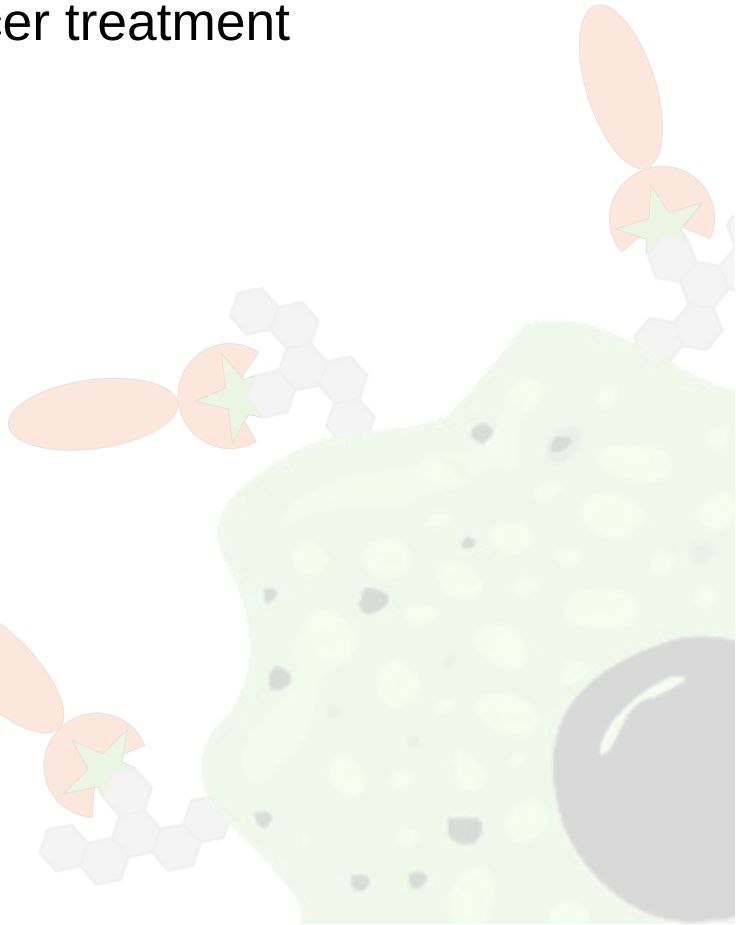
Active Tissue Targeting via Anchored ClicK chemistry (ATTACK)

First-in-class selective cell labeling platform for target cancer treatment

IRIA Pharma, Inc

2020



IRIA Investment Highlights

Management team with established credentials

Selective cell labeling platform (ATTACK)

- First-in-class small molecule technology for targeted treatment of untargetable cancers
- Preclinical stage for cancer therapeutics development
- Up to 1000 times more toxin delivery to cancer than antibody-drug conjugate (ADC) technology
- Diverse pipelines for collaborations, partnership, and outlicensing opportunities
- Proprietary platform for therapeutics, diagnosis, and imaging applications

Seeking $8 M financing toward IND in 2022

- Support IND-enabling research of lead candidate
- Develop 3-4 pre-clinical pipelines as partnerable assets

IRIA Pharma Team

Management

Jianjun Cheng, Ph.D.
Scientific founder, president

- Hans Thurnauer Professor of Materials Science and Engineering, University of Illinois at Urbana-Champaign
- Over 200 publications; co-inventor of over 40 issued patents (22 licensed or in active use)
- Lead/co-developed two nanomedicine systems that made to clinical trials
- 20 yr+ Biotech experience in biomaterials, nanomedicines and therapeutics.
- *American Association for the Advancement of Science* (AAAS) fellow
- American Institute for Medical and Biological Engineering (AIMBE) fellow

Kaimin Cai, Ph.D.
Cofounder, CTO

- 10+ yr R&D in leading preclinical therapeutic development
- PI of multiple NSF and NIH SBIR grants

Jinye James Zhang, Ph.D.
VP

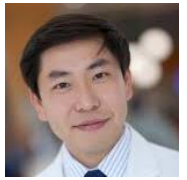
- 10+ yr in leading startup development, fund raising, management, and marketing

Ying Sun
COO

- 20+ yr in drug discovery R&D, corporate management, and IND filing

Consultants

Xiaoqi Charles Chen Ph.D.
20+ yr medicinal chemistry experience



Andrew Z. Wang M.D., Professor
10+ yr clinical trial experience

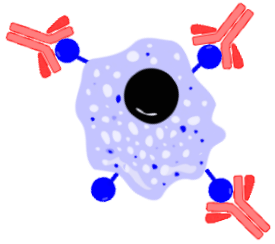
Edwin G. Moore Ph.D.
20+ yr CMC, IND experience

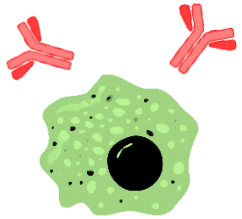
Tim Hoerr
30+ yr BD and VC management

Dana G. Gordon Ph.D.
15+ yr IP prosecution in pharmaceuticals

Unmet Needs: Targeted Treatment of Antibody-Untargetable Cancer

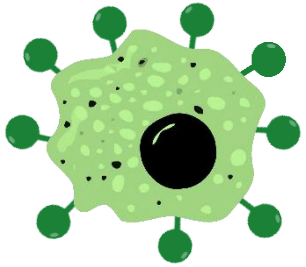
- Antibodies target and treat cancers with known receptors





- >70% of cancer don't have known over-expressed receptors.

Can we engineer artificial receptors onto untargetable cancer cells for targeted treatment?



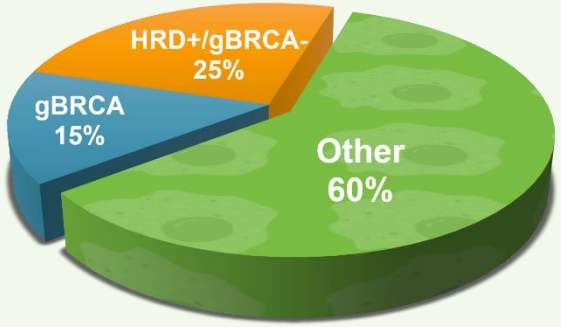
Artificial receptor

Untargetable Cases

Market Size

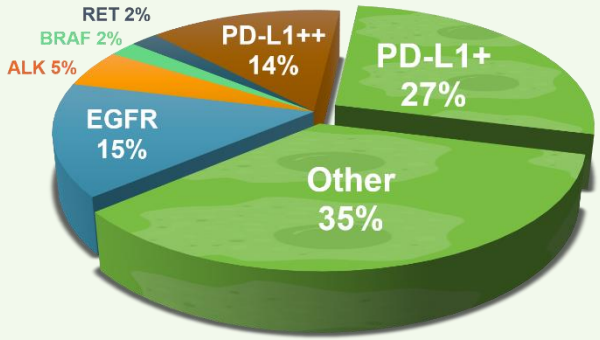
Selected market, based on US new cases in 2020

Ovarian Cancer



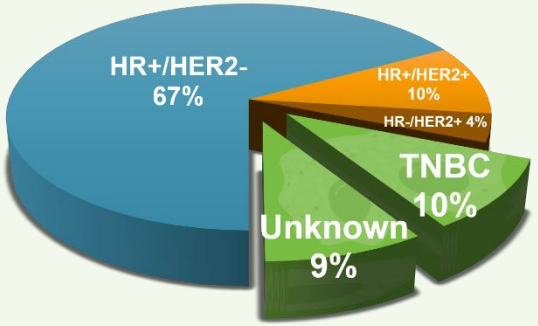
7,920 $792M

NSCLC



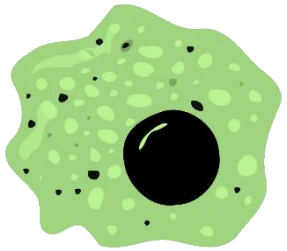
118,790 $11.9B

Breast Cancer



48,340 $48.3B

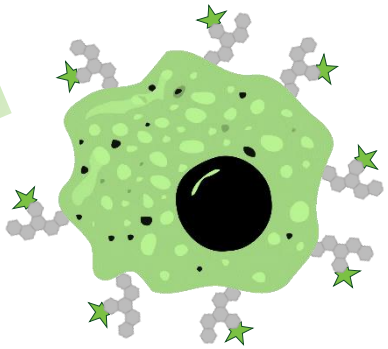
Active Tissue Targeting via Anchored ClicK Chemistry (ATTACK)



- Artificial receptors are inserted onto cell surface glycoproteins through unnatural sugar metabolization.

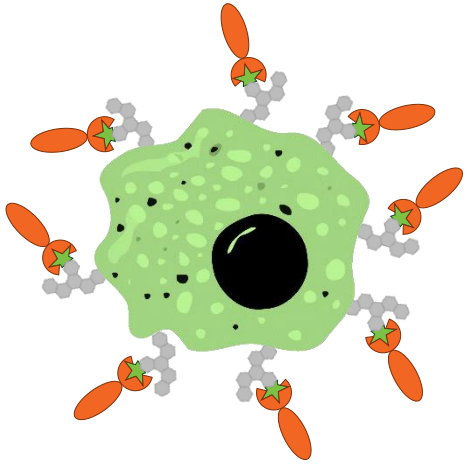
Insert artificial receptors through sugar metabolization

- Cancer-selective labeling can be achieved by intracellular processing of the unnatural sugar by overexpressed enzymes.

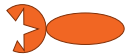


- Labelled cancer cells can be treated selectively by engineered cytotoxic payload

Target the artificial receptors via Click chemistry



ATTACK-Sugar for selective artificial receptor insertion onto cancer cells



ATTACK-Payload for labelled cell targeting

Receptors and target heads are engineered to bond highly specifically through “click chemisty”, similar to antibody-antigen interaction.

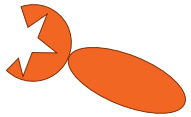
Payload: Therapeutics, probes, imaging agents, radioisotopes, etc.

ATTACK Oncology Pipeline

ATTACK-Sugar
for Selective Cancer Labelling

IRI101: unnatural sugar targeting Histone deacetylase (HDAC) and Cathepsin L (CTSL) dual overexpressing cancer

- Suitable for various solid tumor labeling including breast, lung, liver, kidney, stomach cancer.
- $10B+ market potential

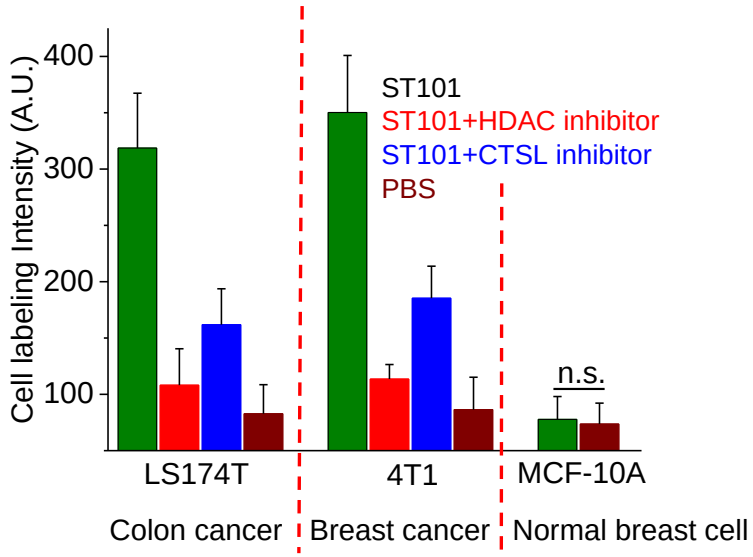


ATTACK-Cytotoxin Conjugates
for Labelled Cancer Targeting

IRI201	Triple negative breast cancer (TNBC), ovarian cancer
IRI202	Ovarian cancer, prostate cancer, NSCLC, sarcoma, H&N cancer
IRI203	TNBC, colorectal cancer, stomach cancer, pancreatic cancer, NSCLC
IRI204	TNBC, HCC, pancreatic cancer

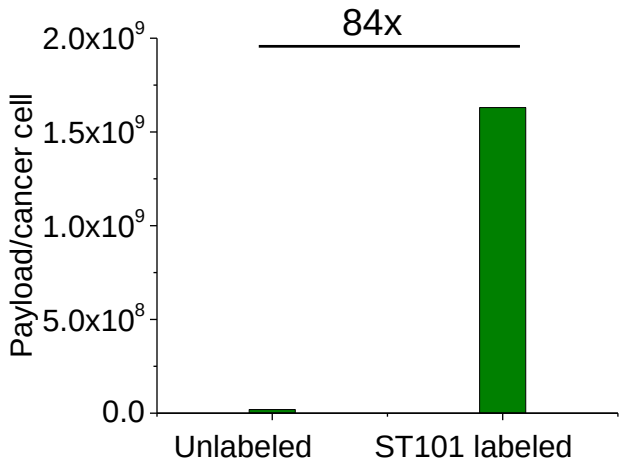
ATTACK *in vitro*: Selective and Efficient Cancer Labeling

ATTACK sugar selectively labels cancer cells through HDAC/CTSL.



- IRI101 does NOT label normal cells;
- IRI101 labels cancer cells efficiently;
- IRI101 labeling can be inhibited by either HDAC or CTSL inhibitors.

ATTACK achieves 1000 more payload delivery to cancer cell than antibody-drug conjugate *in vitro*



- 10^8-10^9 payload delivery/cancer cell *in vitro*
  - ➡ 1000 times more toxin delivery than ADC technology!
    - ➡ more toxin delivery = better efficacy

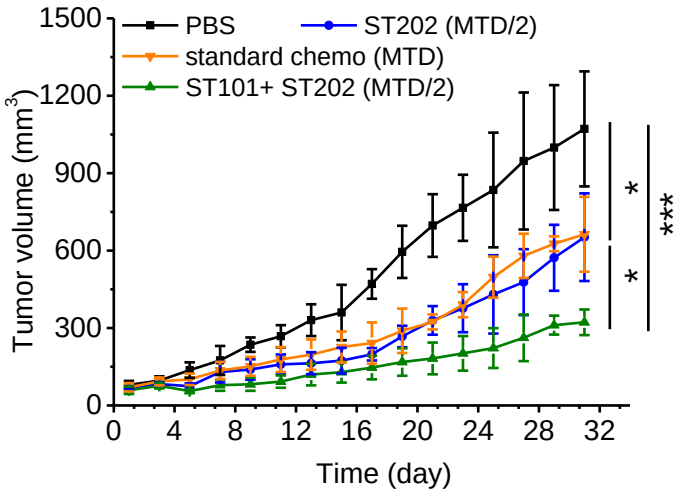
ATTACK *in vivo*: Tumor Targeting and Superior Efficacy

ATTACK lead to 7.2x toxin accumulation than ADC *in vivo* at a safe dose.

	ATTACK (IRI101+IRI201*)	T-DM1*
Toxin/cell *In vitro*	$8*10^8$	$1\text{-}2*10^6$
Active toxin in tumor *in vivo* (mouse tumor model)	722 nM	100 nM

- T-DM1: (Trastuzumab emtansine, Kacyla®, Roche) is FDA approved ADC treatment for $Her2^+$ breast cancer. >$1B sale in 2019
- ATTACK targeting (IRI101+IRI201) achieved higher toxin accumulation in tumor tissue *in vivo* than antibody-drug conjugate.

ATTACK showed better efficacy than standard chemo treatment at a safer dose.



- **IRI101**: ATTACK sugar that labels tumor through HDAC/CTSL.
- **IRI202**: ATTACK-toxin B conjugate that targets IRI101 labeling.
- MTD: maximum tolerable dose

*T-DM1 reference: ImmunoGen, Mol Cancer Ther, 2012, 11, 1133-1142

Expandable Platform Opportunities

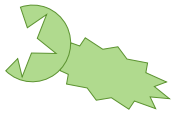
Tuning ATTACK sugar for labeling and treatment of:

Infectious disease

Liver disease

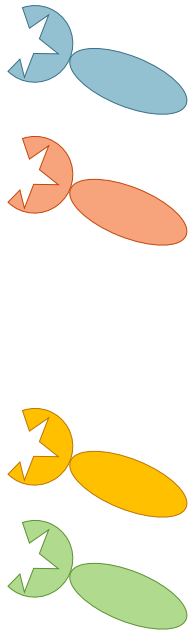
Kidney disease

When Payload = imaging agent:



In vitro diagnosis
Intraoperative imaging
Etc.

ATTACK Conjugatable Payload for cancer treatment:



Chemoagent: platinum, taxane, anthracycline, etc

Potent toxin: camptothecin, auristatin, maytansinoid, duocarmycin, pyrrolobenzodiazepines, salicheamicin, etc

Biopharmaceuticals: protein, etc

Others: radioisotope, etc

ATTACK: A Revolutionary Labeling and Targeting Technology

		Reference company	
Sugar metabolization engineering	• First-in-class technology • Broad applications in biomolecule synthesis, diagnosis, cell labeling.	PALLEON PHARMACEUTICALS	• Glycoprotein targeting for immunotherapy • $48M investment pre-IND
Selective cell labeling	• Interdisciplinary breakthrough in chemistry, biology, and materials science.	GO THERAPEUTICS	• Glycoengineering for antibody • Partner with Roche for up to $186M milestone
Targeting and delivery platform	• Systemic delivery for disease targeting, treatment, diagnosis, and imaging • $B market potential	Tocagen Shasqi	• 2-step gene+prodrug delivery for glioma treatment • Phase III trial • IPO at Nasdaq • 2-step local injection+drug delivery for cancer treatment • $10M pre-IND
Targeted toxin delivery	• Treating antibody-untargetable cancer • Delivering up to 1000 times more toxin/cell than ADC technology	Selecta Biosciences	• 2-step immunomodulation for immune disease treatment • Phase II trial • IPO at Nasdaq

Corporate Strategy: Boost the Technology Value

- Global IP protection
  - Original ATTACK IP (global rights) exclusively licensed from University of Illinois
  - Strategic IP protection in preclinical stage
- Collaboration and partnership
  - Multiple ATTACK pipeline development – different toxins/indication combination as partnerable assets
  - Collaboration on innovative cytotoxin delivery to improve therapeutic window
  - Outlicensing opportunity: development in other disease areas
- Exit strategy
  - M&A at Phase I-II trial
  - IPO at Phase I-II trial

R&D Timeline and Financing

Lead optimization | IND-enabling | IND filing | Clinical

	2020				2021				2022				2023			
Pipeline	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
IRI101																
IRI201																
IRI202*																
IRI203*																
IRI204*																
Financial milestone			$8 M pre-A round								$15 M A round					
Technical milestone	Lead optimization				Lead candidate GMP manufacturing, CMC, GLP toxicology						Phase I trial Pipeline expansion Pipeline collaboration					

IRI101：
ATTACK-Sugar

IRI20x：
ATTACK-Cytotoxin Conjugates

IRIA will file IND (US) for IRI101+IRI201 combination in 2022.[&]

[&] IND filing of combination product has well-established ICH/FDA guidelines.

* IND-enabling development of IRI202-204 depends on availability of funding and partnership opportunities.

Thank you!

For more technical information, please contact:

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