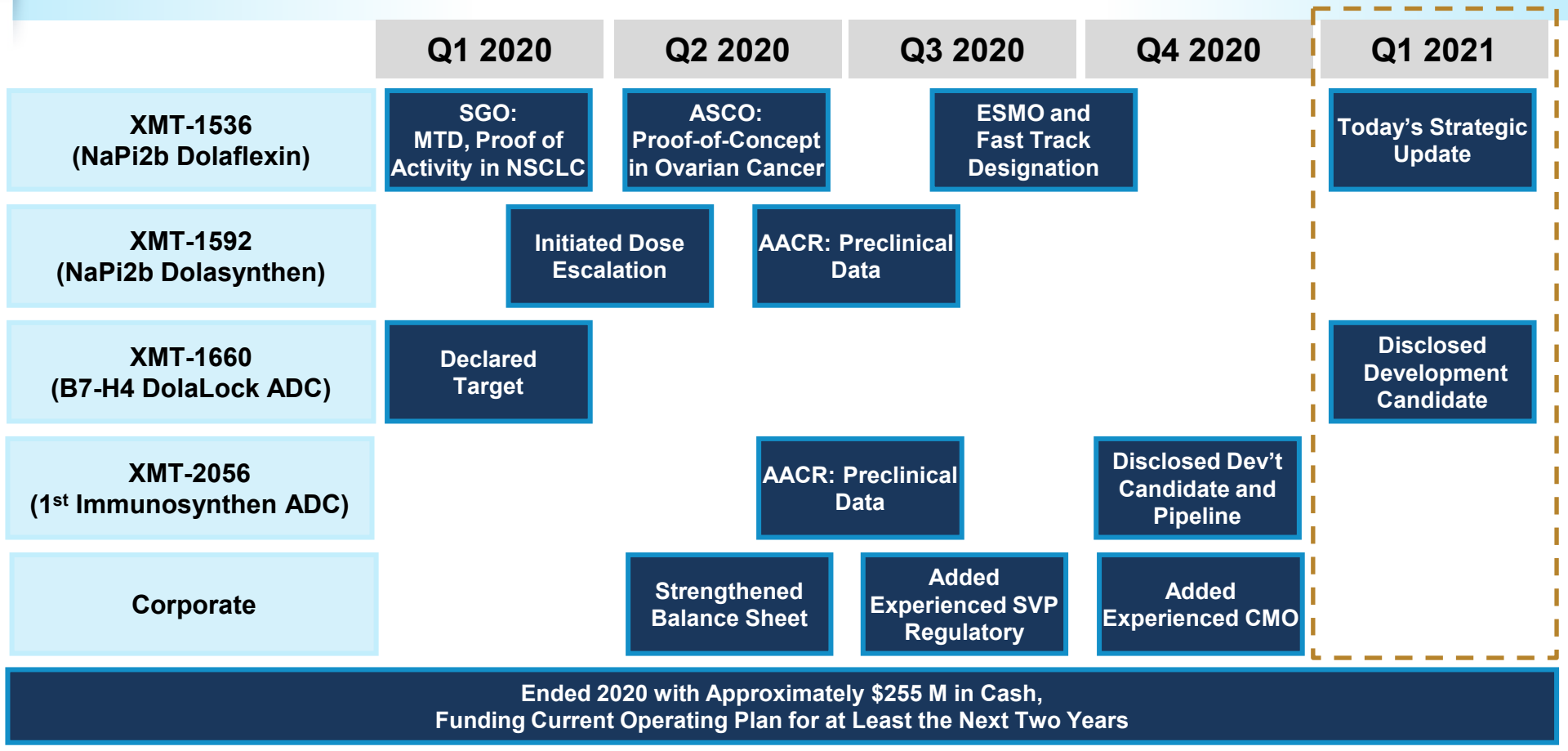
Forward-looking statements generally can be identified by terms such as “aims,” “anticipates,” “believes,” “contemplates,” “continues,” “could,” “estimates,” “expects,” “goal,” “intends,” “may,” “on track,” “opportunity,” “plans,” “poised for,” “possible,” “potential,” “predicts,” “projects,” “promises to be,” “seeks,” “should,” “target,” “will,” “would” or similar expressions and the negatives of those terms. Forward-looking statements represent management’s beliefs and assumptions only as of the date of this presentation. 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 or early clinical results may not be predictive of the results or success of ongoing or later clinical trials, regulatory changes, particularly with respect to the change in the U.S. presidential administration, the FDA’s review of the protocol for our study of the single-arm UPLIFT cohort, and that the development and testing of the Company’s product candidates will take longer and/or cost more than planned, as well as those listed in the Company’s Annual Report on Form 10-K filed with the Securities and Exchange Commission (“SEC”) on February 28, 2020, the Company’s Quarterly Report on Form 10-Q filed with the SEC on May 8, 2020 and subsequent SEC filings. In addition, while we expect that the COVID-19 pandemic might adversely affect the Company’s preclinical and clinical development efforts, business operations and financial results, the extent of the impact on the Company’s operations and the value of and market for the Company’s common stock will depend on future developments that are highly uncertain and cannot be predicted with confidence at this time, such as the ultimate duration of the pandemic, travel restrictions, quarantines, physical distancing and business closure requirements in the U.S. and in other countries, and the effectiveness of actions taken globally to contain and treat the disease. 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 Annual Report on Form 10-K and our other SEC filings are available by visiting EDGAR on the SEC website at http://www.sec.gov.

Today's Agenda

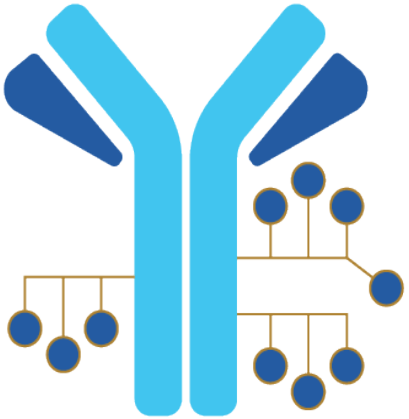
Topic	Speaker
Opening Remarks	Anna Protopapas, President & CEO
XMT-1536 Pivotal Registration Strategy in Ovarian Cancer	Arvin Yang, MD, PhD, Chief Medical Officer
XMT-1536 Phase 1 Ovarian Cancer Expansion Study Data Update	Debra L. Richardson, MD, Associate Professor and Section Chief, Division of Gynecological Oncology at OU Health Stephenson Cancer Center and the Sarah Cannon Research Institute
Ovarian Cancer Market Dynamics and XMT-1536 Opportunities	Brian DeSchuytner, SVP Finance & Product Strategy
XMT-1660 B7-H4 ADC Development Candidate	Tim Lowinger, PhD, Chief Science & Technology Officer
Closing Remarks: 2021 Corporate Goals & Anticipated Milestones	Anna Protopapas, President & CEO
Q&A	

2020 Was a Transformative Year for Mersana



Poised for Significant Value Inflection Points and Continued Momentum in 2021

XMT-1536 Has a New Name

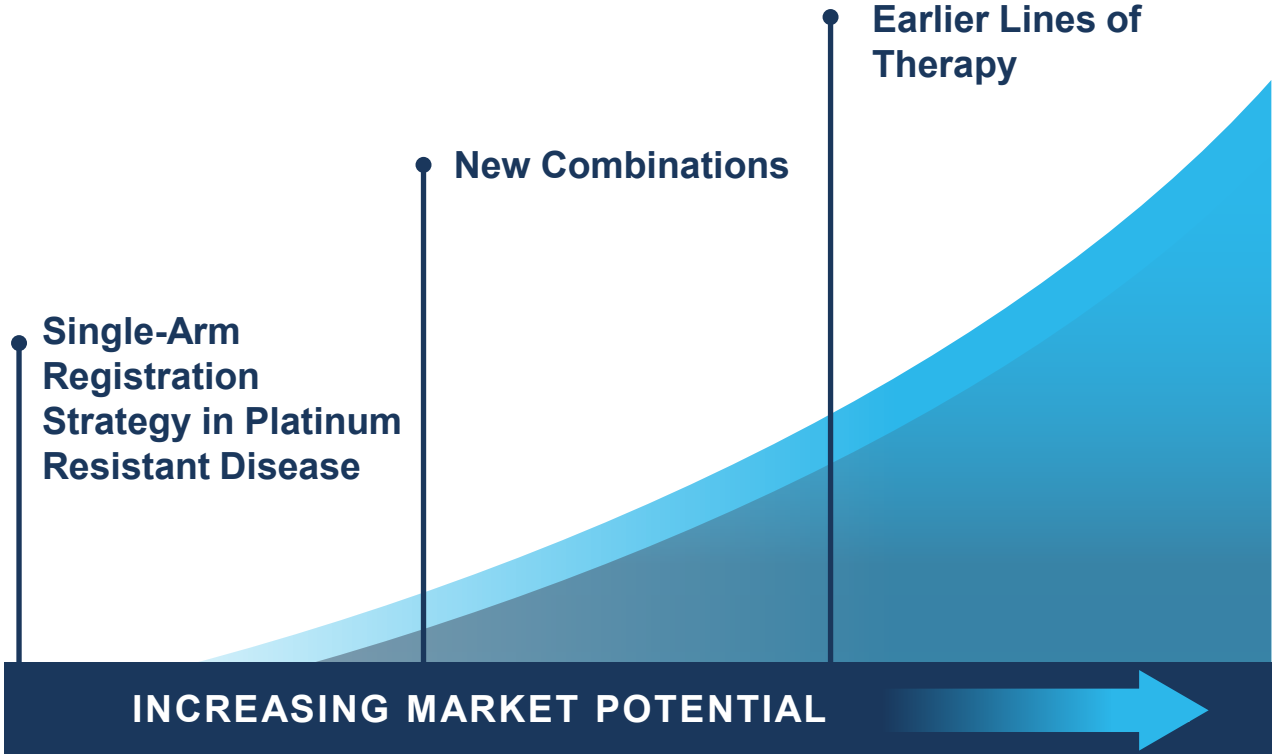


upifitamab rilsodotin

or UpRi, for short

UpRi (XMT-1536): An Opportunity to Deliver a Potentially Foundational Therapy for Ovarian Cancer

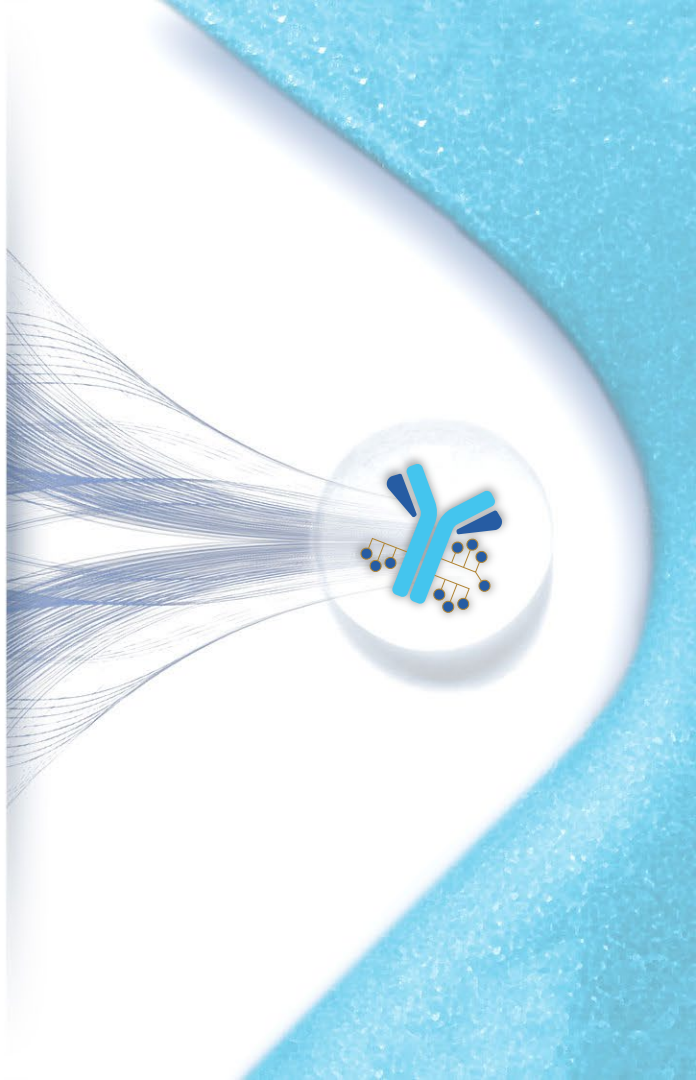
- In a heavily-pretreated ovarian cancer population:
  - Proof of concept, >30% ORR in ovarian cancer with higher NaPi2b expression
  - Activity, including CRs, in patients failing platinum, bevacizumab, and/or PARPi
  - No severe neutropenia, peripheral neuropathy or ocular toxicity
  - Biomarker identification for improved patient outcomes



UpRi (XMT-1536): First-in-Class Dolaflexin ADC Targeting NaPi2b

Single-Arm Registration Strategy in Ovarian Cancer

Arvin Yang, MD, PhD
Chief Medical Officer



UPLIFT Strategy: Key Areas Discussed with FDA

Strategy Informed by End of Phase Meeting and Meeting Minutes

- Population with high unmet medical need
- Performance of current standard of care
- Design of single-arm registration cohort
- Primary and secondary endpoints
- Biomarker validation strategy

Appropriate Benchmarks for Current Standard of Care in Platinum-Resistant Ovarian Cancer

With PARPi and bevacizumab increasingly used in earlier lines, the current standard of care is single agent chemotherapies

			Historical Comparison for UPLIFT Population
Study	**Demographics**	**Control Arm**	**Control Arm Performance**
Forward I ESMO 2019	1 – 3 Prior Median 2 Prior Prior PARPi: 10% Prior Bev: 47%	PLD, Topotecan, Weekly Paclitaxel	ORR 12%
Javelin 200 SGO 2019	1 – 3 Prior Median 2 Prior	PLD	ORR 4%
Corail ESMO 2018	1 – 3 Prior Median 2 Prior Prior PARPi: 5% Prior Bev: 46%	PLD or Topotecan	ORR 12%

UPLIFT: Single-Arm Registration Strategy in Platinum Resistant Ovarian Cancer

Patient Population:

No Pre-Selection for NaPi2b

Inclusion Criteria:
Platinum Resistant Ovarian Cancer
1 – 4 Prior Lines

Exclusion Criteria:
1 – 2 Prior Lines Bev-naïve
Primary Platinum Refractory Disease

Global:
US, Europe,
Australia, Canada

Dose:
43 mg/m^2 q4w

N:
~180 Patients

Primary Endpoint:
Confirmed ORR in higher NaPi2b

Key Secondary Endpoint:
Confirmed ORR in overall population

Other Secondary Endpoints:

- Duration of Response
- Safety

Significant Time Advantage in Amending with the Single-Arm UPLIFT Cohort

UPLIFT will be operationalized as an amendment as opposed to initiating a new study

Objective

First in Human to Pivotal Cohort in One Study

- Determine safety and MTD: 43 mg/m^2

Dose Escalation Cohort
(Enrollment Complete in March 2020)

- Proof of concept achieved June 2020
- Expansion cohort serves as training set for NaPi2b biomarker

Ovarian Cancer Expansion Cohort
(Enrollment August 2019 – Q1 2021)

- Demonstrate clinically meaningful outcome
- Validate NaPi2b Biomarker

UPLIFT: Single-Arm Registration Strategy in Platinum Resistant Ovarian Cancer
(Planning Patient Dosing in Q1 2021)

Strategy to Deliver a Robust and Reproducible Commercial Diagnostic Assay

Ovarian Cancer Expansion Cohort and Relevant Doses from Escalation Cohort

- NaPi2b expression assessed with clinical assay in >80 patients
- "Train" proposed commercial assay
  - Repeat assessment on all samples
  - Ensures same read regardless of lab and pathologist
- Determine cutoff for UPLIFT Pivotal Cohort based on full data set

UPLIFT: Single-Arm Registration Strategy in Platinum-Resistant Ovarian Cancer

- Prospectively-defined retrospective analysis validates NaPi2b biomarker cutoff with proposed commercial assay
- Enroll without NaPi2b biomarker selection
  - Evaluate both NaPi2b biomarker higher and overall population
  - Optionality for either companion diagnostic or complementary diagnostic assay

UPLIFT Registration Strategy Creates Potential for Speed and Label Differentiation

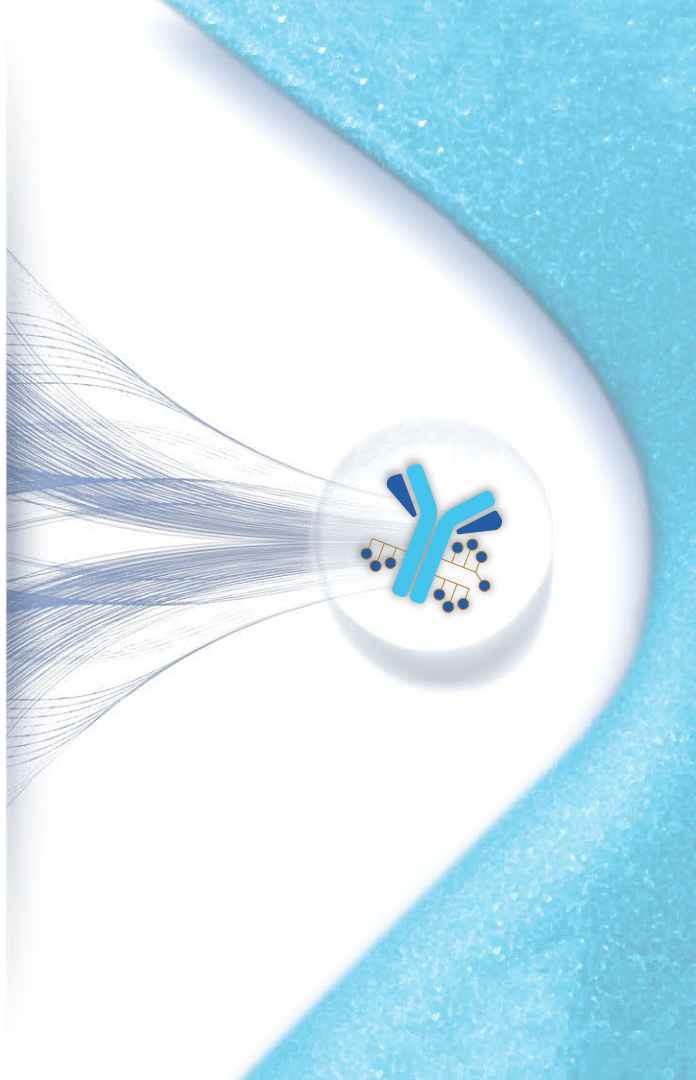
- **Streamlined Execution**
  - Leverages expansion cohort enrollment momentum in high unmet need population for single-arm registration path
- **Broad Target Population**
  - Includes patients with 4 prior lines of therapy, a broader population than historical studies in platinum-resistant ovarian cancer
  - Includes bevacizumab-naïve patients with 3 – 4 prior lines of therapy, accommodating differences in bevacizumab use in early disease
  - No pre-selection accelerates enrollment and provides potential upside opportunity for broad label regardless of NaPi2b expression level
- **Assay Validation Process**
  - Training and validation method designed to support a commercial assay

Planning to Initiate UPLIFT Patient Dosing in Q1 2021

UpRi (XMT-1536): First-in-Class Dolaflexin ADC Targeting NaPi2b

Phase 1 Ovarian Cancer Expansion Cohort Data Update

Debra L. Richardson, MD
Associate Professor and Section Chief, Division of Gynecological Oncology at OU Health Stephenson Cancer Center and the Sarah Cannon Research Institute



The following information is from an ongoing study and based on December 3, 2020 data cut

Acknowledgements

We thank the patients, their families and caregivers for their contribution to this study

UNTED STATES
Allegheny Health Network, Pittsburgh, PA
Arizona Oncology Associates, Tucson, AZ
Billings Clinic, Billings, MT
Dana Farber Cancer Institute, Boston, MA
Emory University, Atlanta, GA
Fox Chase Cancer Center, Philadelphia, PA
H. Lee Moffitt Cancer Center, Tampa FL
Henry Ford Medical Center, Detroit, MI
Greenville Hospital System University Medical Center, Greenville, SC
Lahey Clinic, Burlington, MA
Levine Cancer Center, Charlotte, NC
Mary Crowley Cancer Research Center, Dallas, TX
Maryland Oncology and Hematology, Rockville, MD
Massachusetts General Hospital, Boston, MA
Mount Sinai, New York City, NY
NEXT Oncology, San Antonio, TX
Ohio State University Wexner Medical Center, Hilliard, OH
Oncology and Hematology Assoc. of SW VA, Inc., Roanoke, VA
QUEST Research Institute, Royal Oak, MI
Rocky Mountain Cancer Centers, LLP, Denver, CO
Sarah Cannon Research Institute, Nashville, TN
START, San Antonio, TX

UNITED STATES
START Midwest, Grand Rapids, MI
Stephenson Cancer Centre, Oklahoma City, OK
Texas Oncology, Austin, TX
Texas Oncology Fort Worth, Fort Worth, TX
Texas Oncology, Tyler, TX
University of Alabama at Birmingham, Birmingham, AL
University of Colorado, Aurora, CO
University of Florida, Gainesville, FL
University of Miami, Miami, FL
University of Pittsburgh Medical Center, Pittsburgh, PA
University of Tennessee, Knoxville, TN
University of Utah Huntsman Cancer Institute, Salt Lake City, UT
Virginia Cancer Specialists, Fairfax, VA
Virginia Commonwealth University Massey Cancer Center, Richmond, VA
Washington University, St. Louis, MO
Willamette Valley Cancer Institute, Eugene, OR
CANADA
McGill University (Glen-Cedars Cancer Center), Montreal
British Columbia Cancer Agency, Vancouver
AUSTRALIA
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Peter MacCallum Center, Melbourne, Victoria
Austin Health, Heidelberg, Victoria

Design for the Ovarian Cancer Cohort of the XMT-1536 (UpRi) Phase 1 Expansion Study

Ovarian Cancer Cohort

- 1-3 prior lines in platinum resistant
- 4 prior lines regardless of platinum status
- High grade serous histology
- Archived tumor and fresh biopsy (if medically feasible) for NaPi2b
- Exclusion: primary platinum-resistant defined as lack of response or disease progression within 3 mos after completing front-line platinum containing therapy

Patient population: High grade serous ovarian cancer (including fallopian tube and primary peritoneal cancer) progressing after standard treatments

- Measurable disease per RECIST v1.1
- ECOG Performance Status 0 or 1

Dosing: IV every 4 weeks until disease progression or unacceptable toxicity

- 36 mg/m2 cohort initiated in August 2019 and enrollment closed
- 43 mg/m2 cohort initiated in December 2019 and ongoing; current dose evaluated in EXP

Primary Objectives:

- Evaluate safety and tolerability of MTD
- Assess preliminary efficacy (ORR, DCR)

Secondary Objectives:

- Association of tumor NaPi2b expression and objective tumor response using an immunohistochemistry (IHC) assay with a broad dynamic range to distinguish tumors with higher and lower NaPi2b expression (as previously reported[1,2,3])
- Further assessment of preliminary anti-neoplastic activity (DOR)

Assessments:

- Tumor imaging (MRI or CT): baseline and every 2nd cycle; response assessed per RECIST v1.1

Abbreviations: mos = months; EXP = expansion; RECIST = Response Evaluation Criteria in Solid Tumors; ECOG = Eastern Cooperative Oncology Group; MTD = maximum tolerated dose; ORR = objective response rate; DCR = disease control rate; DOR = duration of response

[1]Tolcher TW et al. J Clin Oncol 37, 2019 (suppl; abstr 3010)
[2]Richardson DL et al. Presented at SGO Annual Meeting 2020; LBA8
[3] Hamilton E et al. Presented during the 2020 European Society of Medical Oncology (ESMO) Virtual Congress

Patient Demographics and Disease Characteristics

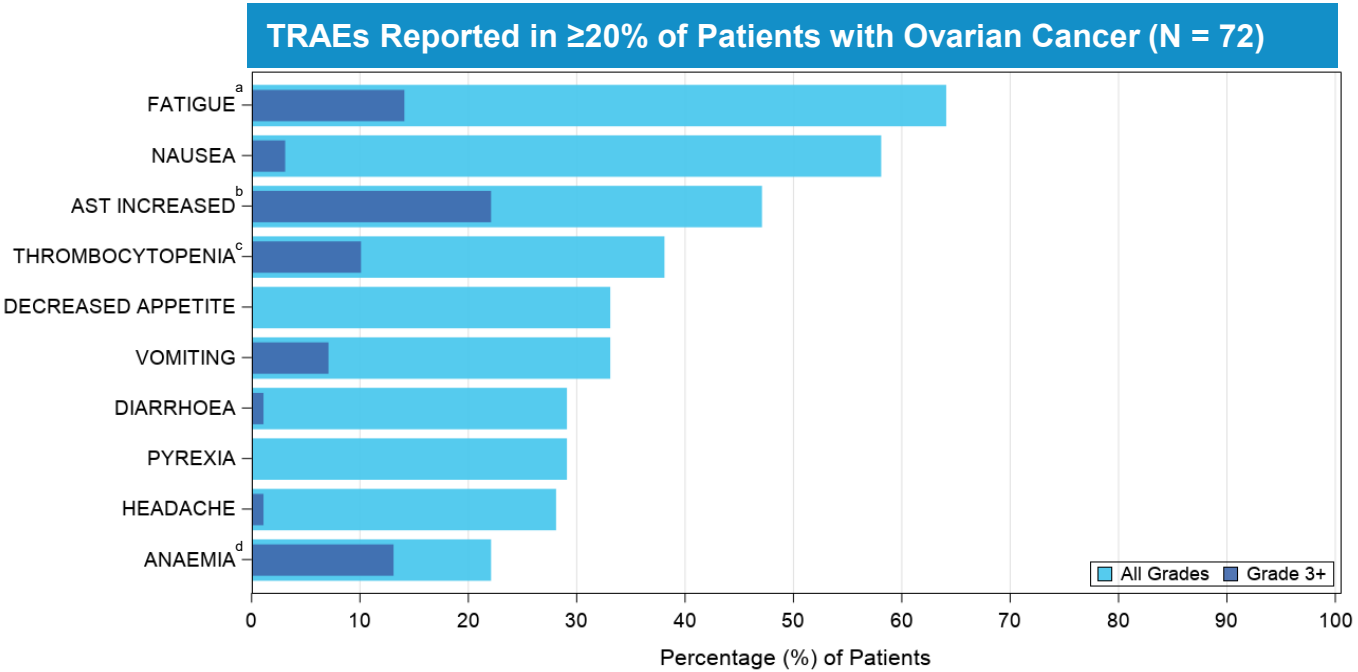
Data cut off: 03 December 2020

Ovarian Cancer Expansion Patients (N = 72)		
Age; years	Median (range)	68 (33, 87)
ECOG Performance Status; n (%)	0 1	26 (36) 46 (64)
Primary Tumor Type[a]; n (%)	Ovarian Fallopian Tube Primary Peritoneal	55 (76) 11 (15) 6 (8)
Prior Lines of Therapy; n (%)	1-3 4+[b]	47 (65) 25 (35)
Prior Therapy; n (%)	Bevacizumab PARP inhibitor	48 (67) 42 (58)
Platinum-free Interval[c]; n (%)	0-3 mos >3-6 mos >6 mos[d] Unknown[e]	26 (36) 39 (54) 6 (8) 1 (1)
BRCA1/2 Mutation; n (%)	Yes No Unknown[f]	11 (15) 52 (72) 9 (13)
NaPi2b H-score[g]; n (%)	Determined Higher Lower Not Yet Determined (ND)	54 (75) 37 (69) 17 (31) 18 (25)

[a] Includes 1 Endometrioid, 1 Low Grade, 1 Serous / Endometroid, and 1 Carcinosarcoma histology. [b] Three patients enrolled with 5 prior lines of systemic therapy. [c] 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. [d] All patients are platinum-sensitive and had received 4 or 5 lines of prior therapy. [e] Treatment dates missing/not provided; unable to determine. [f] BRCA1/2 mutation status not available/not reported. [g] Higher NaPi2b Expression: as defined in dose escalation as at / above lowest H-score at which response observed (≥110); Lower NaPi2b Expression: as defined in dose escalation as below the lowest H-score at which response observed (<110); ND = NaPi2b Expression not yet determined or tissue not available

XMT-1536 (UpRi) Continues to Have a Consistent Tolerability Profile

- 63 (88%) patients reported at least 1 treatment-related adverse event (TRAE)
- No Grade ≥ 3 (severe) TRAEs of neutropenia, peripheral neuropathy, or ocular toxicity have been reported



[a]Fatigue includes preferred terms of asthenia and fatigue; [b]AST increase is transient in nature, recovers to baseline or to Grade 1 prior to the next dose, no instances are associated with elevated bilirubin or cases of Hy's law; [c]Thrombocytopenia includes preferred terms of platelet count decreased and thrombocytopenia. Thrombocytopenia is transient in nature, nadirs at Day 8 and recovers prior to the next dose; [d]Anaemia includes preferred terms of anaemia and blood loss anaemia;

Safety Summary of XMT-1536 (UpRi) in Patients with Ovarian Cancer (N = 72)

Dose Modifications	Patients, n (%)
Any dose reduction, delay, or discontinuation due to TRAE	22 (31%)
Dose reductions due to TRAE	17 (24%)
Dose delays due to TRAE	8 (11%)
Discontinuations due to TRAE	5 (7%)

SAEs	Patients, n (%)	Notes
Any SAEs*	28 (39%)	▪ SAEs reported in ≥2 (3%) patients included: ▪ 5 patients: Gastrointestinal obstruction (0 related) ▪ 4 patients each: Abdominal pain (2 related), pyrexia (4 related), and vomiting (3 related) ▪ 2 patients each: Cerebrovascular accident/transient ischemic attack (0 related), pneumonitis (2 related, Grade 2 and Grade 5**), pneumonia (0 related), respiratory failure (0 related), renal impairment (1 related), fatigue (1 related), and atrial fibrillation (0 related)
Treatment-Related SAEs	11 (15%)	

* Includes both related and unrelated SAEs as assessed by the Investigator
** One grade 5 pneumonitis assessed by the Investigator as related to study drug
Abbreviations: SAEs = serious adverse events; TRAE = treatment related adverse event

Case History of G5 Pneumonitis Case and Program Level Review and Modifications

Heavily Pre-Treated 87-Year-Old Patient with Recurrent Ovarian Cancer and 4 Prior Lines of Chemotherapy
(carboplatin, paclitaxel, pegylated liposomal doxorubicin, niraparib)

Cycle 2 Day 14

Initial Presentation: Admitted to Non-Study Hospital
- Moderate weakness, fatigue, dyspnea, and dizziness
- Treated empirically with diuresis
- Discharged to home in stable condition with some improvement

Cycle 2 Day 20

Re-admitted
- Admitted to cancer hospital with severe fatigue, weakness, and dyspnea
- Treated empirically with diuresis and antibiotics with transient improvement

Cycle 2 Day 24

Diagnosed and Treated for Pneumonitis
- With worsening symptoms, pulmonary consultation suspected pneumonitis
- Started on corticosteroids, complicated by altered mental status and persistent requirement for high-flow oxygen

Cycle 2 Day 30

Transitioned to Palliative Care
- Family concerned respiratory status would not improve
- Determined patient would not want more aggressive care
- Patient was transitioned to comfort care only and died 6 days later

- Safety Review Committee identified a low frequency of pneumonitis cases which were generally low grade and resolved with dose delays, reductions, and/or treatment with steroids
  - 8 additional cases out of 145 treated patients
  - Grade 1/2 n=7, Grade 3 n=1
- Modifications to protocol
  - Enhanced guidance on identification and management of pneumonitis
  - Enhanced Dose delay / reduction guidelines
- No further recommendations received from FDA

Continued Robust Activity Observed in Heavily-Pretreated Ovarian Cancer

Best Response in Evaluable Patients with Ovarian Cancer (n = 47)				
	All (n = 47)	**Higher NaPi2b^{O} (n = 31)**	**Lower NaPi2b^{OO} (n = 13)**	**NaPi2b Not Yet Determined (n = 3)**
CR; n(%)	2 (4)	2 (6)	0	0
PR; n(%)	11 (23)	8 (26)	2 (15)	1 (33)
SD; n(%)	19 (40)	13 (42)	5 (38)	1 (33)
PD; n(%)	15 (32)	8 (26)	6 (46)	1 (33)
ORR; n (%)	**13 (28)**	**10 (32)**	**2 (15)**	**1 (33)**
DCR; n (%)	**32 (68)**	**23 (74)**	**7 (54)**	**2 (67)**

All Responses are Confirmed

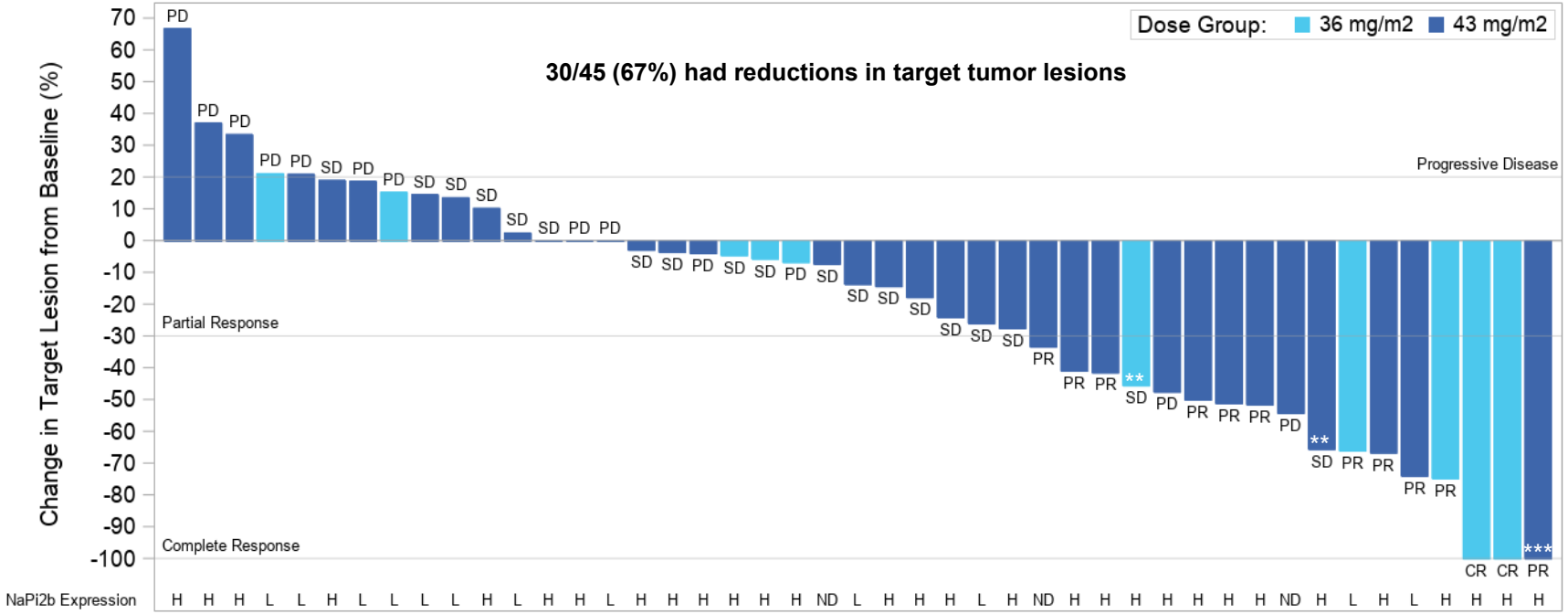
*25 patients were not evaluable for RECIST response: 10 patients discontinued prior to first scans: 1 clinical progression; 1 related SAE (G5 pneumonitis); 3 unrelated SAEs; 5 withdrew consent; 15 patients did not yet have RECIST assessment as of the data cut

^{O} Higher NaPi2b Expression: defined in dose escalation as at / above lowest H-score at which response observed (≥110)

^{OO} Lower NaPi2b Expression: defined in dose escalation as below the lowest H-score at which response observed (<110)

Deep Responses Observed in Heavily-Pretreated Ovarian Cancer

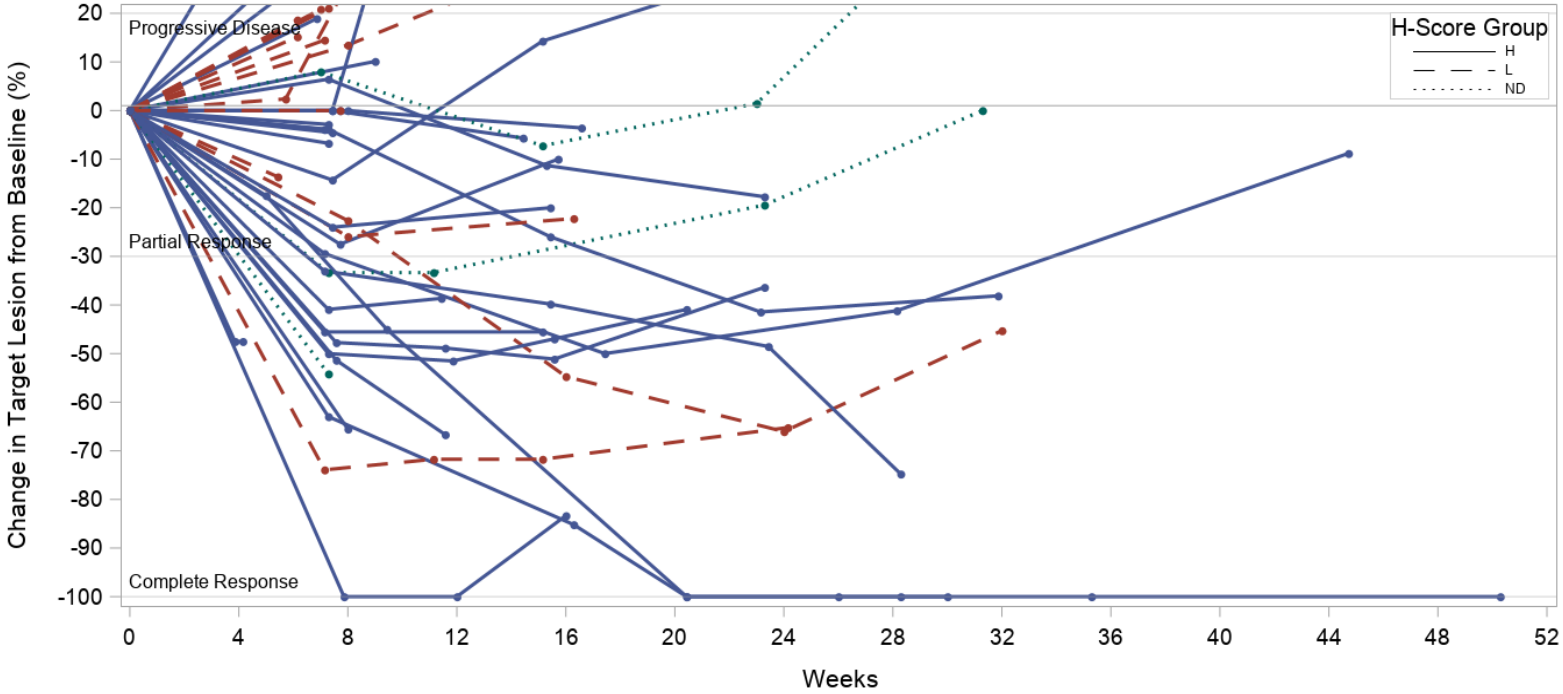
Maximum % Change from Baseline in Target Lesions in Patients with Ovarian Cancer (n = 45*)



* 2 patients not included in waterfall plot as tumor measurement data missing in the database as of data cut; both patients had BOR of PD due to new lesions
** Unconfirmed response, BOR per RECIST v1.1 is SD
*** CR of target lesions and non-CR/non-PD of non-target lesions, BOR per RECIST v1.1 is PR
H = Higher NaPi2b Expression; L = Lower NaPi2b Expression; ND = NaPi2b Expression not yet determined or tissue not available

Responses with XMT-1536 (UpRi) Occur Early and Appear to Deepen Over Time

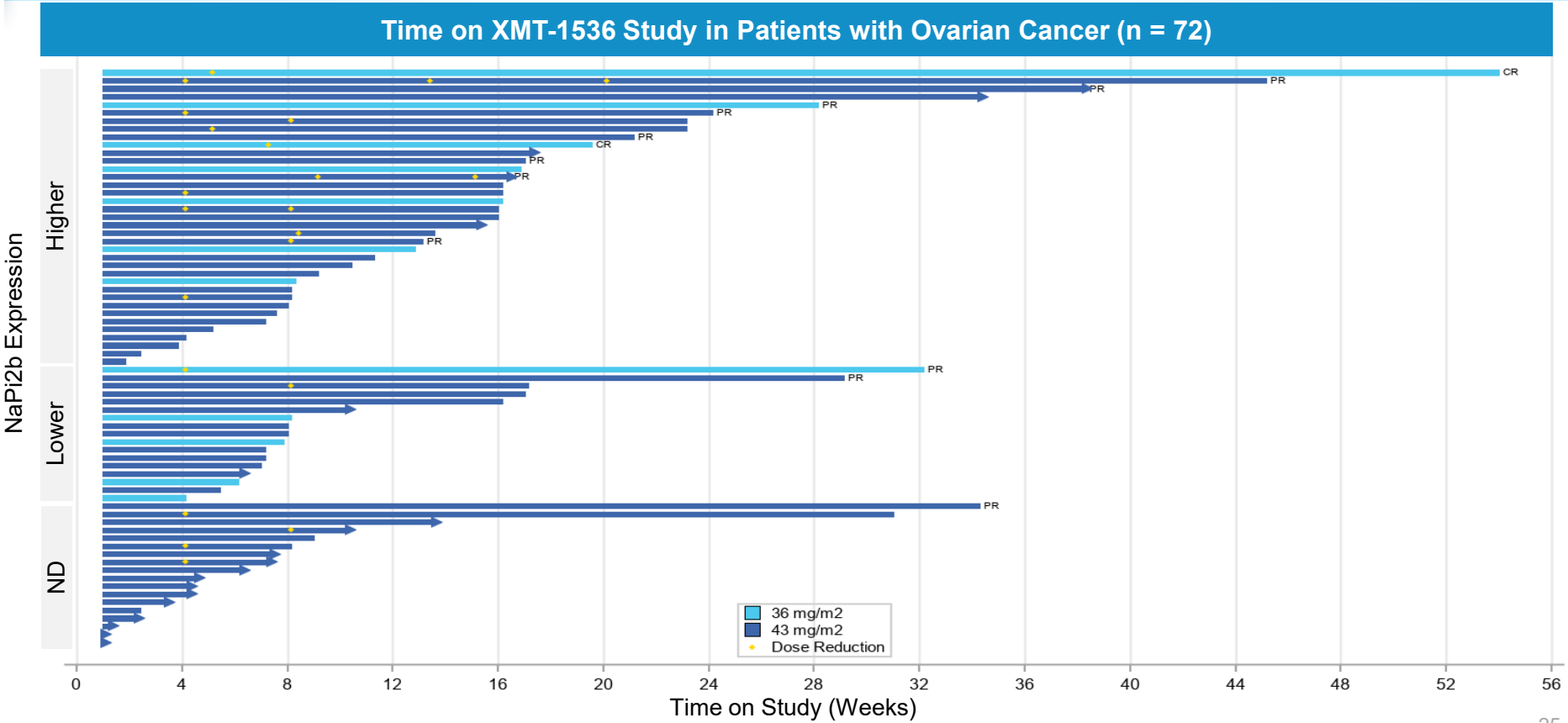
Change from Baseline in Target Lesions in Patients with Ovarian Cancer (n = 45)



Tumor response observed within 2 cycles in 69% (9 of 13) of Responders

H = Higher NaPi2b Expression; L = Lower NaPi2b Expression; ND = NaPi2b Expression not yet determined or tissue not available

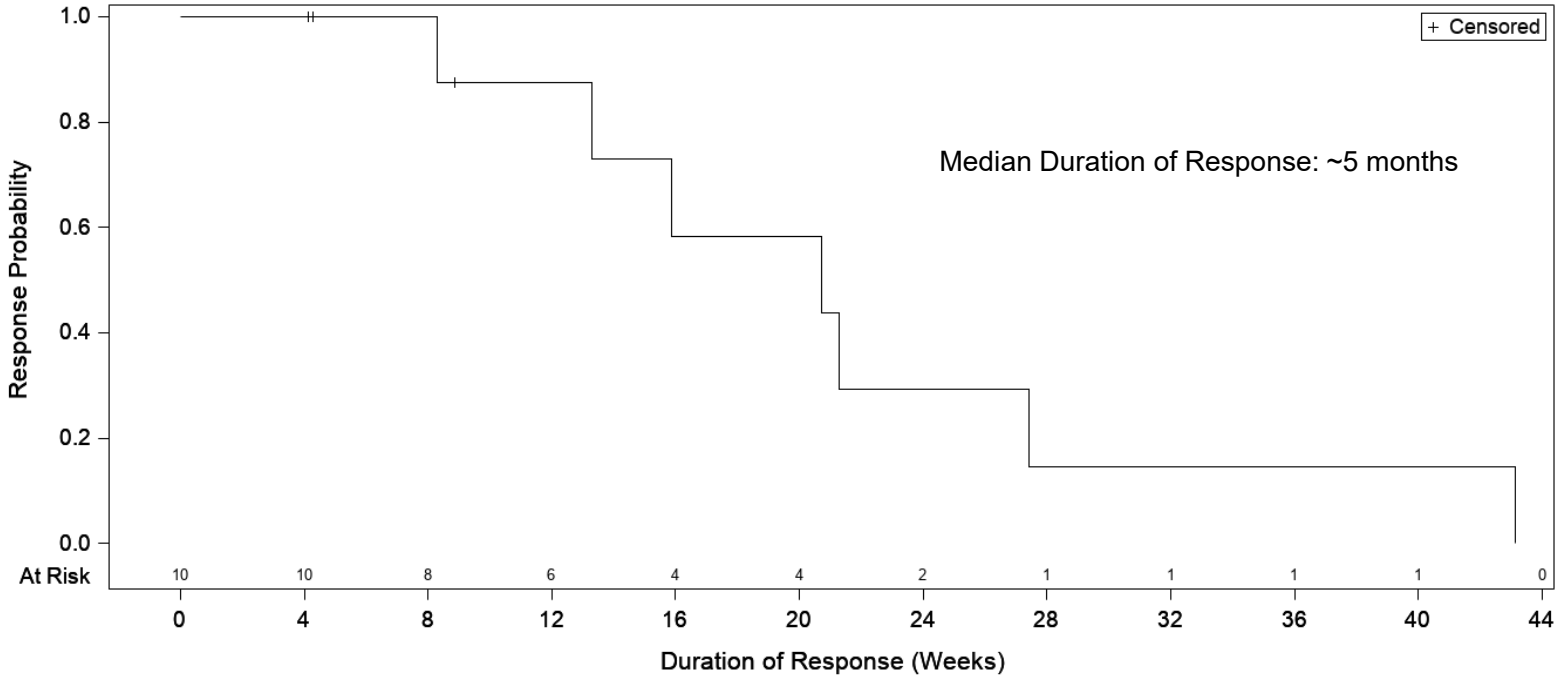
Clear Trend to Longer Time on Study with Higher NaPi2b Expression



Abbreviations: CR = complete response; PR = partial response; H = Higher NaPi2b Expression; L = Lower NaPi2b Expression; ND = NaPi2b Expression not yet determined or tissue not available

Median Duration of Response Estimated to be ~5 Months in Patients with Higher NaPi2b Expression

Durability of Response in Patients with Ovarian Cancer and Higher NaPi2b (n = 10)



- 2 patients with Lower NaPi2b with DOR of 16.1 and 17.1 weeks, respectively
- 1 patient with NaPi2b ND with DOR 16.1 weeks

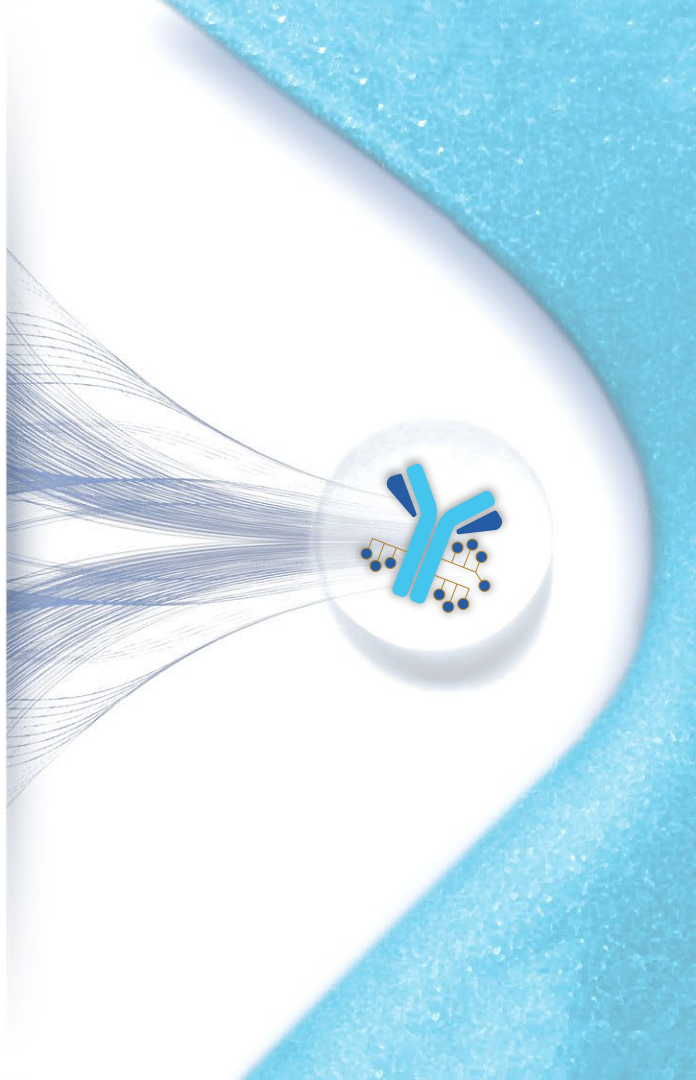
Conclusions: UpRi (XMT-1536) Expansion in Ovarian Cancer

- In this updated analysis of patients with ovarian cancer, UpRi (XMT-1536) continued to be generally well-tolerated with a consistent profile – no severe neutropenia, peripheral neuropathy, or ocular toxicity
- Consistent antitumor activity observed with UpRi (XMT-1536), including patients previously treated with bevacizumab and PARPi
  - Complete response observed in 2 patients with platinum-resistant ovarian cancer
  - Confirmed ORR of 32% and DCR of 74% in higher NaPi2b population
  - Median duration of response ~5 months in higher NaPi2b population
- Trend toward higher response rate as well as deeper and more durable responses in patients with higher NaPi2b expression supports the continued development of NaPi2b diagnostic assay
- These data support the continued development of UpRi (XMT-1536) for the treatment of patients with platinum-resistant high-grade serous ovarian cancer who have received 1 to 4 prior lines of systemic therapy

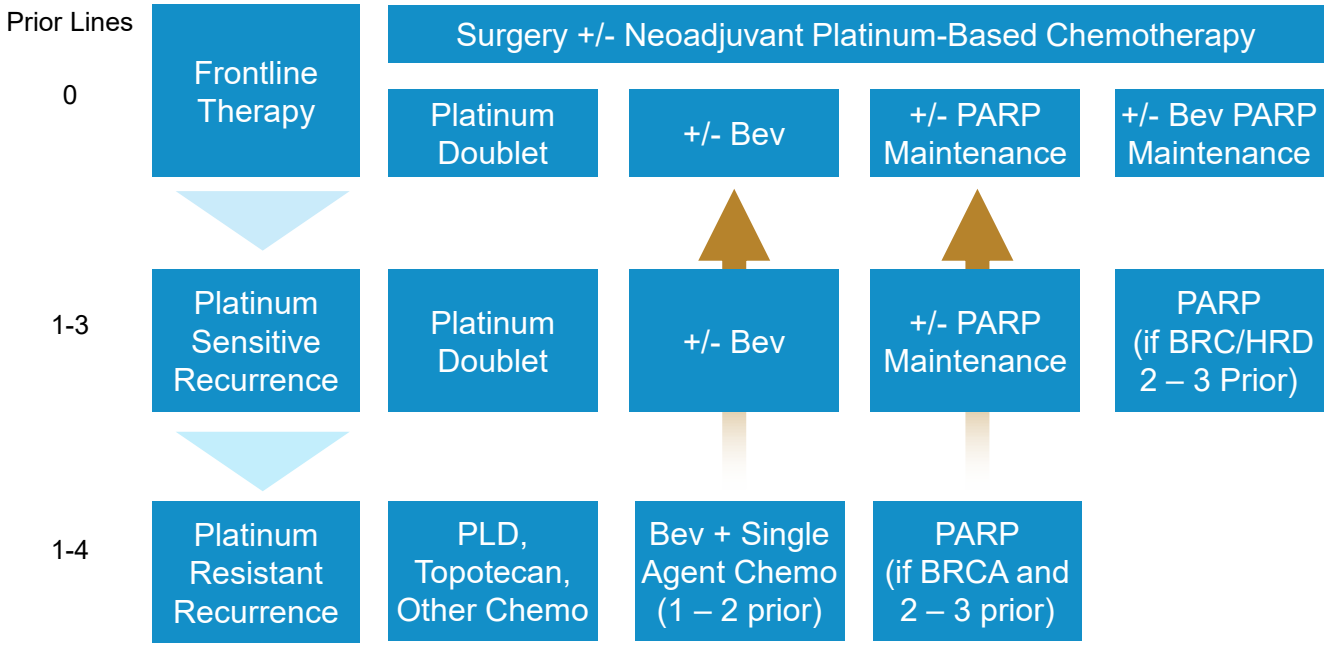
UpRi (XMT-1536): First-in-Class Dolaflexin ADC Targeting NaPi2b

Ovarian Cancer Market Dynamics and UpRi Opportunities

Brian DeSchuytner
SVP Finance & Product Strategy



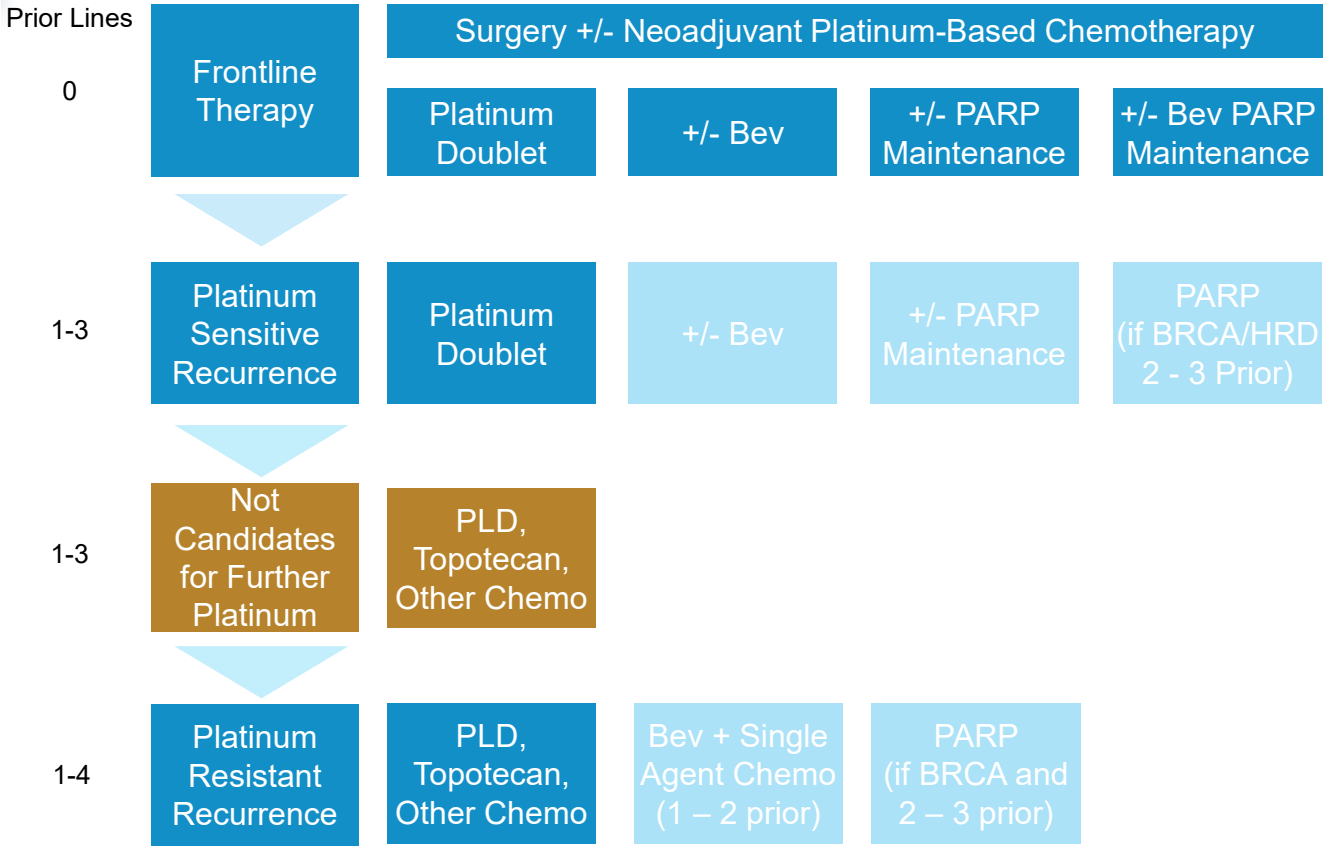
Early Use of Bevacizumab and PARP Inhibitors is Changing the Ovarian Cancer Landscape



- Key approvals moving targeted therapy into the frontline
  - PAOLA-1 (Bevacizumab + Olaparib maintenance vs Bevacizumab)
  - PRIMA (niraparib maintenance vs placebo)
  - GOG-218 (Bevacizumab + platinum doublet vs platinum doublet)

Source: Product Labels, KOL interviews

Creating New Unmet Needs and Patient Populations

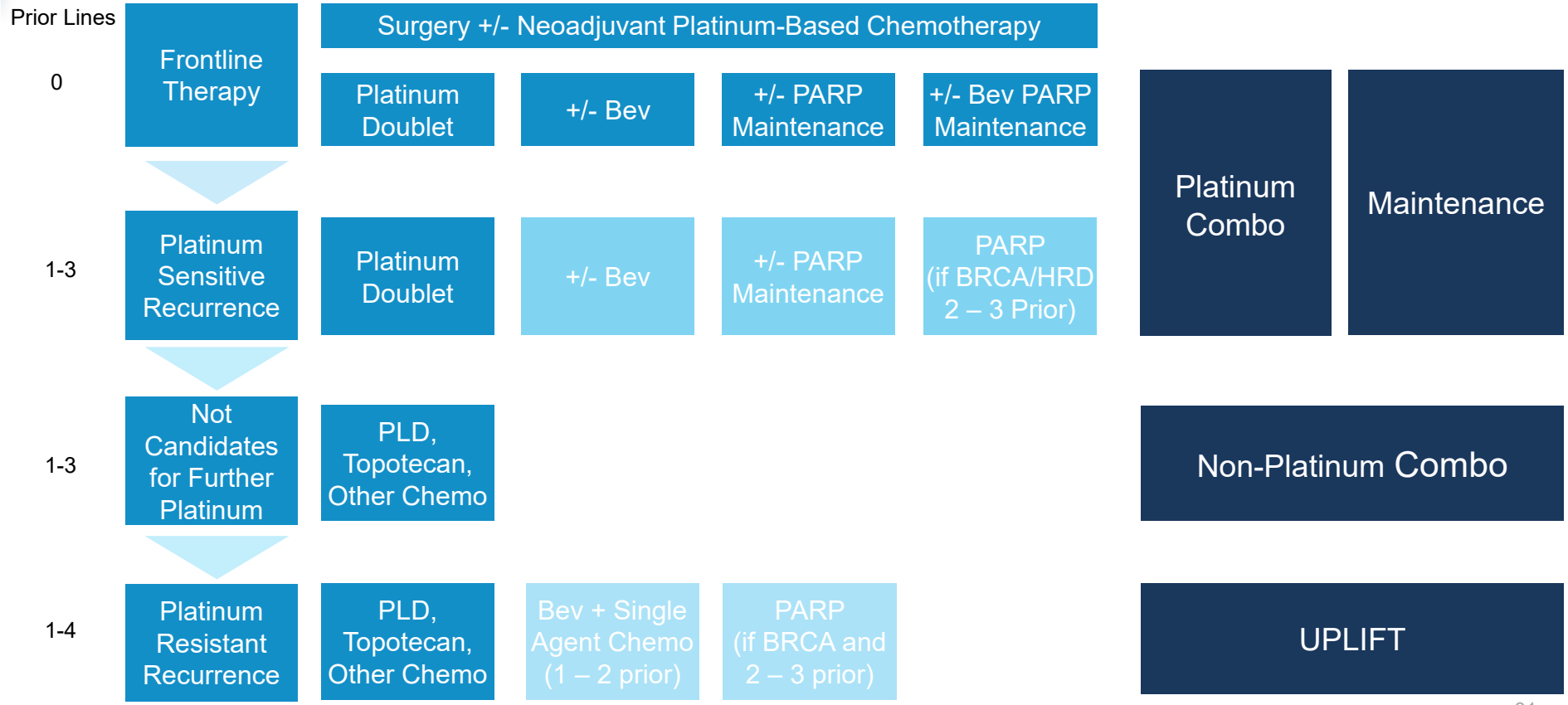


Unmet Needs

- With emerging evidence of poor outcomes with platinum following relapse after PARPi maintenance, non-platinum combos needed
- Better tolerated, more effective platinum combinations
- Agents with activity following platinum, PARP, and bevacizumab and exceeding 4-12% ORR of single agent chemo

Source: Product Labels, KOL interviews

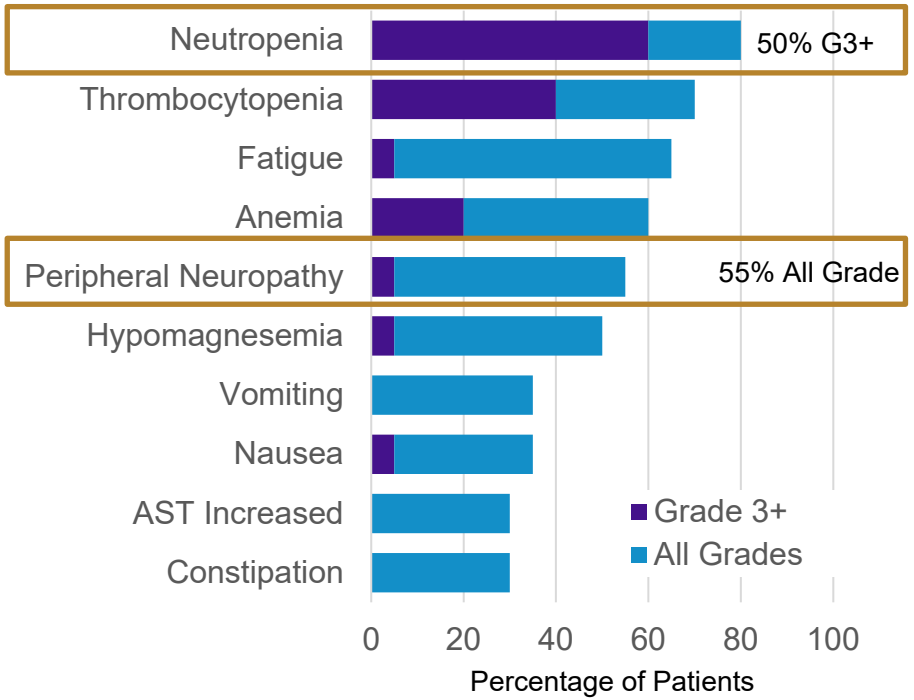
And Opportunities to Evaluate UpRi in Practice Changing Clinical Studies



Source: Product Labels, KOL interviews

UpRi Profile May Offer Potential Advantages in Combination

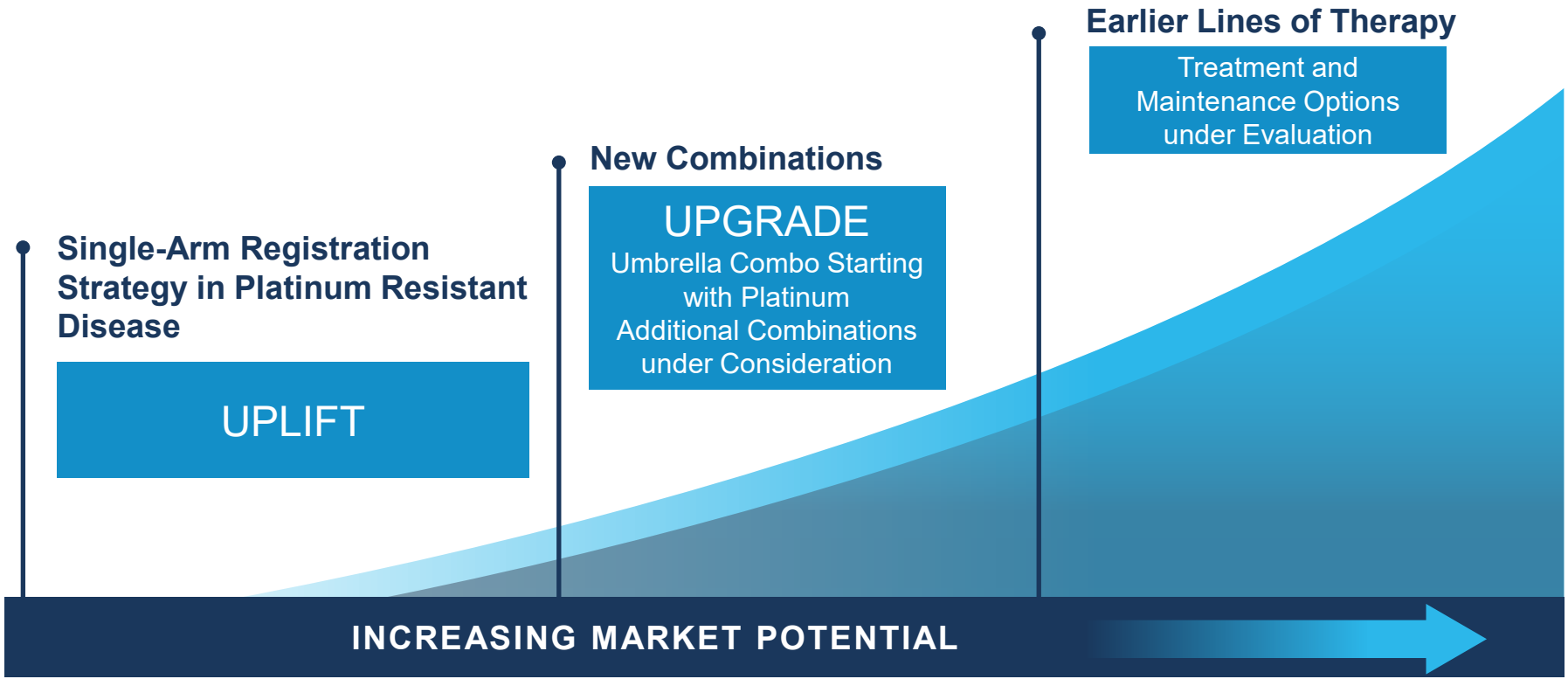
Adverse Events Observed in ≥30% of Patients Treated with Lifastuzumab Vedotin 2.4 mg/kg + Carboplatin (N=20)



- Roche's lifastuzumab vedotin demonstrated significant overlapping toxicities in combination with platinum
- To date, UpRi has demonstrated activity without severe neutropenia, neuropathy, or ocular toxicity
- Platinum doublets remain the backbone of ovarian cancer therapy in earlier lines, but tolerability limits platinum treatment duration

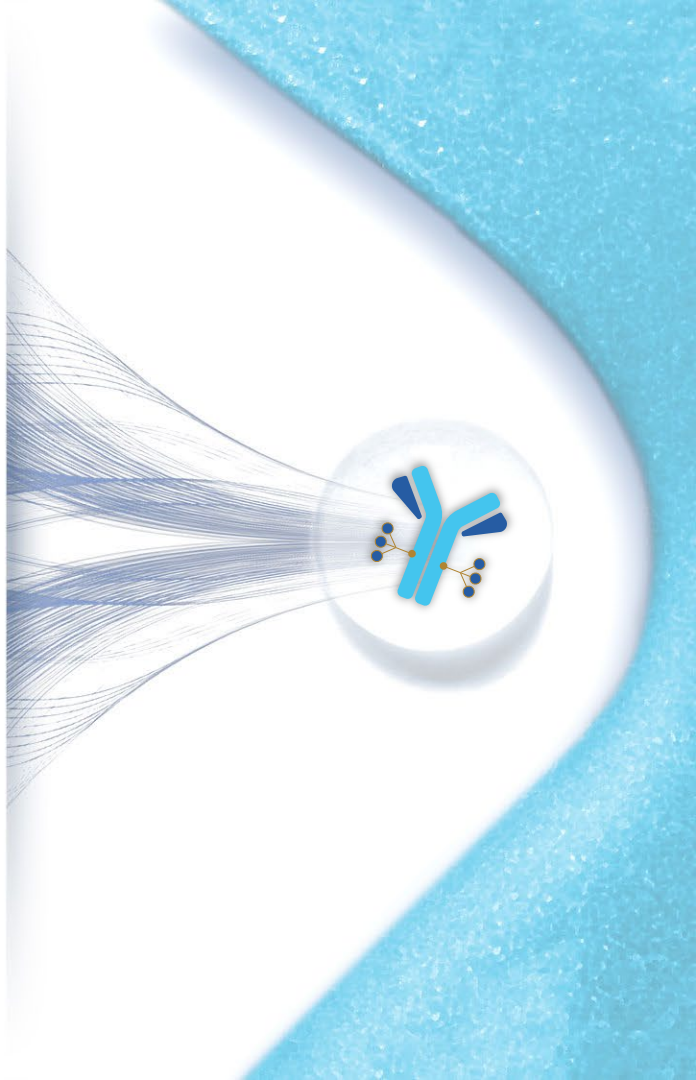
Moore, K. et al Gynecologic Oncology (2020)

UpRi (XMT-1536): An Opportunity to Deliver a Potentially Foundational Therapy for Ovarian Cancer

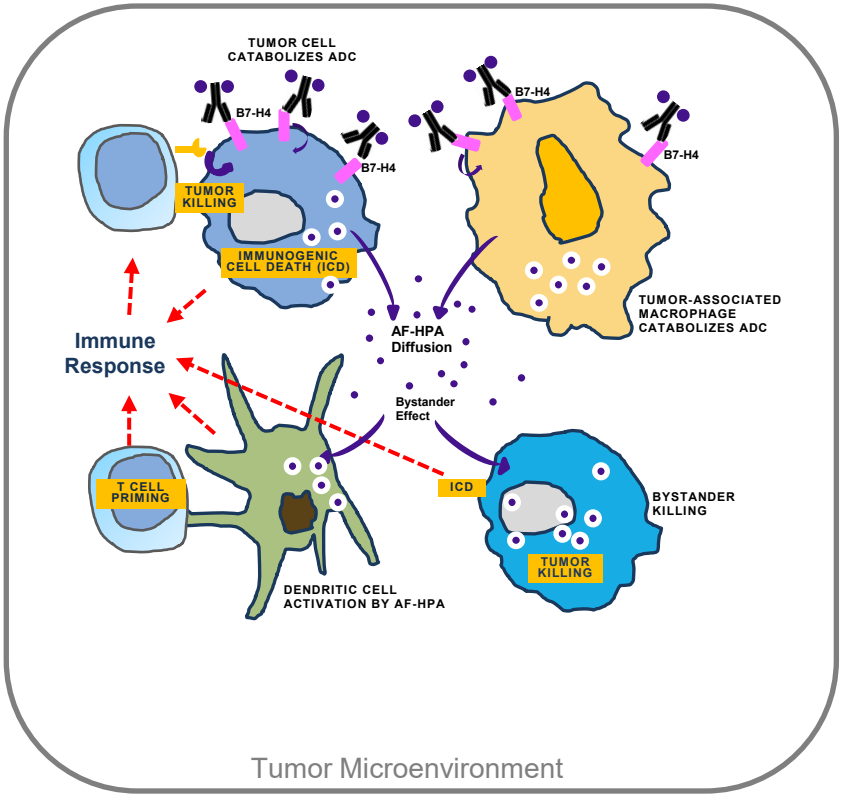


XMT-1660: First-in-Class B7-H4 ADC

Timothy B. Lowinger, PhD
Chief Science & Technology Officer



B7-H4 Expression Well-Suited for a DolaLock ADC



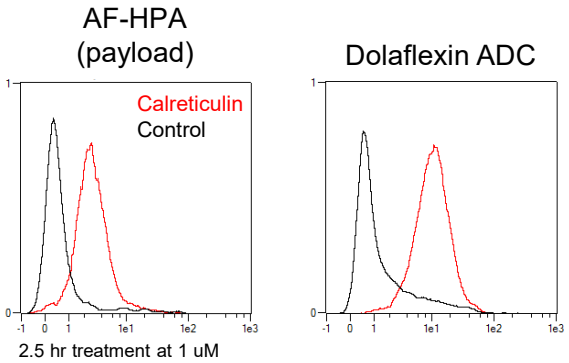
"The Perfect Storm"

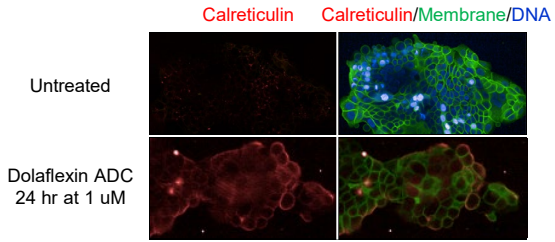
- B7-H4 is selectively expressed on tumor cells in multiple indications
  - Limited expression in normal tissues
- A DolaLock ADC targeting B7-H4 has the potential to exert its effect through multiple mechanisms of action:
  - Uptake by tumor cells and direct cytotoxicity
  - Released payload can also diffuse to antigen negative tumor cells via the DolaLock controlled bystander effect
  - Tumor cell killing results in immunogenic cell death, and the DolaLock payload activates dendritic cells
  - The DolaLock ADC can provide a combined cytotoxic and immune-based anti-tumor effect
- B7-H4 is also expressed on tumor-associated macrophages which can potentially further contribute to the effect

Our DolaLock Payload is Both Cytotoxic and Immunostimulatory

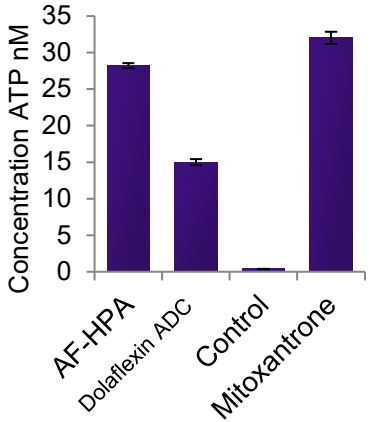
AF-HPA induces immunogenic cell death

Calreticulin surface translocation



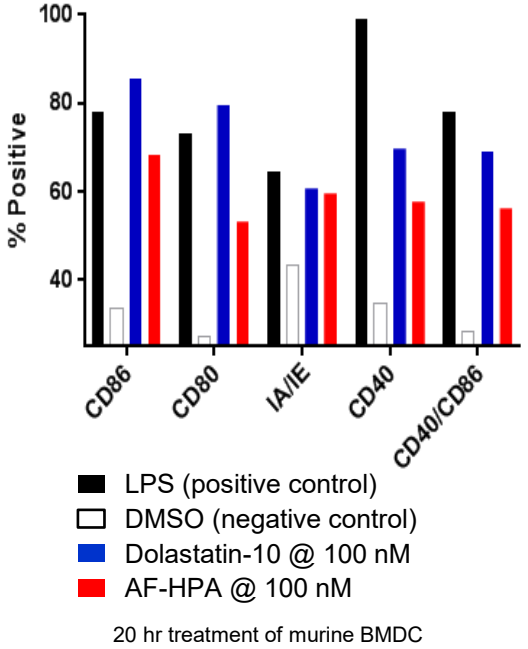


ATP release



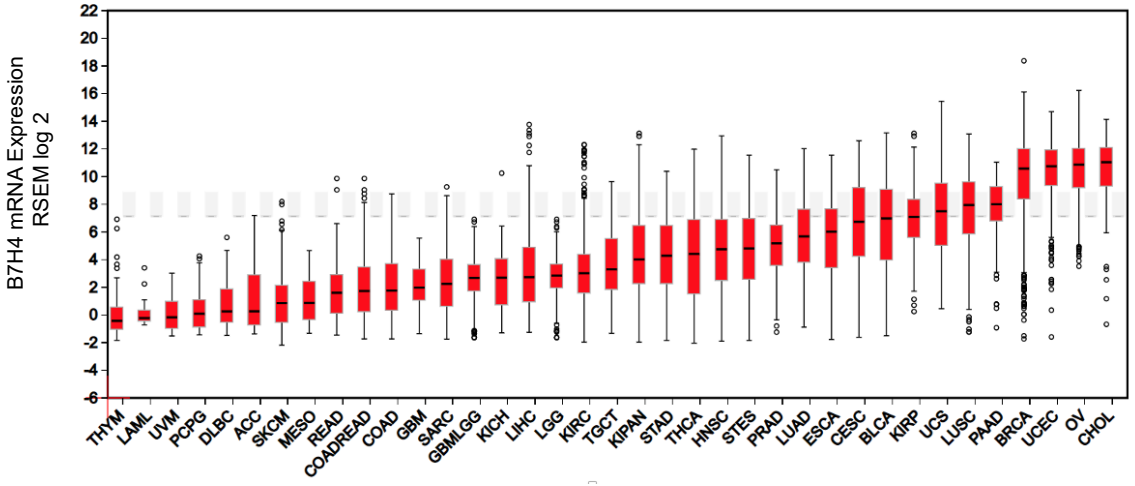
ICD induction consistent with:
Cao *et al.* 2016; Gardai *et al.* 2015; Rios-Doria *et al.* 2017

AF-HPA activates dendritic cells



Dendritic cell activation consistent with:
Martin *et al.* 2014; Mueller *et al.* 2014; Mueller *et al.* 2015

B7-H4 is Expressed in Multiple Cancer Indications with High Unmet Medical Need



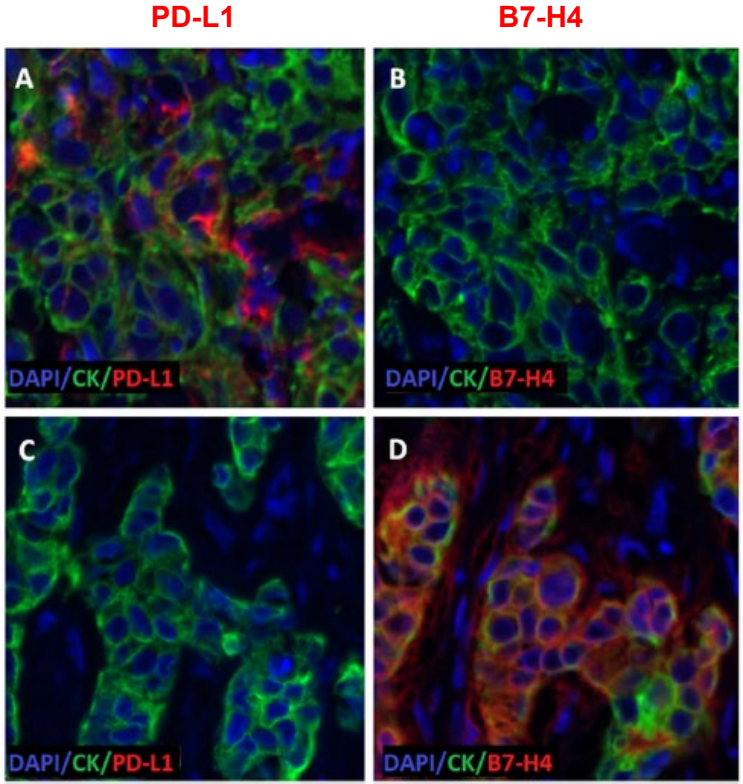
Based on mRNA expression data (cBioPortal), high expression in:

- Bile duct carcinoma
- Ovarian
- Uterine
- Breast
- Pancreatic
- Lung squamous
- Bladder
- Etc.

Protein expression data:

- 2-3+ IHC B7-H4 staining/H>50 in >50% of samples in TNBC, uterine, ovarian cancer (Sachdev et al. ASCO, 2019) n= not stated
- B7-H4 Expression (aggregate 1-3+ immunoreactivity) in 77%TNBC, and ~60% HER2+ and HR+ (Leong et al., 2015) n=202
- B7-H4 Expression “High” in ~ 45% of Breast Cancers (Altan et al., 2018) (two cohorts n=561, 444)
- B7-H4 Expression detected in 12.8 and 22.6 % of NSCLC (two cohorts), with higher frequency in SCC (Schalper et al., 2017)

Targeting B7-H4 Creates Opportunities to Potentially Address Patients Poorly Served by Checkpoint Inhibitors



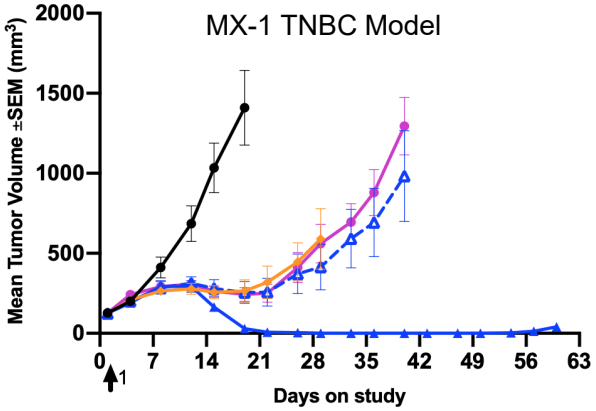
Breast Cancer Examples

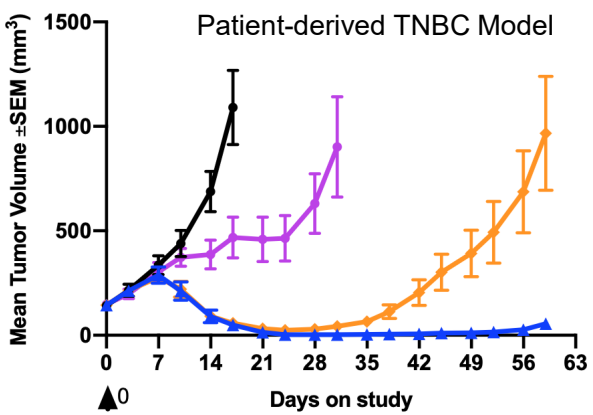
PD-L1 and B7-H4 expression are essentially mutually exclusive

- No co-expression in >95% of breast cancer and lung cancer samples*

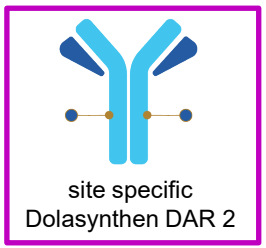
*Altan et al. 2018 Breast Cancer; Schalper et al. 2016 Clin.Canc.Res.

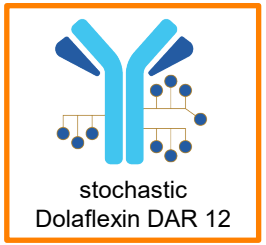
XMT-1660 Selected Candidate Based on Direct Comparison Across Multiple In Vivo Models, including PDX Models

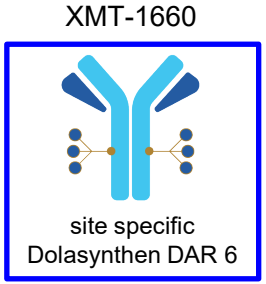




Solid lines indicate equivalent dose by payload; dashed line = 0.5x dose
Non-binding control ADCs and unconjugated B7-H4 mAb were all inactive; data omitted for clarity







Preclinical Profile of XMT-1660 Supports Advancement

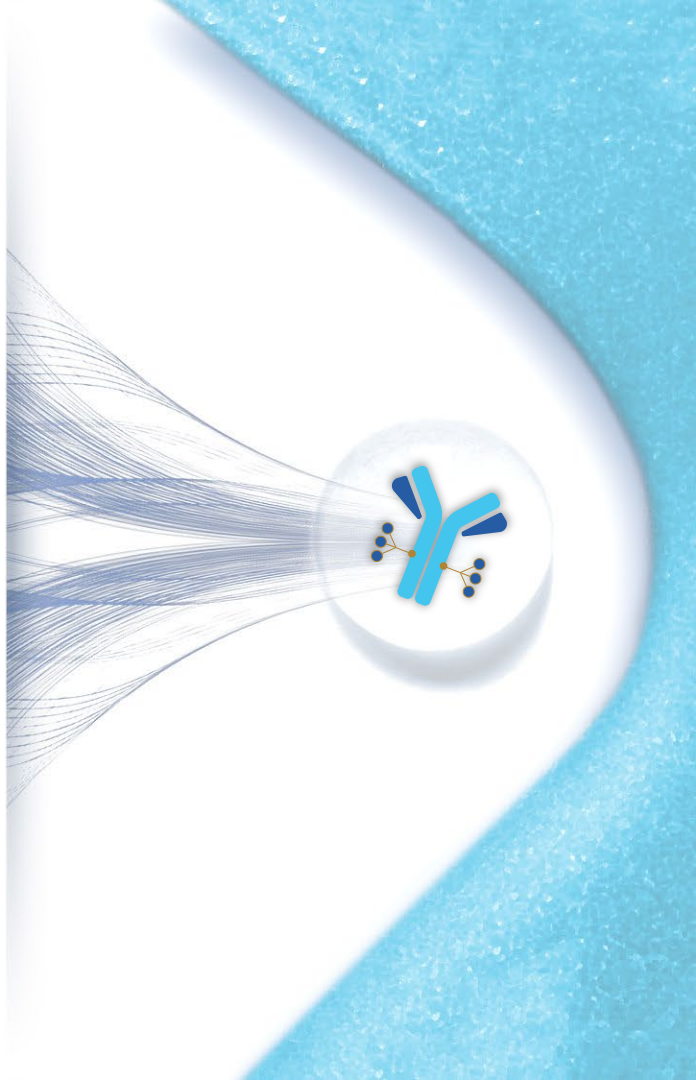
- Pharmacokinetic profile displays long half life (~5 days in NHPs) and dose-dependent exposure
  - Highly stable with very low (<0.1%) free payload detected in circulation
- Well tolerated in NHPs after multiple doses
- Demonstrated therapeutic index based on well-tolerated exposure in NHPs and efficacious exposures in mouse

Summary of the Opportunity

- Potential first-in-class opportunity with compelling target biology and unique fit to DolaLock payload
- Clinical candidate was optimized on multiple parameters
  - DAR, site specific bioconjugation, selection of optimal antibody
  - Dolasynthen DAR-6 consistently outperformed stochastic Dolaflexin DAR-12 and site specific Dolasynthen DAR-2 across multiple tumor models
- Expression in areas of high unmet medical need: TNBC, ER+ BC, Endometrial cancer and others
  - Opportunity for accelerated development path in key indications of interest
- Expected to enter the clinic in Q1 2022

Corporate Update

Anna Protopapas
President & CEO



UpRi (XMT-1536): Compelling Efficacy and Tolerability Data with Broad Potential in Ovarian Cancer

>30% ORR with CRs in Ovarian Cancer Patients with Higher NaPi2b Expression

- Majority of patients pre-treated with PARP inhibitors or bevacizumab; 35% with 4 or more prior lines
  - Complete response observed in 2 patients with platinum-resistant ovarian cancer
  - ORR of 32% and DCR of 74% in patients with higher NaPi2b expression
  - Median duration of response: 5 months in higher NaPi2b Population
- Biomarker selects for enhanced outcomes, but responses and stable disease observed in lower NaPi2b population as well

No Severe Neutropenia, Ocular Toxicity, or Peripheral Neuropathy

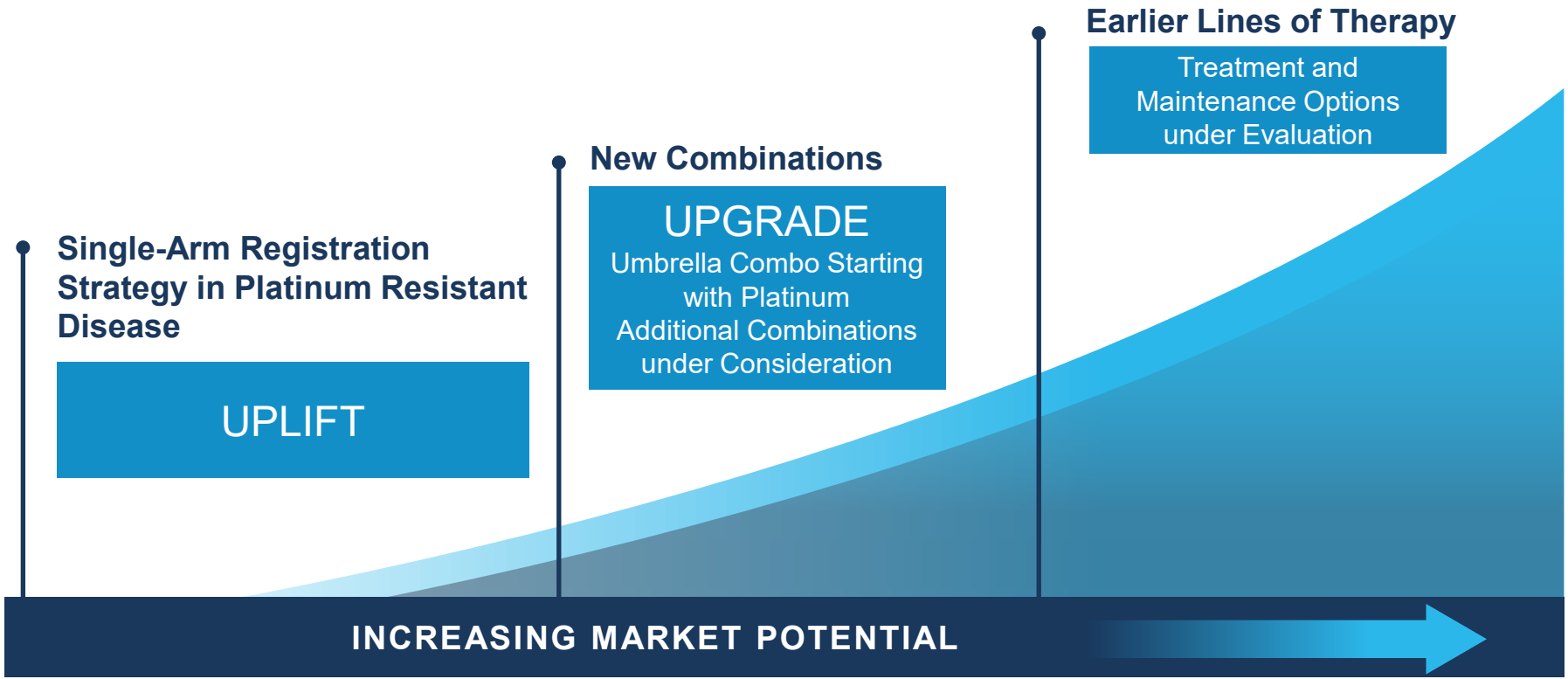
- Most common treatment-related adverse events (TRAEs) were generally Grade 1-2 fatigue, nausea, transient AST elevation without associated changes in bilirubin or cases of Hy's law, transient thrombocytopenia
- Enhanced dose modification and management guidelines for pneumonitis

Single-Arm Registration Strategy and Expansion Potential in Combos and Earlier Lines

- UPLIFT includes key differentiators
  - Leverages expansion cohort momentum and no biomarker pre-selection for enrollment speed
  - Broad population up to 4 prior lines, with no prior bevacizumab required for 3 – 4 prior lines
  - Assay validation strategy
- UPGRADE umbrella combination study, with initial platinum cohort, informs strategy in earlier lines

Data as of December 3,2020. Complete ESMO 2020 disclosure available here: https://www.mersana.com/wp-content/uploads/2020/09/Mersana_ESMO-2020_Poster_FINAL.pdf
Complete ASCO 2020 disclosure available here: https://www.mersana.com/wp-content/uploads/2020/05/2020-ASCO_XMT-1536_Poster_FINAL-14May2020.pdf

UpRi (XMT-1536): An Opportunity to Deliver a Potentially Foundational Therapy for Ovarian Cancer



Goals and Anticipated Milestones for 2021

Upifitamab Rilsodotin UpRi (XMT-1536)	• Q1 2021: Initiate UPLIFT single-arm registration strategy as amendment • Q3 2021: Initiate UPGRADE combination dose escalation umbrella study • 2H 2021: Report updated interim data from NSCLC expansion cohort
XMT-1592	• 2H 2021: Report dose escalation data • Q4 2021: Outline further development path
XMT-1660	• Q4 2021: Complete IND-enabling studies to initiate Phase I dose escalation in 2022
XMT-2056	• Q4 2021: Complete IND-enabling studies to initiate Phase I dose escalation in 2022 • Q4 2021: Disclose target
Corporate	• Continue to leverage proprietary platforms to expand pipeline • Proactively evaluate potential for collaborations that maximize value

We are Leveraging our Novel ADC Platforms to Generate Differentiated Product Candidates

ADC Program	Target	Indication	Platform	Discovery	Preclinical	P1 Dose Escalation	P1 Proof of Concept	P2/Pivotal
XMT-1536*	NaPi2b	Ovarian Cancer	Dolaflexin					
		NSCLC Adenocarcinoma	Dolaflexin					
XMT-1592*	NaPi2b	Ovarian Cancer NSCLC Adenocarcinoma	Dolasynthen					
XMT-1660	B7-H4	Multiple Solid Tumors	Dolasynthen					
XMT-2056	Undisclosed	Undisclosed	Immunosynthen					
Multiple Programs	Undisclosed	Undisclosed	Immunosynthen					
Multiple Programs	Undisclosed	Undisclosed	Dolasynthen or Dolaflexin					
Multiple EMD SERONO	Multiple	Undisclosed	Dolaflexin					
ASN004 ASANA BioSciences	5T4	Undisclosed	Dolaflexin					

*NaPi2b antibody used in XMT-1536 and XMT-1592 is in-licensed from Recepta Biopharma. Recepta has rights to commercialize XMT-1536 and XMT-1592 in Brazil

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		NSCLC Adenocarcinoma	Dolaflexin					
XMT-1592*	NaPi2b	Ovarian Cancer NSCLC Adenocarcinoma	Dolasynthen					
XMT-1660	B7-H4	Multiple Solid Tumors	Dolasynthen					
XMT-2056	Undisclosed	Undisclosed	Immunosynthen					
Multiple Programs	Undisclosed	Undisclosed	Immunosynthen					
Multiple Programs	Undisclosed	Undisclosed	Dolasynthen or Dolaflexin					
Multiple EMD SERONO	Multiple	Undisclosed	Dolaflexin					
ASN004 ASANA BioSciences	5T4	Undisclosed	Dolaflexin					

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Question & Answer Session