UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 8-K

CURRENT REPORT

Pursuant to Section 13 or 15(d)
of the Securities Exchange Act of 1934

January 26, 2023
Date of Report (Date of earliest event reported)

Aprea Therapeutics, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**001-39069**	**84-2246769**
(State or other jurisdiction of incorporation)	(Commission File Number)	(IRS Employer Identification No.)

3805 Old Easton Road **Doylestown, PA**	**18902**
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: **(617) 463-9385**

(Former name or former address, if changed since last report):

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

☐ Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)

☐ Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)

☐ Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))

☐ Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	**Trading Symbol(s)**	**Name of each exchange on which registered**
Common stock, par value $0.001 per share	APRE	NASDAQ Global Select Market

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter).

Emerging growth company ☒

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☒

Item 8.01 Other Events.

On January 26, 2023, Aprea Therapeutics, Inc. (the "Company") will be presenting at the 6th Annual DDR Inhibitors Summit, held in Boston, Massachusetts. Copies of the presentation slide decks that the Company will use at the 6th Annual DDR Inhibitors Summit are filed herewith as Exhibit 99.1 and Exhibit 99.2, respectively, and are hereby incorporated by reference herein.

Item 9.01. Financial Statements and Exhibits.

(d) Exhibits.

Exhibit Number	Description
99.1	Aprea Therapeutics, Inc. Presentation.
99.2	Aprea Therapeutics, Inc. Presentation.
104	Cover Page Interactive Data File (embedded within the Inline XBRL Document).

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

Aprea Therapeutics, Inc.

Dated: January 26, 2023

By: /s/ Oren Gilad
Name: Oren Gilad
Title: President and Chief Executive Officer

aprea therapeutics

DDR Inhibitors Summit 2023

January 24-26, 2023 | Boston, MA | ddr-inhibitors-summit.com

Adding On to Monotherapy:
Combining DDR Inhibitors

January 2023

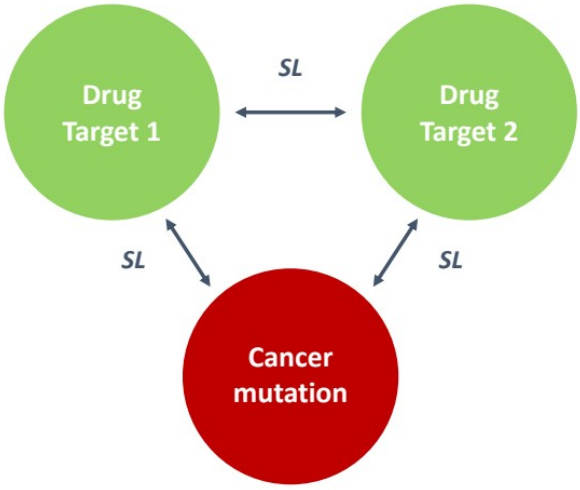
Forward-Looking Statements

Certain information contained in this presentation includes “forward-looking statements”, within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, related to our clinical trials, regulatory submissions and strategic plans. We may, in some cases use terms such as “predicts,” “believes,” “potential,” “continue,” “anticipates,” “estimates,” “expects,” “plans,” “intends,” “may,” “could,” “might,” “likely,” “will,” “should” or other words that convey uncertainty of the future events or outcomes to identify these forward-looking statements. The forward-looking statements are based on current beliefs and expectations of our management team that involve risks, potential changes in circumstances, assumptions, and uncertainties. Any or all of the forward-looking statements may turn out to be wrong or be affected by inaccurate assumptions our management team might make or by known or unknown risks and uncertainties. These forward-looking statements are subject to risks and uncertainties including, without limitation, risks related to the success and timing of our clinical trials or other studies and the other risks set forth in our filings with the U.S. Securities and Exchange Commission, including our Annual Reports on Form 10-K and Quarterly Reports on Form 10-Q. Forward-looking statements regarding our product candidates are also subject to additional risks and uncertainties, including without limitation, with respect to: our dependence on additional financing to fund our operations and complete the development and commercialization of our product candidates, and the risks that raising such additional capital may restrict our operations or require us to relinquish rights to our technologies or product candidates; our limited history and preclinical status of the assets we acquired from Atrin Pharmaceuticals Inc.; our business plan or the likelihood of the successful implementation of such business plan; the timing of initiation of planned clinical trials for our product candidates; the future success of such trials; the successful implementation of our research and development programs and collaborations and the interpretation of the results and findings of such programs and collaborations and whether such results are sufficient to support the future success of our product candidates; the success, timing and cost of our anticipated clinical trials for our current product candidates; the timing of initiation, futility analyses, data presentation, reporting and publication and receipt of interim results (including, without limitation, any preclinical results or data); any statements about our understanding of product candidates mechanisms of action and interpretation of preclinical and early clinical results from its clinical development programs and any collaboration studies; and other factors, including legislative, regulatory, political and economic developments not within our control. For all these reasons, actual results and developments could be materially different from those expressed in or implied by our forward-looking statements. You are cautioned not to place undue reliance on these forward-looking statements, which are made only as of the date of this presentation. We undertake no obligation to update such forward-looking statements to reflect subsequent events or circumstances, except to the extent required by law or regulation.

Potential Benefits For Combination Therapy:

- Overcome Resistance
- Increase Efficacy
- Reduce Toxicity
- Indication Expansion

Drug Combination SL Approach



Combining DDR Inhibitors with PARPi:

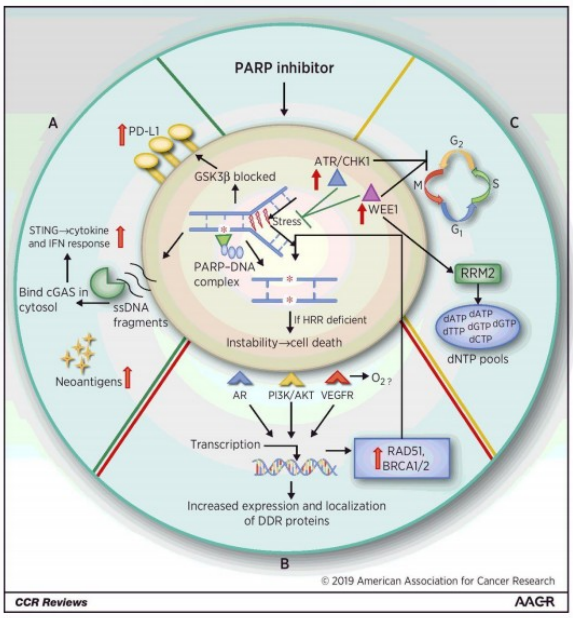
Standard of Care

CA CANCER J CLIN 2011;61:31–49

Poly(ADP-Ribose) Polymerase (PARP) Inhibitors: Exploiting a Synthetic Lethal Strategy in the Clinic

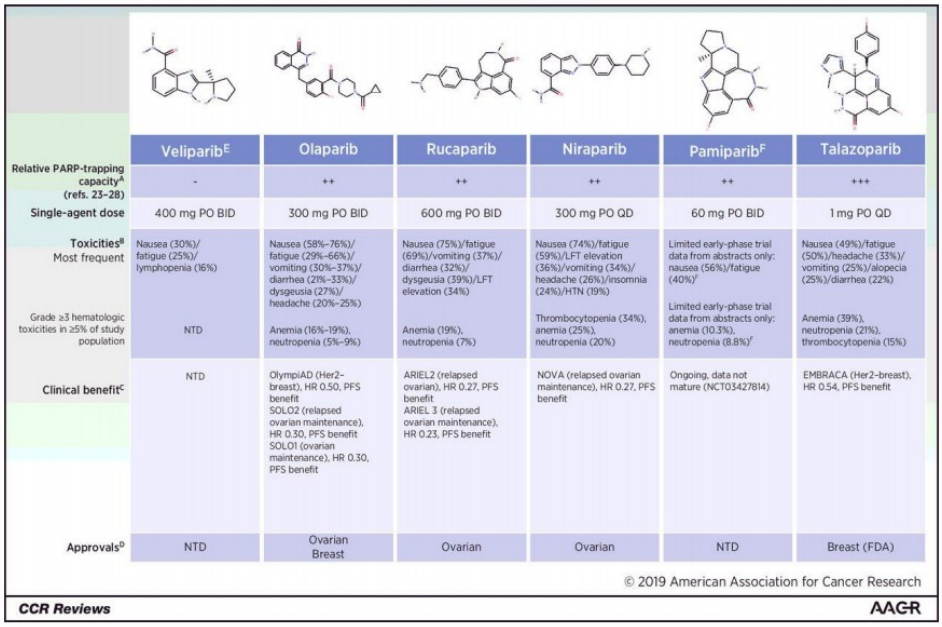
Timothy A. Yap, BSc, MB BS[1,2]; Shahneen K. Sandhu, MB BS[1,2]; Craig P. Carden, MB BS[1,2]; Johann S. de Bono, MB ChB, MSc, PhD[1,2]

PARP inhibitor–based combination treatment strategies
Broad categories of PARP inhibitors: combination treatment strategies



Pilié et al., Clin Cancer Res. 2019;25(13):3759-3771

Comparison of PARP inhibitors under clinical development Including toxicity profile



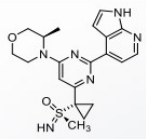
	Veliparib[E]	Olaparib	Rucaparib	Niraparib	Pamiparib[F]	Talazoparib
Relative PARP-trapping capacity[A] (refs. 23–28)	-	++	++	++	++	+++
Single-agent dose	400 mg PO BID	300 mg PO BID	600 mg PO BID	300 mg PO QD	60 mg PO BID	1 mg PO QD
Toxicities[B] Most frequent	Nausea (30%)/ fatigue (25%)/ lymphopenia (16%)	Nausea (58%–76%)/ fatigue (29%–66%)/ vomiting (30%–37%)/ diarrhea (21%–33%)/ dysgeusia (27%)/ headache (20%–25%)	Nausea (75%)/fatigue (69%)/vomiting (37%)/ diarrhea (32%)/ dysgeusia (39%)/LFT elevation (34%)	Nausea (74%)/fatigue (59%)/LFT elevation (36%)/vomiting (34%)/ headache (26%)/insomnia (24%)/HTN (19%)	Limited early-phase trial data from abstracts only: nausea (56%)/fatigue (40%)[F]	Nausea (49%)/fatigue (50%)/headache (33%)/ vomiting (25%)/alopecia (25%)/diarrhea (22%)
Grade ≥3 hematologic toxicities in ≥5% of study population	NTD	Anemia (16%–19%), neutropenia (5%–9%)	Anemia (19%), neutropenia (7%)	Thrombocytopenia (34%), anemia (25%), neutropenia (20%)	Limited early-phase trial data from abstracts only: anemia (10.3%), neutropenia (8.8%)[F]	Anemia (39%), neutropenia (21%), thrombocytopenia (15%)
Clinical benefit[C]	NTD	OlympiAD (Her2–breast), HR 0.50, PFS benefit SOLO2 (relapsed ovarian maintenance), HR 0.30, PFS benefit SOLO1 (ovarian maintenance), HR 0.30, PFS benefit	ARIEL2 (relapsed ovarian), HR 0.27, PFS benefit ARIEL 3 (relapsed ovarian maintenance), HR 0.23, PFS benefit	NOVA (relapsed ovarian maintenance), HR 0.27, PFS benefit	Ongoing, data not mature (NCT03427814)	EMBRACA (Her2–breast), HR 0.54, PFS benefit
Approvals[D]	NTD	Ovarian Breast	Ovarian	Ovarian	NTD	Breast (FDA)

CCR Reviews AACR

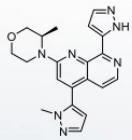
Pilié et al., Clin Cancer Res. 2019;25(13):3759-3771

ATR Landscape: Current ATRs Structurally Similar in Backbone, and Toxicity Profile

Potential *overlapping toxicity in combination with other agents may limit therapeutic affect*



AZD-6738



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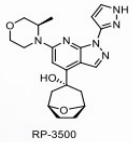


RP-3500

CAMOSERTIB

Parameter	AstraZeneca AZD6738 [1][2]	Bayer BAY1895344 [3]	Repare / Roche[4] RP-3500 [5]
Route Of Administration	Oral	Oral	Oral
Clinical Studies Chosen (MTD/RP2D), Dose Schedule	160mg BID, 2-weeks-on, 2-weeks-off, or: Continuous dosing [1]	40mg BID, 3-days-on/4-days-off	160mg QD, 3-days-on/4-days-off
Main Grade ≥3 Hematological toxicities reported at Chosen Dose Schedule (MTD/RP2D), in clinical studies	Patriot 1, Escalation Phase, 160mg, BID [2]: **Anemia** (1/6, 17%) Patriot 2, Expansion Phase [1]: **Fatigue, anemia, nausea & thrombocytopenia (not differentiated)** [1]: (4/6, 67%) with continuous dosing (3/15, 20%) with 2-week-on, 2-week-off	**Anemia** (2/2, 100%) **Neutropenia** (1/2, 50%)	**Anemia** (23/95, 24%) **Neutrophil count decreased** (10/95, 11%) **Platelet count decreased** (5/95, 5%)

Note: Head-to-head studies with ATRN-119 have not been conducted

(1) Phase I study of ATR inhibitor, AZD6738, as monotherapy in advanced solid tumors (PATRIOT part A, B), Dillon et al, Volume 30, October 2019, Pages v165-v166

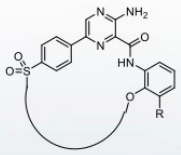
(2) Poster CT084: A Phase I dose-escalation study of ATR inhibitor monotherapy with AZD6738 in advanced solid tumors (PATRIOT Part A), AACR 2017

(3) First-in-Human Trial of the Oral Ataxia Telangiectasia and RAD3-Related (ATR) Inhibitor BAY 1895344 in Patients with Advanced Solid Tumors, Yap et al, Cancer Discov 2021;11:80-91 and 2019 ASCO Poster, De-Bono et al.

(4) Repare announced a worldwide license and collaboration agreement with Roche on June 1, 2022

(5) Preliminary Phase 1 Data From Ongoing First-in-Human Phase 1/2 TRESR Study of RP-3500, AACR 2022

ATRN-119: Potential Best-in-Class Oral ATR Inhibitor With Structurally Differentiated Core, Backbone, and Toxicity Profile



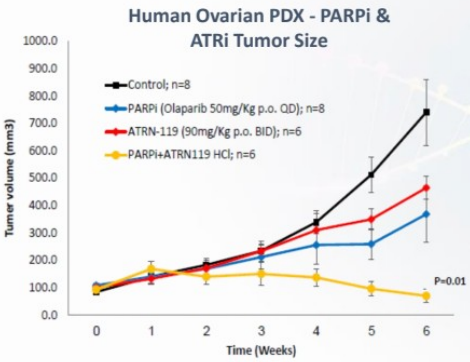
Parameter	ATRN-119 (1)
Route Of Administration	Oral
Clinical Studies Chosen (MTD/RP2D), Dose Schedule	continuous once-daily dosing (dose TBD in Phase 1) (1)
Hematological toxicities in preclinical studies	**Pre-Clinical, Toxicology Studies:** • In 28-day GLP tox study in dogs, hematological changes were of small magnitude with complete recovery • In a head-to-head comparative tolerability study, ATRN-119 demonstrated significantly less toxicity than another oral ATRi that is currently in clinical development

ATRN-119 potential for reduced toxicity could make it a preferred ATR inhibitor as a single agent, as well as a candidate for combination with standard of care therapies

Note: ATRN-119 has not yet been tested clinically
(1) ATRN-119, Phase 1/2a Clinical Study Protocol

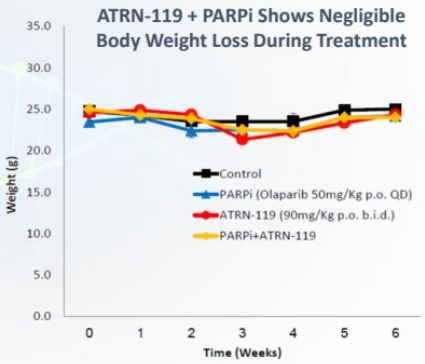
ATRN-119 + Olaparib (Lynparza®):
Regression of BRCA2-Deficient Ovarian (HGSOC) Tumors

ATRN-119 + PARPi Inhibits Ovarian Tumor Growth Over Time



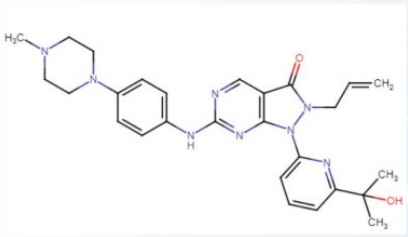
Based on pre-clinical results to date, the combination of ATRN-119 and PARPi has shown potentially compelling tumor growth inhibition

ATRN-119 + PARPi Shows Negligible Weight Loss Over Time

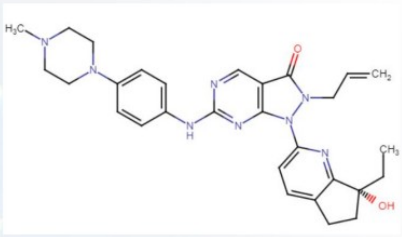


Based on pre-clinical results to date, the combination of ATRN-119 and PARPi potentially appears to be well tolerated

Leading WEE1i are potent but off-target PLK1, PLK2 and PLK3



AZD-1775[1]



ZN-c3

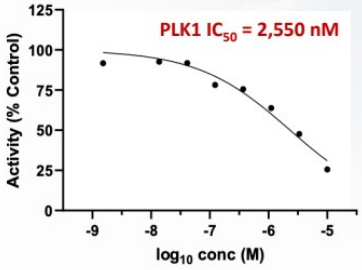
	On-Target IC_{50} (nM)	Off-Target Inhibition at 1 µM (%)		
	WEE1	PLK1	PLK2	PLK3
ZN-c3 [1]	3.8	79	96	92
AZD-1775 [1,2]	3.9	70	101	91

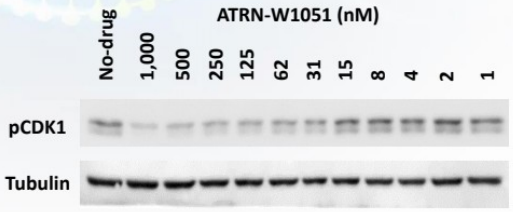
1. Huang et al, *J Med Chem*, 2021
2. AstraZeneca announced discontinuation of AZD-1775 development on June 29, 2022

ATRN-W1051 is potentially differentiated from other WEE1 inhibitors

	On-Target IC_{50} (nM)	Off-Target Inhibition at 1 µM (%)		
	WEE1	PLK1	PLK2	PLK3
ATRN-W1051	2.2	17	33	12
ZN-c3 (1)	3.8	79	96	92
AZD-1775 (1)	3.9	70	101	91

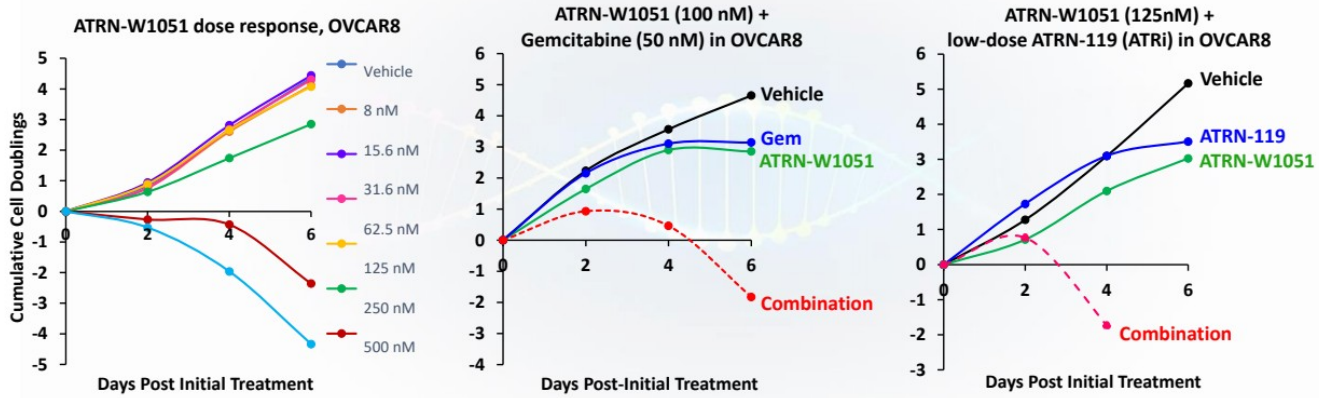
ATRN-W1051 IC50 for PLK1 inhibition is >1000-fold higher than for WEE1 inhibition





(1) Head-to-head studies have not been conducted.
(2) Huang et al, J Med Chem, 2021

ATRN-W1051 potently inhibits OvCa cell proliferation both alone and in combination



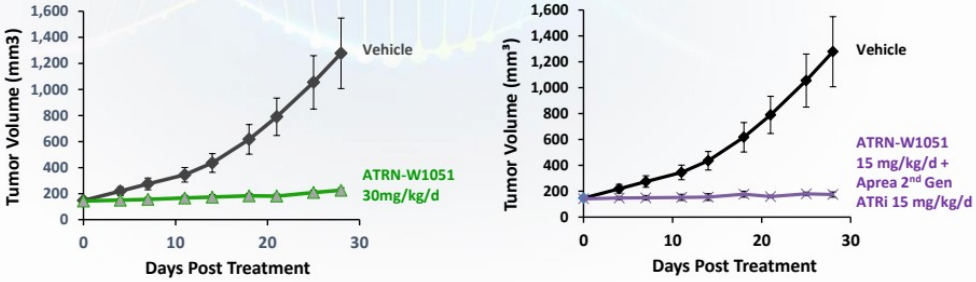
ATRN-W1051 has potentially compelling PK and anti-tumor activity

Preclinical data highlight potentially favorable PK properties of ATRN-W1051

	ATRN-W1051 [1,2]	ZN-c3 [1,3]			AZD-1775 [1,3]		
Dose (mg/kg/d)	10	20	40	80	20	40	80
C_{max}, ng/mL	1219	1167	1997	5100	635	2460	4703
T_{max}, hr	2	1	1	1	1	1	1
AUC_{0-24}, ng*hr/mL	14,211	4863	17,088	39,722	1494	6,313	13,408
Tumor concentration, ng/mL	9000 ng/gr (@ 15 mg/kg/d)	10.5	48	811	BQL	BQL	6.95

Anti-tumor activity of ATRN-W1051 – Oral administration

OVCAR3 CCNE1-amplified xenograft model

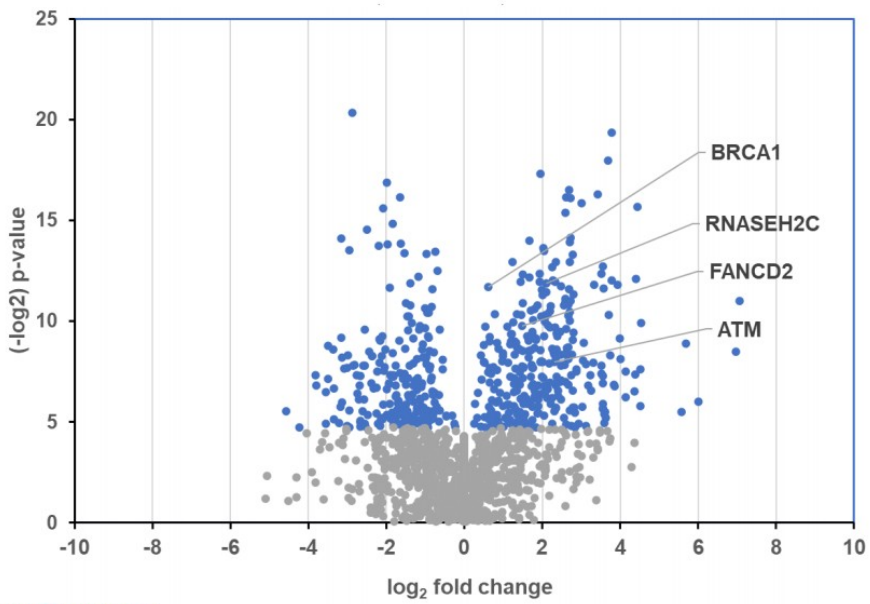


1. Head-to-head studies have not been conducted.
2. Data from study in normal mice
3. Data from study in A-427 NSCLC xenograft model as reported in Zentalis Corporate Overview, March 2022

Summary

- Numerous ongoing trials investigating inhibitors in Synthetic Lethality and DDR as monotherapy or in combination
- PARP inhibitors are approved as standard of care
- Toxicity remains a major challenge in the development of new therapies as single agents and in combination
- ATRN-119's potential for reduced toxicity could make it a preferred ATR inhibitor as a single agent, as well as a candidate for combination with standard of care therapies
- ATRN-W1051 is a potent WEE1i (2.2 nM IC50) with low off-target inhibition of PLK1, PLK2 and PLK3
- ATRN-W1051 has the potential to become a promising therapeutic candidate as a singly agent and in combination with ATRi.

ATRN-119 causes recruitment of factors previously shown to be SL with ATRi



In collaboration with Aprea Therapeutics

Yap et al., *Cancer Discovery*, 2021
Ngoi et al., *Trends Cancer*, 2021
Chen et al., *Molecular Cancer*, 2009
Wang et al., *Oncogene*, 2019
Zimmerman et al., Cell Report, 2022

aprea therapeutics
The p53 Reactivation Company

DDR Inhibitors Summit 2023

January 24-26, 2023 | Boston, MA | ddr-inhibitors-summit.com

aprea therapeutics
The p53 Reactivation Company

Understanding DDRi's In the Clinic:
Why is Toxicity Such a Big Issue?

January 2023

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How much inhibition is needed?
On Target Vs Off Target Toxicological Effects:
• Lesson learned from ATR inhibitors
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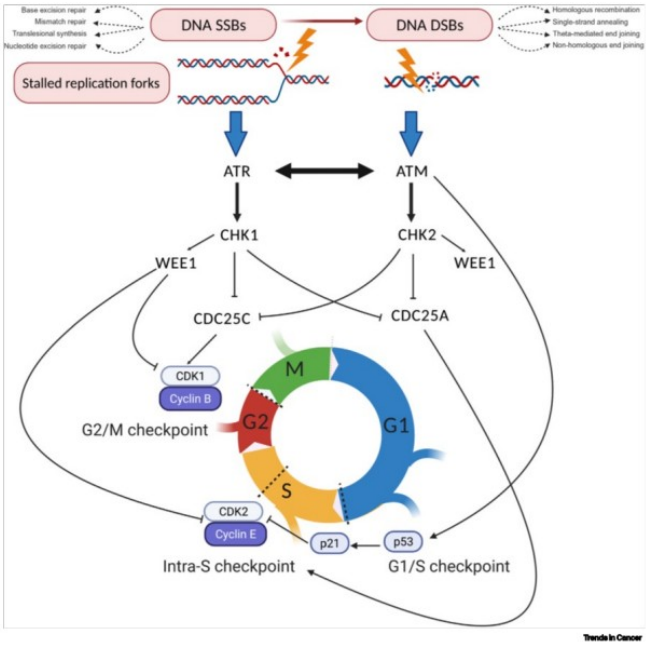
4

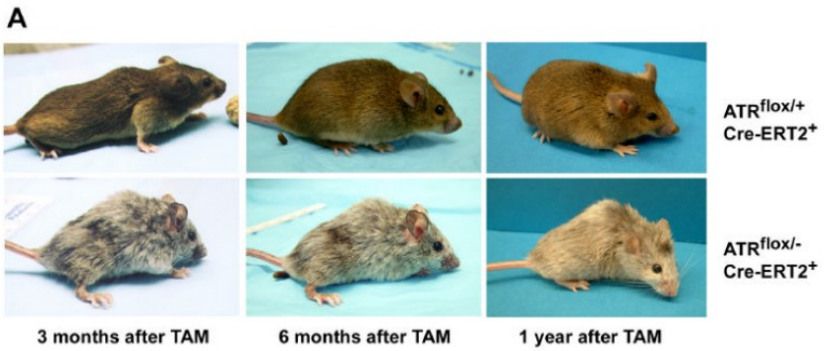
Target Coverage



Ngoi et al., Trends in Cancer, 2021

ATR - On Target Toxicological Effects

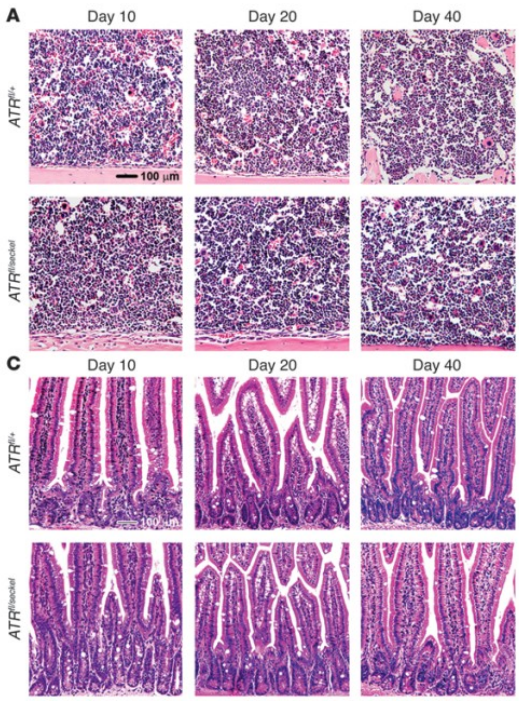
Eliminating ATR in adult mice leads to defects in tissue homeostasis and the rapid appearance of age-related phenotypes, such as hair graying, alopecia, kyphosis, osteoporosis, thymic involution, fibrosis, and other abnormalities.



Ruzankina et al. *Cell Stem Cell*. 2007

ATR - On Target Toxicological Effects

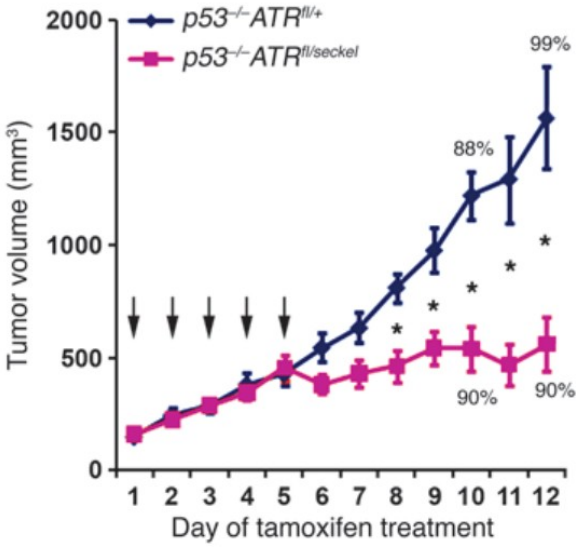
ATR hypomorphic suppression has a minimal impact on normal tissue homeostasis.



Schoppy et al. *J Clin Invest 2012*

ATR - On Target Toxicological Effects

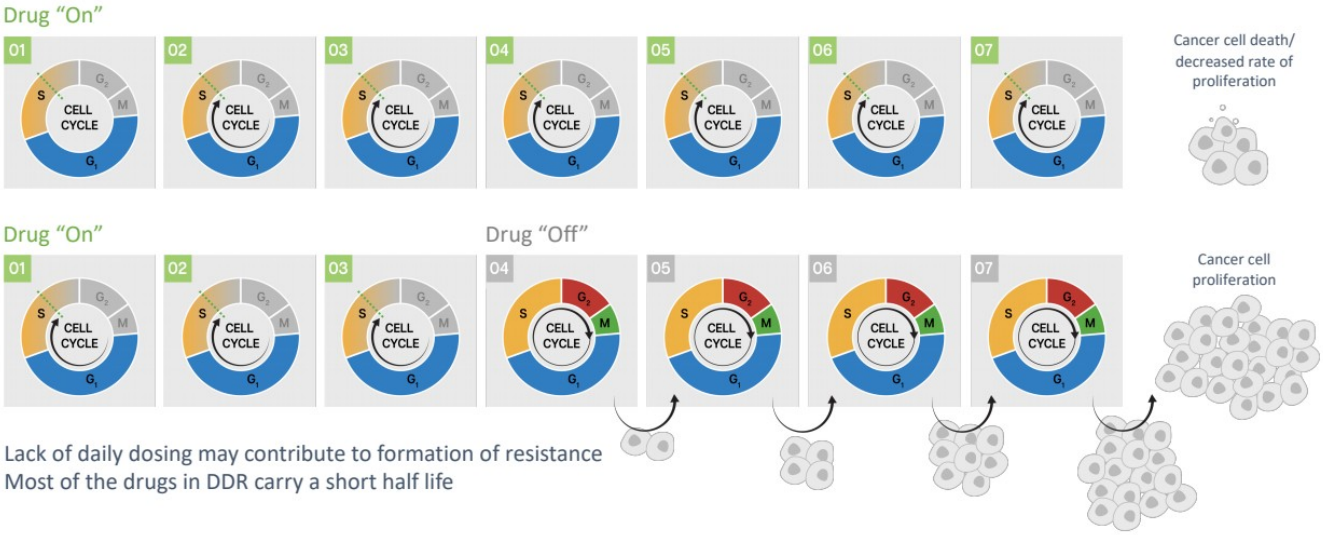
ATR hypomorphic suppression affects tumor growth



Schoppy et al. *J Clin Invest 2012*

Target Coverage: Daily dosing is desirable

- Assumption: Cancer cells proliferate at an estimated rate of one cell cycle per day



- Lack of daily dosing may contribute to formation of resistance
- Most of the drugs in DDR carry a short half life

Potential Off Target Toxicological Effects

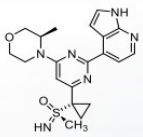
	On-Target Cellular IC_{50} (nM)	Fold Difference in IC_{50} for Off-Target PIKK Inhibition		
	ATRi	ATM	DNA-PK	mTOR
ATRN-119 (1)	4	> 600x	> 2000x	> 2000x
Berzosertib (1)	61	31x	> 200x	> 50x
AZD-6738 (2)	74	> 400x	> 400x	70 – 310x
BAY 1895344 (3)	36	39x	9x	61x
RP3500 (4)	0.33	> 20000x	> 20000x	30x

- Compounds that are highly potent with high selectivity may potentially limit off-target toxicity
- Other targets, outside of PIKK, may also contribute to off target toxicity
- ATRN-119 is highly potent and selective to potentially limit off-target toxicity
- In pre-clinical studies, ATRN-119 has shown potential to have lower hematological toxicity than other ATRi
- M1774 potentially a derivative of Berzosertib

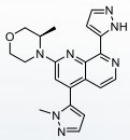
Note: Head-to-head studies with ATRN-119 have not been conducted
(1) Atrin data reported for HCT116 - Bcl/XL cell line;
(2) Foote et al (2018), J Med Chem;
(3) Lücking et al (2020), J Med Chem;
(4) Roulston et al (2022) Mol Cancer Ther

ATR Landscape

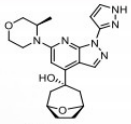
Current ATRs Structurally Similar in Core, Backbone, and Toxicity Profile



AZD-6738



BAY1895344



RP-3500

CAMOSERTIB

Parameter	AstraZeneca AZD6738 [1][2]	Bayer BAY1895344 [3]	Repare / Roche[4] RP-3500 [5]
Route Of Administration	Oral	Oral	Oral
Clinical Studies Chosen (MTD/RP2D), Dose Schedule	160mg BID, 2-weeks-on, 2-weeks-off, or: Continuous dosing [1]	40mg BID, 3-days-on/4-days-off	160mg QD, 3-days-on/4-days-off
Main Grade ≥3 Hematological toxicities reported at Chosen Dose Schedule (MTD/RP2D), in clinical studies	Patriot 1, Escalation Phase, 160mg, BID [2]: **Anemia** (1/6, 17%) Patriot 2, Expansion Phase [1]: **Fatigue, anemia, nausea & thrombocytopenia (not differentiated)** [1]: (4/6, 67%) with continuous dosing (3/15, 20%) with 2-week-on, 2-week-off	**Anemia** (2/2, 100%) **Neutropenia** (1/2, 50%)	**Anemia** (23/95, 24%) **Neutrophil count decreased** (10/95, 11%) **Platelet count decreased** (5/95, 5%)

Note: Head-to-head studies with ATRN-119 have not been conducted

(1) Phase I study of ATR inhibitor, AZD6738, as monotherapy in advanced solid tumors (PATRIOT part A, B), Dillon et al, Volume 30, October 2019, Pages v165-v166

(2) Poster CT084: A Phase I dose-escalation study of ATR inhibitor monotherapy with AZD6738 in advanced solid tumors (PATRIOT Part A), AACR 2017

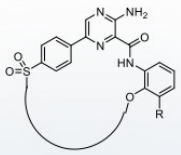
(3) First-in-Human Trial of the Oral Ataxia Telangiectasia and RAD3-Related (ATR) Inhibitor BAY 1895344 in Patients with Advanced Solid Tumors, Yap et al, Cancer Discov 2021;11:80-91 and 2019 ASCO Poster, De-Bono et al.

(4) Repare announced a worldwide license and collaboration agreement with Roche on June 1, 2022

(5) Preliminary Phase 1 Data From Ongoing First-in-Human Phase 1/2 TRESR Study of RP-3500, AACR 2022

ATRN-119: Potential Best-in-Class Oral ATR Inhibitor

With Structurally Differentiated Core, Backbone, and Toxicity Profile



Parameter	ATRN-119 (1)
Route Of Administration	Oral
Clinical Studies Chosen (MTD/RP2D), Dose Schedule	continuous once-daily dosing (dose TBD in Phase 1) (1)
Hematological toxicities in preclinical studies	**Pre-Clinical, Toxicology Studies:** • In 28-day GLP tox study in dogs, hematological changes were of small magnitude with complete recovery • In a head-to-head comparative tolerability study, ATRN-119 demonstrated significantly less toxicity than another oral ATRi that is currently in clinical development

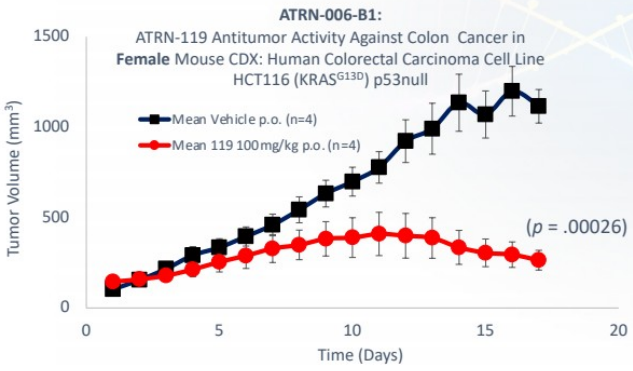
ATRN-119 potential for reduced toxicity could make it a preferred ATR inhibitor as a single agent, as well as a candidate for combination with standard of care therapies

Note: ATRN-119 has not yet been tested clinically
(1) ATRN-119, Phase 1/2a Clinical Study Protocol

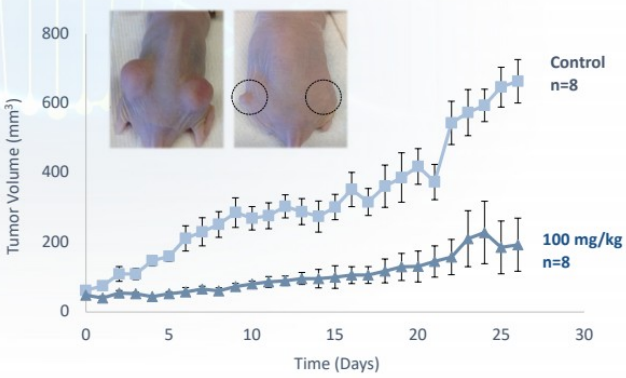
ATRN-119 Preclinical Profile

- Nanomolar potency *in vitro* across a broad spectrum of cancer cell lines
- Based on pre-clinical studies, strong tumor control observed *in vivo*, including in challenging genetic backgrounds

HCT-116 p53 null (KRAS^{mut}, p53)



Pancreatic (CAPAN-1) (KRAS^{mut}, BRCA2)

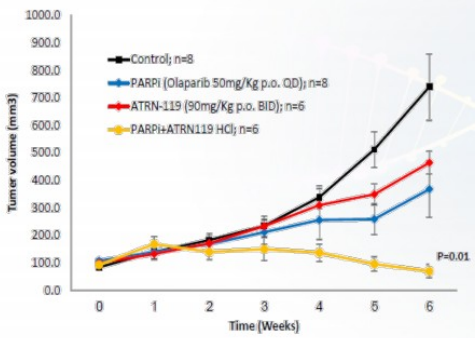


Pre-clinical studies with ATRN-119

ATRN-119 + Olaparib (Lynparza®): Regression of BRCA2-Deficient Ovarian (HGSOC) Tumors

ATRN-119 + PARPi Inhibits Ovarian Tumor Growth Over Time

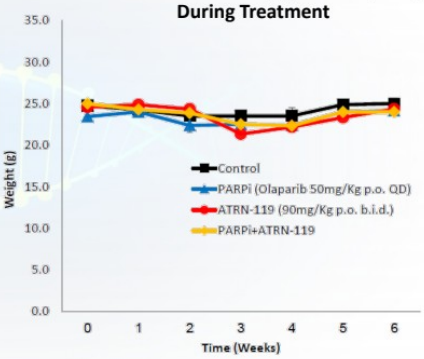
Human Ovarian PDX - PARPi & ATRi Tumor Size



Based on pre-clinical results to date, the combination of ATRN-119 and PARPi has shown potentially compelling tumor growth inhibition

ATRN-119 + PARPi Shows Negligible Weight Loss Over Time

ATRN-119 + PARPi Shows Negligible Body Weight Loss During Treatment



Based on pre-clinical results to date, the combination of ATRN-119 and PARPi potentially appears to be well tolerated

Pre-clinical studies with ATRN-119

Summary

- Multiple DDR inhibitors have been shown to cause hematologic toxicity
- However, genetic models of ATR suppression showed tumor can be targeted with limited toxicity
- This leads to the hypothesis that selectivity can help limit toxicity for ATR inhibitors
- ATRN-119 shows decrease hematologic toxicity yet is therapeutic at allometric concertation in mice
- Phase 1 human clinical trial of ATRN-119 are ongoing