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

Date of Report (Date of earliest event reported): May 18, 2020

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	**92121**
(Address of Principal Executive Offices)	**(Zip Code)**

Registrant's telephone number, including area code: (858) 731-8389

Not Applicable
(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 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))

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	LIFE	The Nasdaq Capital Market

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 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 Financial Statements and Exhibits.

(d) Exhibits

Exhibit No.	Description
99.1	Corporate Presentation Materials of aTyr Pharma, Inc. dated May 2020.

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/ Jill M. Broadfoot
Jill M. Broadfoot
Chief Financial Officer

Date: May 18, 2020

Exhibit 99.1

A New Path to Medicine

MAY 2020

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 regarding: the potential therapeutic benefits of proteins derived from tRNA synthetase genes and our product candidates, including ATYR1923, and development programs; the ability to successfully advance our product candidates and undertake certain development activities (such as the initiation of clinical trials, clinical trials enrollment, the conduct of clinical trials and announcement of top-line results) and accomplish certain development goals, and the timing of such events; our ability to receive regulatory approvals for, and commercialize, our product candidates; our ability to identify and discover additional product candidates; potential activities and payments under collaboration agreements; 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 Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q, 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.

aTyr: A New Path to Medicine

Mission	• Develop a new class of medicine based on proprietary biology platform
Phase 2 clinical program: ATYR1923	• Potential first-in-class immunomodulator for inflammatory lung diseases • Phase 1b/2a study in pulmonary sarcoidosis, a major form of interstitial lung disease (ILD) • Collaboration with Kyorin Pharmaceutical for ILDs in Japan • Phase 2 study in COVID-19 patients with severe respiratory complications
Pipeline of novel discovery candidates	• Neuropilin-2 (NRP2) targeting antibodies for cancer and inflammation • New tRNA synthetase candidates for immunology
Financial Position	• Cash, cash equivalents and investments at $49.8m as of March 31, 2020

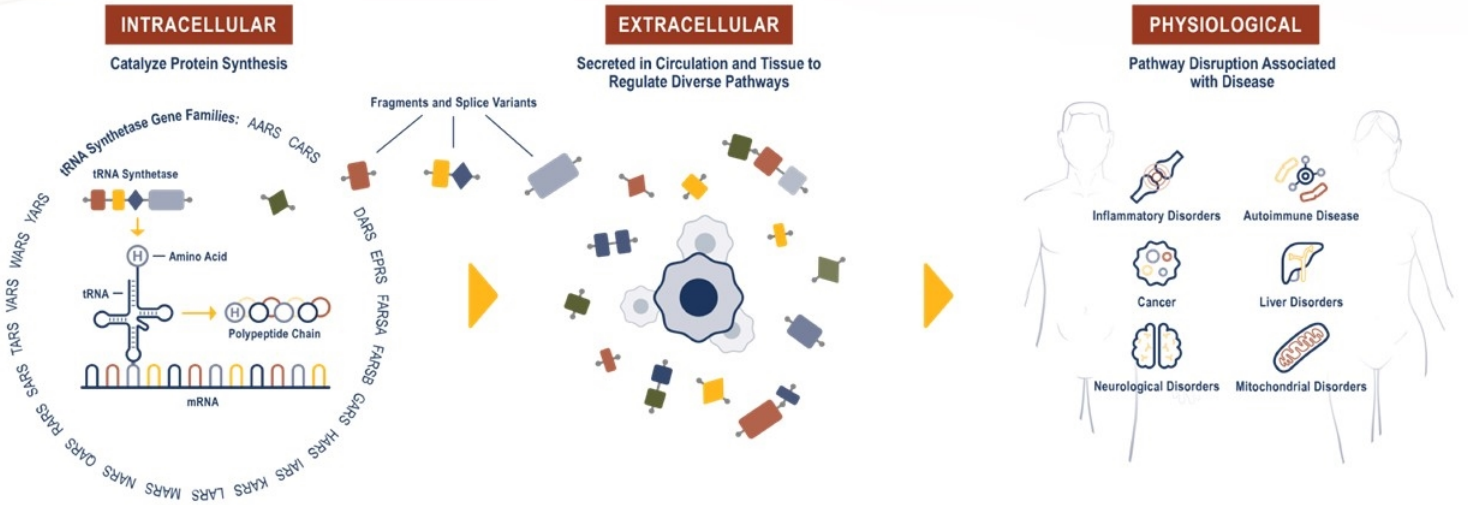
aTyr

aTyr Development Pipeline

PROGRAM	DISEASES	DISCOVERY	PRECLINCAL	PHASE 1	PHASE 2	PHASE 3	Partners
ATYR1923	Pulmonary Sarcoidosis						Kyorin (2)
	Other ILDs (CTD-ILD; CHP)(1)						
	COVID-19 related severe respiratory complications						
NRP2 Antibodies	Cancer; Inflammation						
tRNA Synthetase Candidates	Immunology						CSL Behring (3)

(1) CTD-ILD = connective tissue disease-related ILD; CHP = chronic hypersensitivity pneumonitis
(2) Kyorin partnership for ILD in Japan
(3) CSL partnership for up to 4 tRNA synthetases

tRNA Synthetases May Have Novel Functions Extracellularly



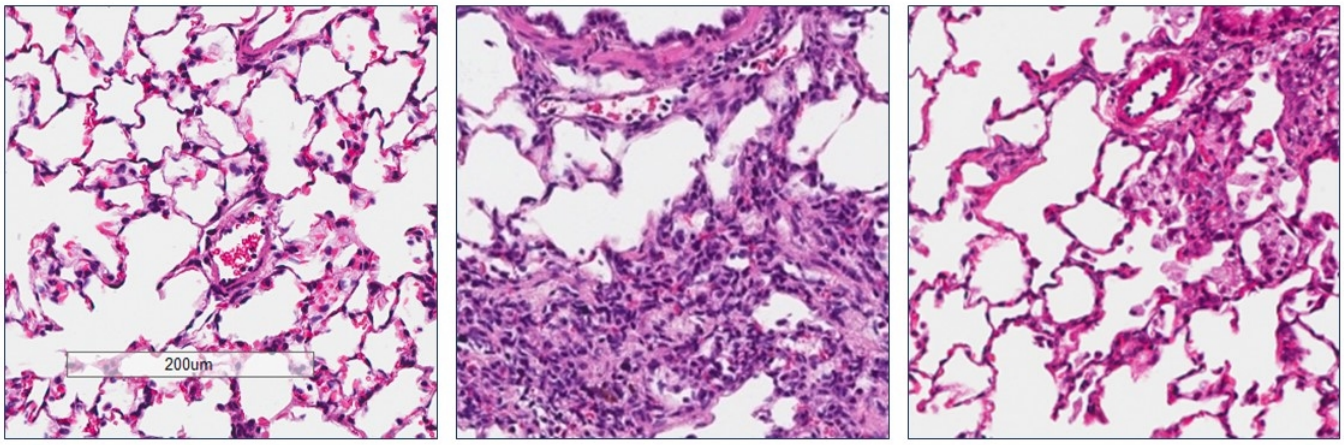
aTyr

ATYR1923

A Novel Immunomodulator for Inflammatory Lung Disease

A Novel Mechanism to Treat Inflammation

Healthy lung | **Injured lung** | **ATYR1923 treated**



7 Representative histology showing immune cell infiltrate in a rat model of bleomycin induced lung fibrosis presented at the American Thoracic Society annual meeting 2018.

ATYR1923: Potential First-in-Class Therapy for Inflammatory Lung Disease

- Fc fusion protein therapeutic derived from aTyr's proprietary protein library
- Binds selectively to NRP2, a cell surface receptor upregulated in inflamed lung tissue
- Downregulates inflammatory and pro-fibrotic cytokine and chemokine levels as well as histological inflammation and fibrosis in pre-clinical models
- Generally well tolerated in healthy volunteers with PK supporting once-monthly dosing
- Currently enrolling first-in-patient trial in pulmonary sarcoidosis, a major form of ILD
- Phase 2 trial in COVID-19 patients with severe respiratory complications announced April 2020
- Future development opportunities in other ILDs (e.g. CTD-ILD or CHP)

ATYR1923 Mechanism of Action in Inflammatory Lung Disease

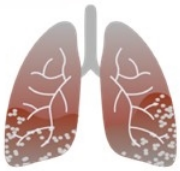
Disease Trigger

Organic; inorganic; infectious; autoimmune

Aberrant Immune Responses

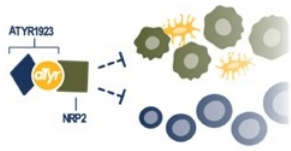
T-cell activation; Pro-inflammatory cytokine/chemokines triggering fibrotic pathways; NRP2 upregulation on immune cells

Lung Inflammation & Fibrosis



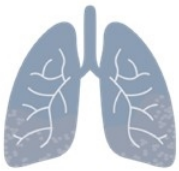
Persistent, unresolved inflammation in the lung can lead to fibrosis; patients experience chronic cough, dyspnea, mortality

ATYR1923 Dampens Immune Responses



ATYR1923 binds to NRP2 and downregulates cytokine and chemokine production and T-cell activation

Stabilized Lung



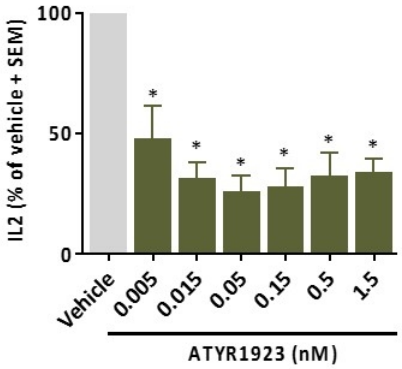
Reduced inflammation and fibrotic deposition; symptom relief, stabilized lung function*

*aTyr hypothesis

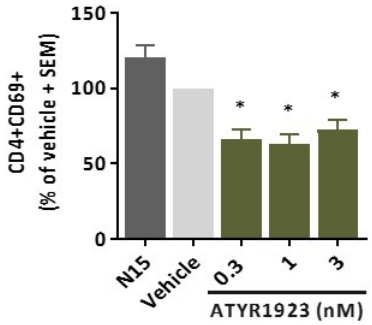
aTyr

First Identified Mechanism: Inhibition of T Cell Activation

Human naïve T cells
Stimulated with anti-CD3/CD28



CD4+ T cells
Surface activation marker (CD69)



Also inhibits release of other cytokines: IFNγ, IL-17, IL-5, IL-13, IL-21, IL-10, TNFα

Modified from *in vitro* data presented at AAI 2018; * = $p < 0.05$; N15 = negative control for ATYR1923

Demonstrated Effect in Animal Lung Injury Models

P. acnes (Sarcoidosis)	↓ pro-fibrotic proteins
S. Rectivirgula (CHP)	↓ tissue cytokines/chemokines and enzymes
Sclerodermatous GvHD (SSc-ILD)	↓ fibrosis
SKG mice (RA-ILD)	↓ immune infiltrates
Bleomycin-Induced Lung Fibrosis (IPF)	↓ inflammation / fibrosis

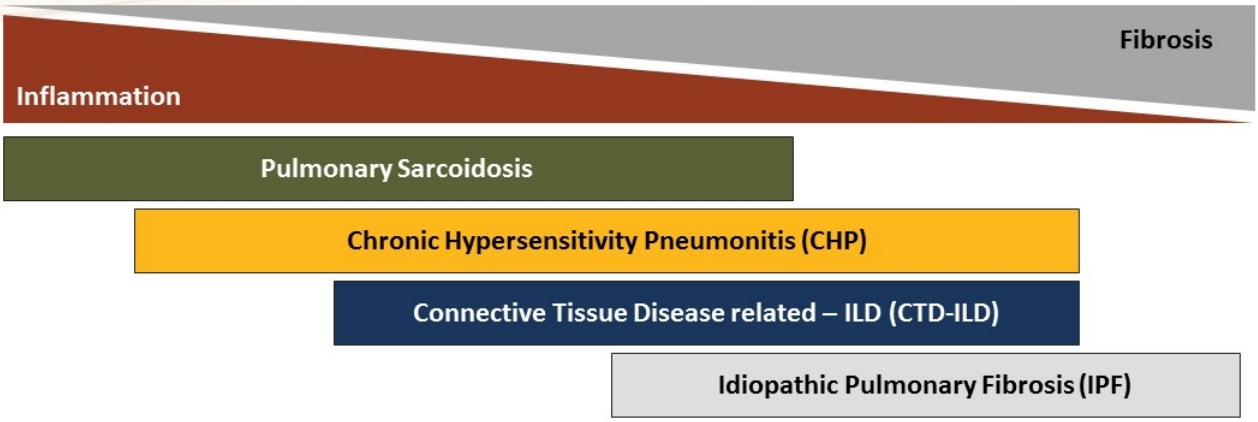
Consistent downregulation of pro-inflammatory cytokines including IL-6, MCP-1, and IFN-γ

Data available at https://www.atyrpharma.com/our-science/publications/

ATYR1923

Interstitial Lung Disease

ILDs Share Common Immune Pathology Leading to Fibrosis

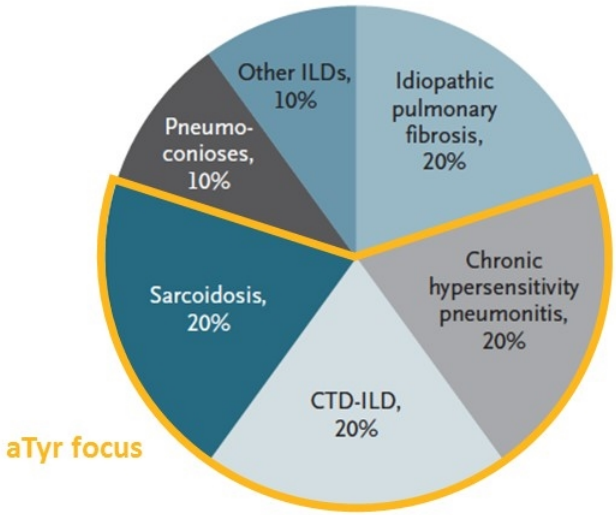


- ILDs lie on a spectrum of inflammation and fibrosis, but all share an immune pathology
- Progression to fibrosis is a key driver of morbidity and mortality
- By targeting aberrant immune response driving fibrosis, ATYR1923 has potential to improve outcomes in multiple ILDs

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

Market Opportunity in Inflammatory Interstitial Lung Disease

Relative Distribution of ILDs in the USA[1]

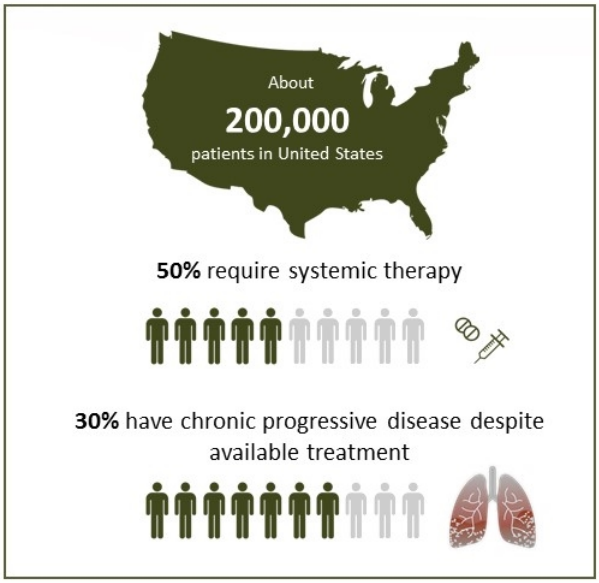


- >200 types of ILD: 4 major types comprise 80% of patients
- Limited standard of care with substantial morbidity and mortality
- aTyr focused on 3 most inflammatory types: ~500-600k US patients[2]; ~3m globally
- $2-3b global market opportunity[3]

(1) Lederer, Martinez. NEJM 2018
(2) All ILDs individually have potential for orphan status
(3) aTyr estimates for ATYR1923 in Pulmonary Sarcoidosis, CHP, CTD-ILD; excludes IPF

First ATYR1923 Indication: Pulmonary Sarcoidosis

- Inflammatory disease of unknown etiology characterized by the formation of granulomas (clumps of immune cells)
- T cell driven: CD4+ (Th1 / Th17)
- Pulmonary sarcoidosis occurs in ~90% of all sarcoidosis patients
- Treatment options are limited with associated toxicity: Corticosteroids, cytotoxic immunosuppressants, TNF inhibitors

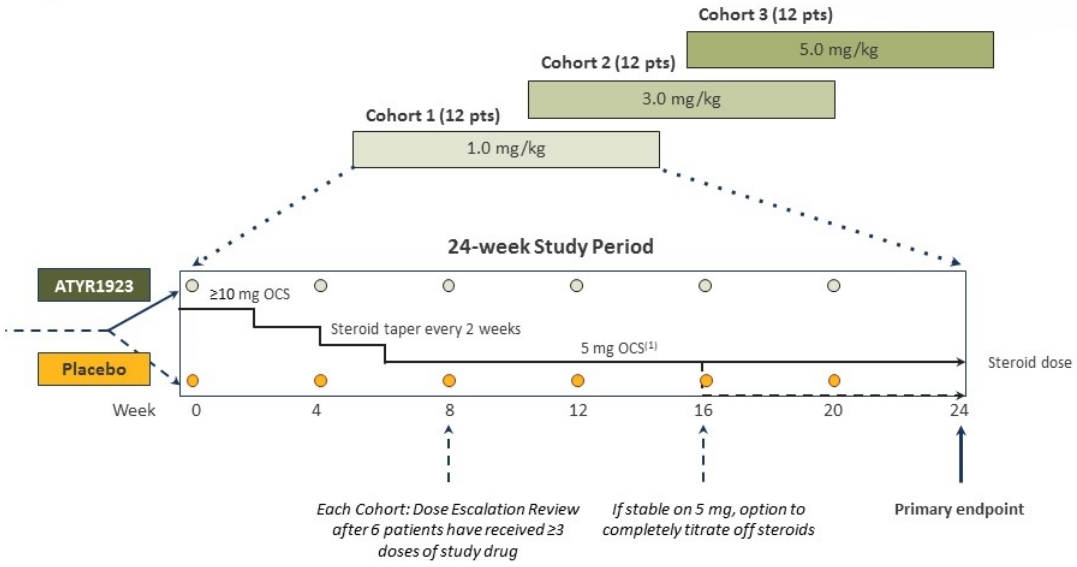


Culver et al. BMJ 2019; Baughman ATS Annals 2016

Phase 1b/2a Study in Pulmonary Sarcoidosis Ongoing

Design	• Randomized (2:1), double-blind, placebo-controlled, multiple ascending dose • Forced steroid taper to 5 mg by week 8; taper to 0 mg possible at week 16 in responders
Population	• 36 histologically confirmed pulmonary sarcoidosis patients • ≥10 mg stable oral corticosteroid treatment • Symptomatic/active disease at baseline
Primary Endpoint	• Safety and tolerability of multiple ascending IV ATYR1923 doses
Secondary Endpoints	• Steroid-sparing effect • Immunogenicity • Pharmacokinetics (PK) • Exploratory efficacy measures: FDG-PET/CT imaging; Lung function (FVC); Serum biomarkers; Health-related quality of life scales

Phase 1b/2a Pulmonary Sarcoidosis Study Schema



(1) subtherapeutic dose

ATYR1923 Japan Collaboration

Kyorin Overview

- Founded: 1923
- Focus: Respiratory, ENT, Urology
- 1600 employees: incl. 350 in R&D; 750 sales reps covering top respiratory centers in Japan
- Sales: ~$1b USD
- Market cap: $1.1b USD (4569:JP TSE)

Key Terms

- Scope: ATYR1923; Japan; ILD
- Upfront payment: $8m
- Development, regulatory and commercial milestones: $167m
- Tiered sales royalties into double digits
- Kyorin to fund all development and commercial activities in Japan

ATYR1923

COVID-19 Related Severe Respiratory Complications

ATYR1923 for COVID-19 Related Severe Respiratory Complications

- A subset of COVID-19 patients progress to experience significant inflammatory infiltration of the lungs
- Severely ill patients have significant increases of several pro-inflammatory cytokines: IL-2, -7, -6 and 10, G-CSF, MCP1, MIP1A and TNF-α
- ATYR1923 has been shown to decrease the release of inflammatory cytokines, including IL-2, TNF-α, and IL-13, from human T cells activated *in vitro*
- Anti-inflammatory and anti-fibrotic effects of ATYR1923, including decreased cytokine/chemokine signaling including IL-6, MCP1 and IFN-ɣ, have been shown in various animal models of immune-mediated lung injury

ATYR1923 Phase 2 Study in COVID-19 Related Severe Respiratory Complications

Objective	Evaluate safety and preliminary efficacy of ATYR1923 in subjects with COVID-19-related severe respiratory complications not requiring mechanical ventilation
Design	Randomized, double-blind, placebo controlled, single dose
Population	30 adult patients with severe respiratory complications related to COVID-19 infection
Doses	Randomized 1:1:1 - Single dose of 1.0 or 3.0 mg/kg ATYR1923 or Placebo
Endpoints	• Primary: Safety and Tolerability • Secondary: Oxygenation, Fever, Hospital / ICU metrics, Inflammatory markers

IND accepted

aTyr

NRP2 Antibodies

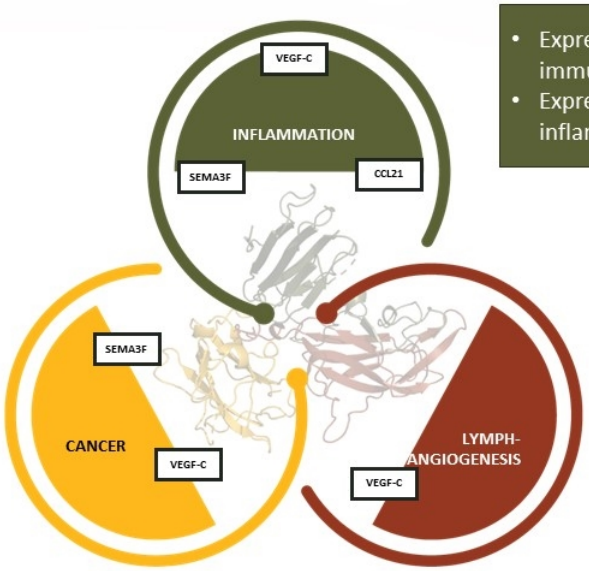
Regulating Diverse Disease Pathways

NRP2: A Novel Therapeutic Target

- NRP2 is a potentially novel target for cancer and inflammatory disorders
- Acts as a co-receptor for VEGF-C, class 3 Semaphorins and CCL21
- NRP2 expression is upregulated on tumors and immune cells during inflammation
- NRP2 expression is linked to worse outcomes in many cancers
- aTyr has developed antibodies to selectively target different NRP2 epitopes for diverse therapeutic applications

NRP2 is a Compelling Target for Cancer and Inflammation

- Overexpressed in a variety of cancers
- Tumor expression linked to worse outcomes

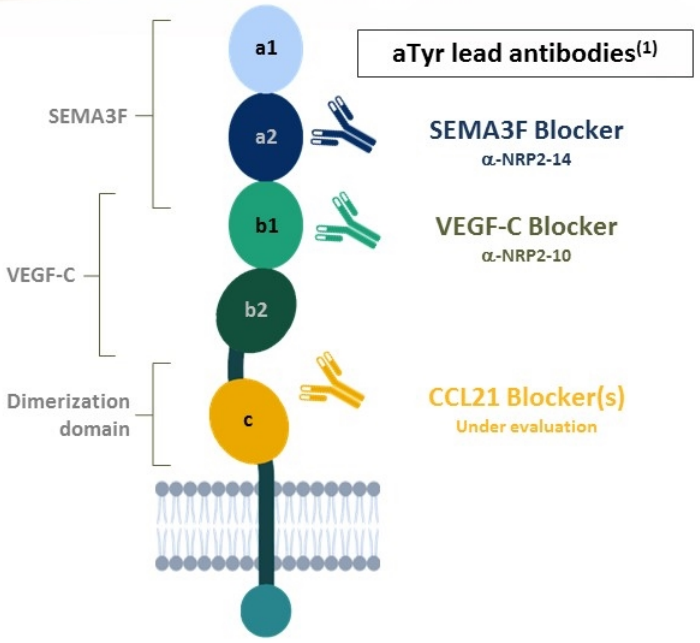


- Expressed on multiple immune cell types
- Expression upregulated in inflammatory conditions

- Lymphatic development and function impaired in NRP2 knockout

aTyr

aTyr is Developing Human NRP2 Blocking Antibodies



(1) Distinct from ATYR1923 interaction with NRP2

tRNA Synthetases

A Potential New Therapeutic Protein Class

tRNA Synthetases: A Potential New Therapeutic Protein Class

- aTyr owns IP covering proteins derived from all 20 tRNA synthetase gene families
- Lead program ATYR1923 is based on a naturally occurring splice variant of one of these families, histidyl-tRNA synthetase (HARS)
- tRNA synthetases are secreted extracellularly and occur in novel forms which lose their canonical function
- Extracellular tRNA synthetase disruption (genetic / autoimmune) is associated with disease in humans
- aTyr working with leading biopharmaceutical company CSL Behring on identifying new IND candidates for immunological disorders in up to four tRNA synthetases from aTyr's pipeline (non-HARS derived)
  - CSL will fund all R&D activities and will pay a total of up to $17.0 million in option fees if all four synthetase programs advance
  - aTyr will grant CSL an option to negotiate licenses for worldwide rights to each IND candidate that emerges from this research collaboration

A New Path to Medicine

aTyr: A New Path to Medicine

- Platform of proprietary new biology
- Phase 2 clinical program: ATYR1923
  - Novel MOA for inflammatory lung disease
  - Demonstrated effect in multiple animal lung injury models
  - Phase 1 in healthy volunteers completed
  - Phase 1b/2a clinical study in pulmonary sarcoidosis enrolling in US – positive interim safety data reported 12/2019
  - Kyorin collaboration for ILD in Japan with total deal value up to $175m
  - Phase 2 trial in COVID-19 patients with severe respiratory complications
- Discovery stage programs in cancer and immunology
- Cash, cash equivalents, and investments at $49.8m as of March 31, 2020

aTyr

Upcoming Catalysts

ATYR1923	• Phase 1b/2a results in pulmonary sarcoidosis patients[1] • Initiation of Phase 1 in Japan • Phase 2 results in COVID-19 patients by end of year[2] • Potential expansion into Phase 2 studies for second ILD indication
NRP2 Antibodies	• Selection of first NRP2 antibody IND candidate
tRNA Synthetase Candidates	• Advance discovery work on multiple candidates through CSL Behring collaboration

(1) Timing dependent on impact of the COVID-19 pandemic
(2) Timing dependent on site initiation and patient enrollment

Thank You