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 8, 2018
Date of Report (Date of earliest event reported)

ATYR PHARMA, INC.
(Exact name of registrant as specified in its charter)

Delaware	**001-37378**	**20-3435077**
(State or other jurisdiction of incorporation)	**(Commission File Number)**	**(IRS Employer Identification No.)**

3545 John Hopkins Court, Suite #250
San Diego, California 92121

(Address of principal executive offices, including zip code)

(858) 731-8389

(Registrant's telephone number, including area code)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligations 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))

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

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 7.01 Regulation FD Disclosure.

aTyr Pharma, Inc. (the "Company") intends to use an investor presentation to conduct meetings with investors, stockholders and analysts and at investor conferences. The Company intends to place this investor presentation on its website. A copy of the presentation materials is attached hereto as Exhibit 99.1. The Company does not undertake to update the presentation materials.

The information under this Item 7.01, including Exhibit 99.1, is being furnished herewith and shall not be deemed "filed" for the purposes of Section 18 of the Securities and Exchange Act of 1934, as amended, or the Exchange Act, or otherwise subject to the liabilities of that section, nor shall they be deemed incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Exchange Act, except as expressly set forth by specific reference in such filing.

Item 9.01 Exhibits.

(d) Exhibits

Exhibit No.	Description
99.1	Corporate Presentation Materials of aTyr Pharma, Inc. dated January 2018

SIGNATURE

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.

ATYR PHARMA, INC.

By: /s/ John T. Blake
John T. Blake
Senior Vice President, Finance

Date: January 8, 2018

Exhibit 99.1

aTyr Pharma
NASDAQ: LIFE

Harnessing Newly Discovered Pathways in Immunology Effected by Extracellular tRNA Synthetases

CORPORATE PRESENTATION

January 2018

Forward-Looking Statements

The following slides and any accompanying oral presentation contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 and other federal securities laws. The use of words such as "may," "might," "will," "should," "expect," "plan," "anticipate," "believe," "estimate," "project," "intend," "future," "potential," "opportunity," or "continue," and other similar expressions are intended to identify forward-looking statements. For example, all statements we make regarding the potential therapeutic benefits of proteins derived from tRNA synthetase genes and our product candidates, including ATYR1940 (Resolaris™), ATYR1923 (iMod.Fc) and our ORCA program, the ability to successfully advance our pipeline or product candidates, the timing within which we expect to initiate, receive and report data from, and complete our planned clinical trials, our ability to receive regulatory approvals for, and commercialize, our product candidates, our ability to identify and discover additional product candidates, our projected cash expenditures, and the ability of our intellectual property portfolio to provide protection are forward-looking statements. All forward-looking statements are based on estimates and assumptions by our management that, although we believe to be reasonable, are inherently uncertain. All forward-looking statements are subject to risks and uncertainties that may cause actual results to differ materially from those that we expected. These risks, uncertainties and other factors are more fully described in our filings with the U.S. Securities and Exchange Commission, including our Quarterly Report on Form 10-Q, our Annual Report on Form 10-K and in our other filings. The forward-looking statements in this presentation speak only as of the date of this presentation and neither we nor any other person assume responsibility for the accuracy and completeness of any forward-looking statement. We undertake no obligation to publicly update or revise any forward-looking statement, whether as a result of new information, future events or otherwise, except as required by law.

Accelerating Value Creation from Novel Immune Pathways

Research:

Discover innovative therapeutic candidates based on extracellular functionality of tRNA synthetases

Initial focus on extracellular histidyl-tRNA synthetase (HARS)

Development:

ATYR1923 (interstitial lung diseases) in ongoing Phase 1 trial

ORCA antibody program (immuno-oncology) in IND enabling activities

Financials:

2017 year-end cash and investments at $85.1M*

Cash runway into 3Q 2019

Upcoming Catalysts:

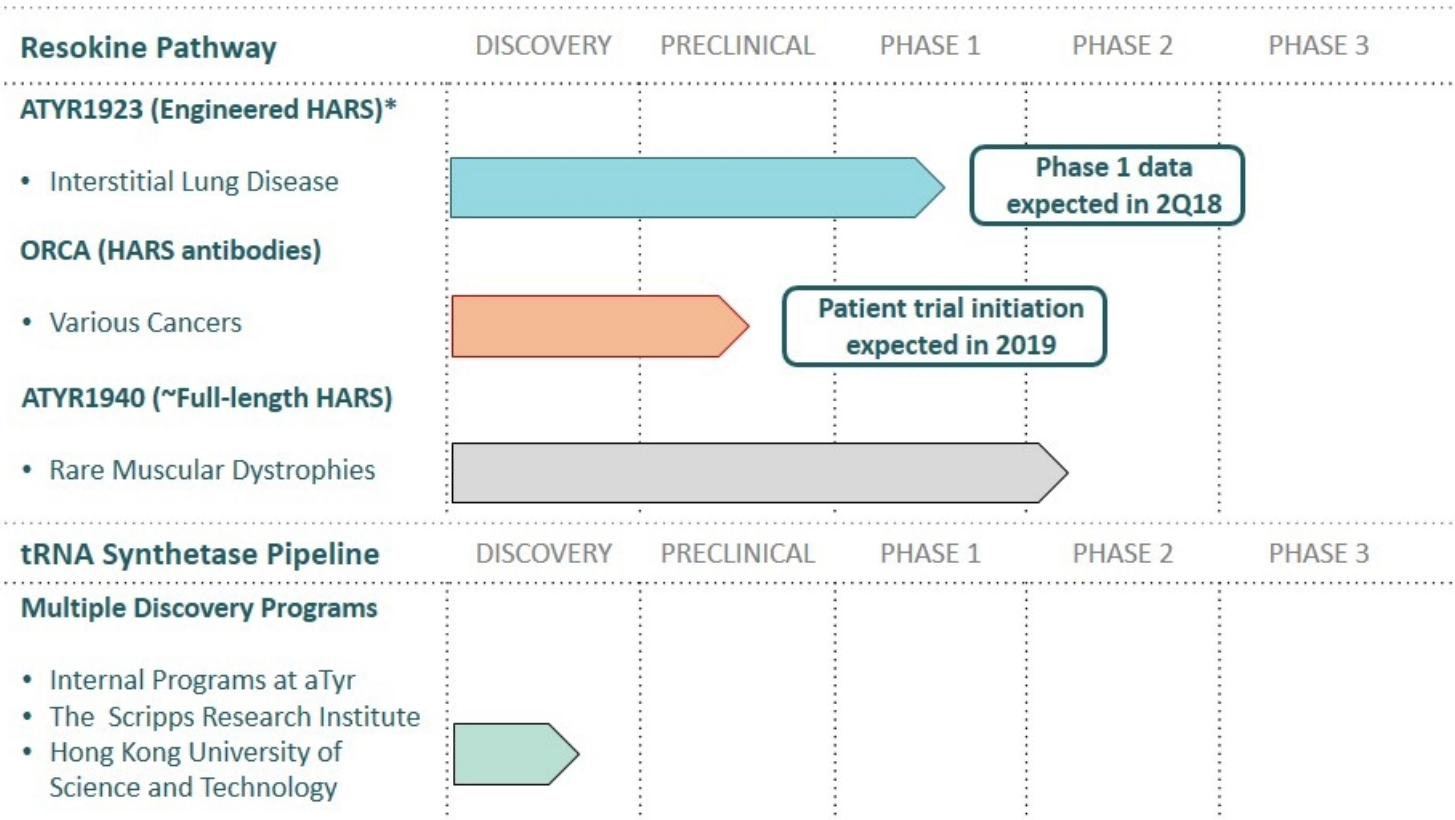
ATYR1923 Phase 1 data – 2Q 2018

First publication of ORCA data at key oncology and immunology conferences in 2018

aTyr Pharma NASDAQ: LIFE

**Estimated cash, cash equivalents, and investments provided pending completion of year-end financial close and external audit*

Therapeutic Candidate Pipeline



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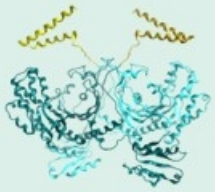
***HARS:** Histidyl-tRNA synthetase
ATYR1923 (Engineered HARS): Engineered fusion protein with HARS splice variant (additional information on slide 9)

Resokine: Extracellular Proteins Derived From HARS Gene

tRNA Synthetase Genes:

AARS
CARS
DARS
EPRS
FARS
GARS
HARS
IARS
KARS
LARS
MARS
NARS
QARS
RARS
SARS
TARS
VARS
WARS
YARS

Intracellular:
(Cytoplasm)



Histidyl-tRNA synthetase (HARS)

Enzymes that catalyze **protein synthesis**

Secretion

Extracellular:
(Circulation)

Full-length HARS

Splice variant of HARS
One example of multiple splice variant proteins

"Resokine Pathway"
Homeostatic pathway that controls the set point for activation of key immune cells

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aTyr has built an intellectual property estate, to protect its pipeline, comprising over 300 potential protein compositions derived from all 20 human tRNA synthetase genes.

Resokine MOA Hypothesis: Regulates T Cell Activation

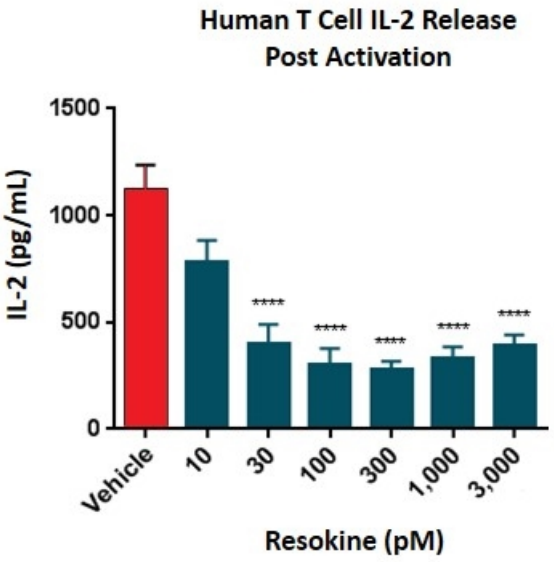
Acts on both CD4 and CD8 T cells

Effector functions at levels closer to a resting T cell

Stimulatory pathways at levels closer to a resting T cell

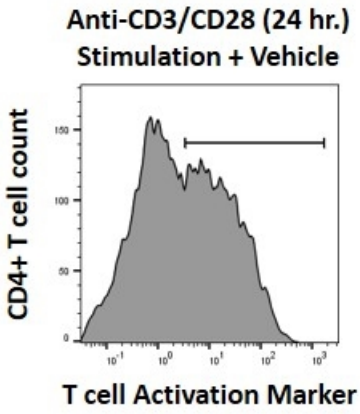
Shifts trafficking and residence closer to a resting T cell

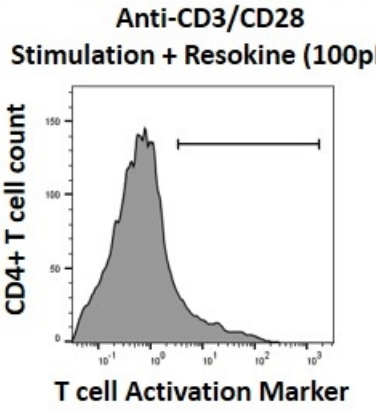
Resokine Regulates T Cell Activation



***** p < 0.0001*

Similar for: INFγ, TNFα…
Similar to hitting PD-1 pathway





Similar for:
CD69, 4-1BB,
PD-1, ICOS…

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Graphs on Right: *T cells were stimulated with anti-CD3/CD28 antibodies in the presence of vehicle or Resokine. After 24 hours, supernatants were collected and analyzed by ELISA. Statistics by T test.*


ATYR1923 for the Treatment of Interstitial Lung Diseases
Engineered HARS Splice Variant (iMod.Fc)

ATYR1923: Program Snapshot

ATYR1923 (iMod.Fc):

Engineered fusion protein with HARS splice variant

Refer to splice variant as the "iMod domain"

(iMod for **i**mmuno-**mod**ulatory function)

Patients:

Interstitial lung diseases (ILDs) characterized by an immune component

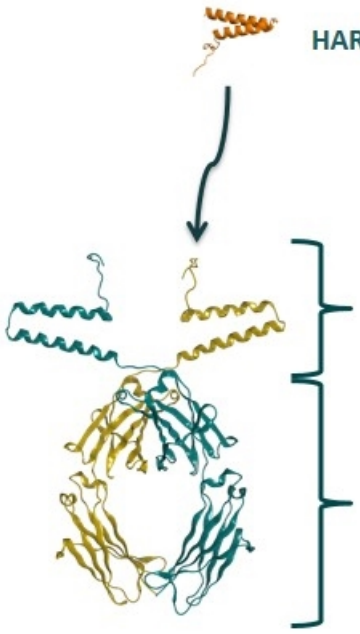
Mechanism:

Regulation of T cell activation via the Resokine pathway

Rationale:

Functional knockout of Resokine pathway in humans and rodents results in T cell mobilization and lung damage

Immune dysfunction is key to pathophysiology of ILDs



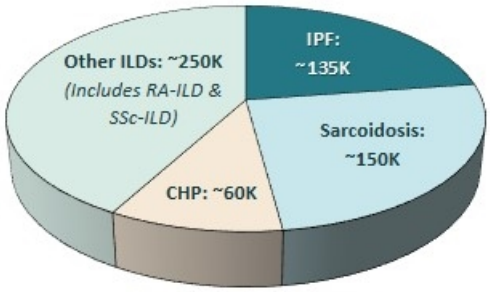
Target Dosing:

Improved pharmacokinetic profile that supports once/twice monthly IV infusion

Interstitial Lung Diseases Share Persistent Immune Engagement

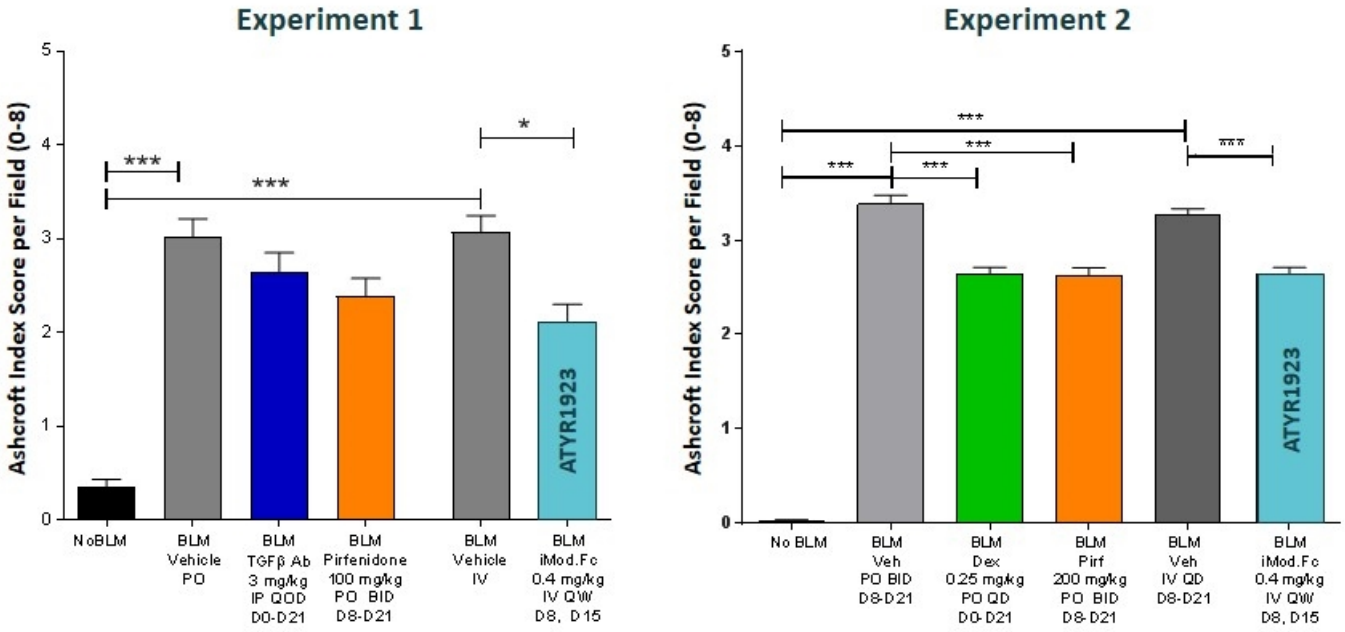
- **Idiopathic Pulmonary Fibrosis (IPF)**
- **Rheumatoid Arthritis – ILD (RA-ILD)**
- **Chronic Hypersensitivity Pneumonitis (CHP)**
- **Systemic Sclerosis – ILD (SSc-ILD)**
- **Sarcoidosis**

Estimated ILD US Patient Populations



Slide adapted from Dr. Steven Nathan, Medical Director, Advanced Lung Disease and Transplant Program at Inova Fairfax Hospital, Falls Church, VA

ATYR1923 Ameliorates Fibrosis in Bleomycin-Induced Lung Injury



ATYR1923 (iMod.Fc) administered therapeutically at 0.4 mg/kg weekly drives efficacy comparable to or greater than Pirfenidone*, anti-TGF antibodies, and dexamethasone

aTyr Pharma NASDAQ: LIFE

Pirfenidone: *Current approved therapy for IPF patients (annual sales in 2016 ~ $830M)*

Note: *Bleomycin mouse model abstract presented as a poster at the American Thoracic Society in May 2017*

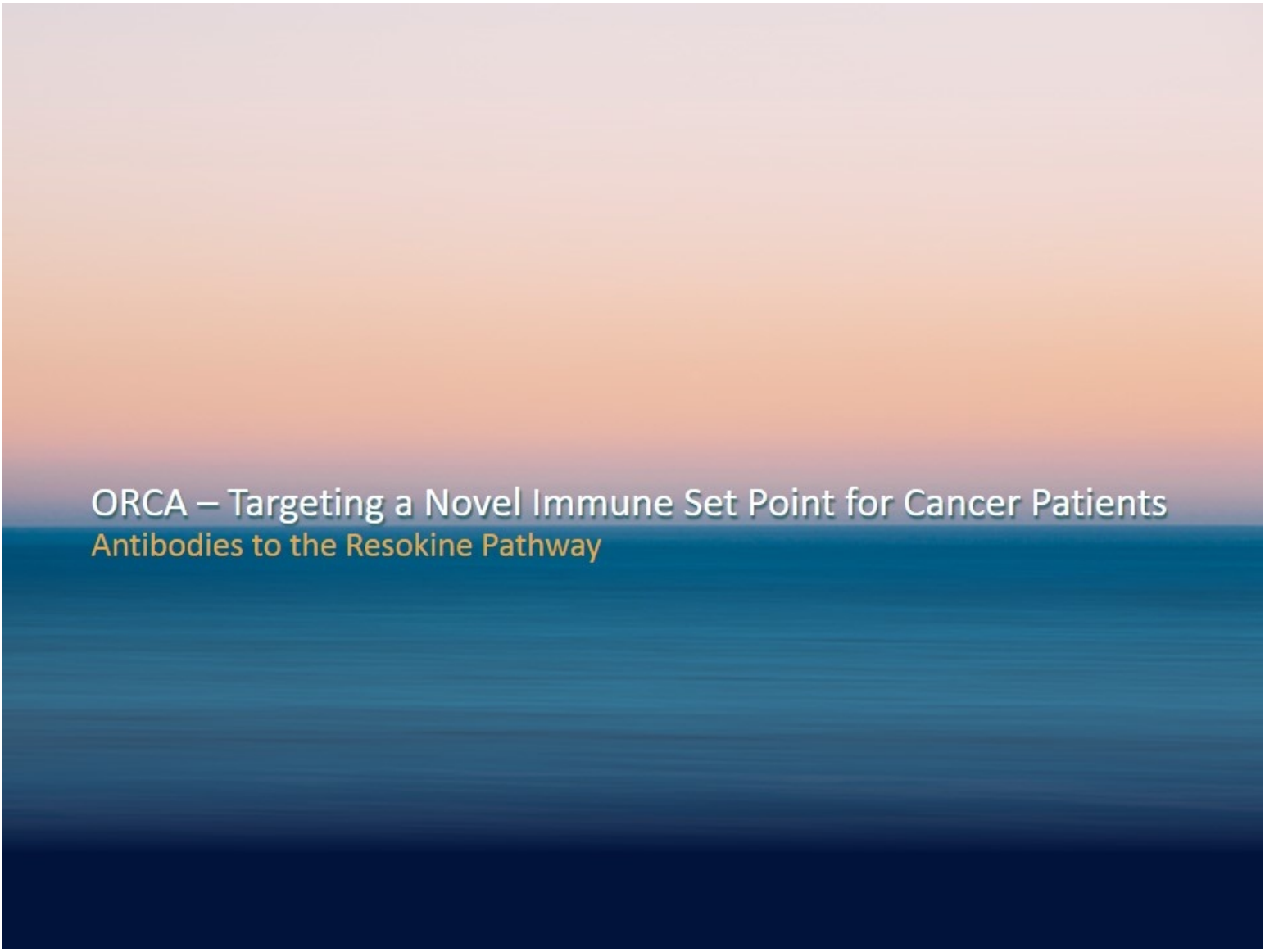
ATYR1923 Clinical Development for Interstitial Lung Diseases

Clinical Overview
Randomized, double-blind, placebo-controlled studies to investigate the safety, tolerability, immunogenicity, pharmacokinetics and pharmacodynamics of intravenous ATYR1923 (iMod.Fc) in healthy volunteers and patients with interstitial lung disease.

Phase 1 - Healthy Volunteers:
- 36 subjects across 6 dose cohorts
- Dosing (single infusion):
  - 0.03 mg/kg up to potentially 5.0 mg/kg

✓ First subjects dosed in the fourth quarter of 2017
❑ Data expected in 2Q 2018

Phase 2 - Interstitial Lung Disease patients with an immune component:
- Collaborating with industry leading clinicians to develop patient trials for ATYR1923


ORCA – Targeting a Novel Immune Set Point for Cancer Patients
Antibodies to the Resokine Pathway

Regulating T Cells to Temper or Enhance Anti-Tumor Immunity

Resokine

"Agonist"

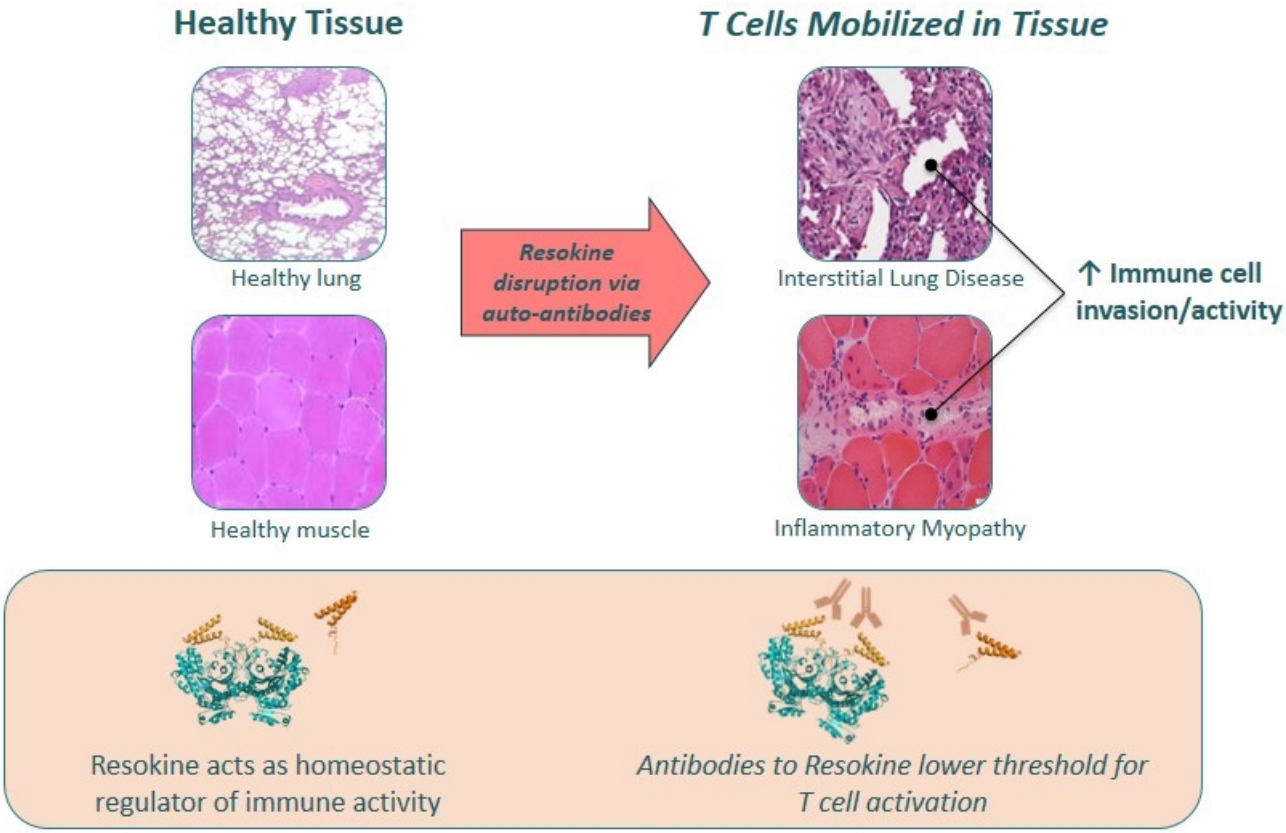
Regulates T cell activation with potential to ***temper*** immune system

ORCA

"Antagonist"

Unlocks T cell activity with potential to ***enhance*** *anti-tumor immunity*

Anti-Synthetase Syndrome: Evidence of Resokine Pathway Relevance in a Human Disease Setting



*100% (18 of 18) anti-synthetase syndrome patients tested positive for antibodies for Resokine proteins

ORCA Program: Snapshot

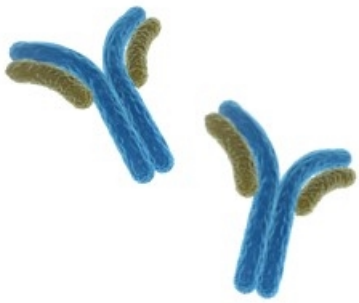
Patients:
Potentially all cancer types:

- >450 patient samples in over 10 tumor types tested
- ~95% of cancer patients tested positive for Resokine

Target:
Resokine pathway

Therapeutic Concept:
Antibody to block Resokine activity, increases T cell engagement

Rationale:
Human evidence of Resokine antibody changing T cell behavior (anti-synthetase syndrome patients)
Phenotype replicated in animal functional knock-out models



Biomarker:
Liquid biopsy correlates with tumor volume and efficacy

ORCA Program: Supportive *In Vivo* Data and Development Timelines

In Vivo Efficacy Data

Resokine Abs effective in multiple mouse syngeneic tumor models

- ✓ Outperformed checkpoint inhibitors (e.g. Abs to PD-1, PD-L1, CTLA-4) in various animal models

Resokine Abs effective alone and in combination

- ✓ Efficacy potential as monotherapy and with checkpoint inhibitors (based on tumor model data)

Development Timelines

Resokine antibody selection:

- ✓ Panel of antibodies selected and in IND enabling activities

Present Data at Scientific Conferences:

- ✓ Abstract at ASCO-SITC in January 2018
- ❑ Additional presentations in 2018

First clinical trial in patients:

- ❑ Initiate in 2019

Accelerating Value Creation from Novel Immune Pathways

2018 Strategic Goals:

Advance Clinical Development

- ATYR1923 Phase 1 ongoing with data in 2Q 2018

Advance Immuno-Oncology Program

- IND-enabling activities ongoing for patient trials in 2019

Discovery and Pipeline Enhancement

- Collaborating with academic institutions and ongoing internal programs to discover innovative therapeutic candidates from tRNA synthetase biology

Financials:

✓ **$85.1M*** cash and investments as of 12/31/17; cash runway into 3Q 2019

✓ Market capitalization as of closing price on 12/31/17: **~$144M****

aTyr Pharma NASDAQ: LIFE

**Estimated cash, cash equivalents and investments provided pending completion of year-end financial close and external audit*
***Market capitalization calculated using all common shares outstanding and preferred class X shares on an if-converted basis for a total outstanding share count of 41.14M shares.*