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): September 13, 2021

ATYR PHARMA, INC.

(Exact name of registrant as specified in its charter)

Delaware (State or other jurisdiction of incorporation) 001-37378
(Commission File Number)

20-3435077 (IRS Employer Identification No.)

3545 John Hopkins Court, Suite #250 San Diego, CA (Address of Principal Executive Offices)

92121 (Zip Code)

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

Not Applicable (Former Name or Former Address, if Changed Since Last Report)

Chec	ck 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 w	vhether the regi	strant is an en	nerging growt	h company a	s defined in I	Rule 405 of the	Securities A	ct of 1933 o	r Rule 12b-	2 of the S	Securities I	Exchange A	rC1
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. \Box

Item 8.01 Other Events.

On September 13, 2021, aTyr Pharma, Inc. (the "Company") announced positive results from its Phase 1b/2a double-blind, placebo-controlled clinical trial of its lead therapeutic candidate, ATYR1923, in 37 patients with pulmonary sarcoidosis, a major form of interstitial lung disease (ILD). ATYR1923 was safe and well-tolerated at all doses with no drug-related serious adverse events or signal of immunogenicity. Additionally, the study demonstrated consistent dose response for ATYR1923 on key efficacy endpoints and improvements compared to placebo, including measures of steroid reduction, lung function, sarcoidosis symptom measures and inflammatory biomarkers.

Key Safety and Clinical Efficacy Findings for ATYR1923

- Safe and well-tolerated at all doses
 - O No dose-relationship, with most common adverse events associated with underlying disease
 - O No drug-related serious adverse events
 - O No signal of immunogenicity
- Dose response and consistent positive findings across key efficacy endpoints
 - O Steroid reduction of 58% overall from baseline and 22% relative reduction compared to placebo in steroid usage post taper in the 5.0 mg/kg treatment group
 - O Complete steroid taper to 0 mg achieved and maintained for 33% of patients in the 5.0 mg/kg treatment group compared to no patients in any other group
 - O Absolute improvement in forced vital capacity (FVC) as a measure of lung function at week 24 of 3.3% in the 5.0 mg/kg treatment group compared to placebo, with an improvement in FVC of > 2.5% considered clinically meaningful
 - O Clinically meaningful improvement over placebo observed for dyspnea (shortness of breath), cough, fatigue and the King's Sarcoidosis Scores for Lung and General Health in the 5.0 mg/kg treatment group
 - O Dose dependent trends of improvement in key inflammatory biomarkers compared to placebo including IL-6, MCP-1, IFN-γ, IP-10 and TNFa as well as key sarcoidosis markers including ACE, IL-2Ra and SAA with tightest control in the 5.0 mg/kg treatment group
 - O FDG-PET-CT was not evaluable due to incomplete data primarily caused by operational issues related to the COVID-19 pandemic

The Phase 1b/2a study was a randomized, double-blind, placebo-controlled, multiple-ascending dose clinical trial in 37 patients with pulmonary sarcoidosis. The trial consisted of three cohorts testing doses of 1.0 mg/kg, 3.0 mg/kg and 5.0 mg/kg of ATYR1923 or placebo, dosed intravenously every month for six months. The primary objective of the study was to evaluate the safety, tolerability, immunogenicity and pharmacokinetic profile of multiple doses of ATYR1923 compared to placebo. Secondary objectives included the potential steroid-sparing effects of ATYR1923, in addition to other exploratory assessments of efficacy, such as lung function.

The Company plans to request an end of Phase 2 meeting with the U.S. Food and Drug Administration to discuss the results from this trial and subsequent clinical development and path to registration for ATYR1923 for pulmonary sarcoidosis. The Company expects to initiate a registrational trial in pulmonary sarcoidosis in 2022.

A press release announcing the results and a corporate presentation regarding the results are attached hereto as Exhibits 99.1 and 99.2, respectively.

(d) Exhibits	
Exhibit No.	Description
99.1	Press Release of aTyr Pharma, Inc. dated September 13, 2021
99.2	aTyr Pharma, Inc. Corporate Presentation dated September 13, 2021
104	Cover Page Interactive Data File (embedded within the Inline XBRL document)
	3

Item 9.01

Financial Statements and Exhibits.

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: September 13, 2021



IMMEDIATE RELEASE Contact:

Ashlee Dunston
Director, Investor Relations and Corporate Communications
adunston@atyrpharma.com

aTyr Pharma Announces Positive Data from Phase 1b/2a Clinical Trial Demonstrating Consistent Dose Response for ATYR1923 in Pulmonary Sarcoidosis

Trial met primary endpoint, ATYR1923 was safe and well-tolerated.

Efficacy observed in key endpoints including steroid reduction of 58% in the 5.0 mg/kg treatment group with 33% of patients in the group able to taper completely off of steroids.

Clinically meaningful improvements in forced vital capacity (FVC) of 3.3% and all sarcoidosis symptom measures, including shortness of breath, cough, and fatigue, observed in the 5.0 mg/kg treatment group.

Management to host conference call and webcast today, September 13th at 8:30am ET/5:30am PT

SAN DIEGO – September 13, 2021 – aTyr Pharma, Inc. (Nasdaq: LIFE), a clinical stage biotherapeutics company engaged in the discovery and development of innovative medicines based on novel biological pathways, today announced positive results from its Phase 1b/2a double-blind, placebo-controlled clinical trial of its lead therapeutic candidate, ATYR1923, in 37 patients with pulmonary sarcoidosis, a major form of interstitial lung disease (ILD). ATYR1923 was safe and well-tolerated at all doses with no drug-related serious adverse events or signal of immunogenicity. Additionally, the study demonstrated consistent dose response for ATYR1923 on key efficacy endpoints and improvements compared to placebo, including measures of steroid reduction, lung function, sarcoidosis symptom measures and inflammatory biomarkers.

"We are delighted by the results of this study, which provide the first clinical proof-of-concept for ATYR1923, as well as validation for our tRNA synthetase biology platform and Neuropilin-2 as a target. The consistency in dose response and clinically meaningful benefit observed, along with ATYR1923's favorable safety and tolerability profile, give us great confidence that ATYR1923 could be a transformative, disease modifying therapy for pulmonary sarcoidosis patients," said Sanjay S. Shukla, M.D., M.S., President and Chief Executive Officer of aTyr. "Based on the results of this study, we plan to meet with the U.S. Food and Drug Administration to present these data and our plans for subsequent clinical development and path to registration for ATYR1923 for pulmonary sarcoidosis, and we expect to initiate a registrational trial next year."

"I am very impressed by this study, which is one of the best that I have seen conducted in sarcoidosis, a patient population that is highly underserved by current treatment options," said Robert Baughman, M.D., Professor of Medicine and Pulmonologist at the University of Cincinnati Medical Center. "The dose response and consistent response seen across multiple efficacy measures, without added toxicity, in this patient population with advanced disease is notable. Importantly,

ATYR1923 demonstrated an improvement in several indicators of quality of life, a high priority for patients, by a much larger margin than I would expect in a trial of this size and duration."

"The dose response and consistent results across almost every endpoint are remarkable findings, and as good as could be expected in this small study. The ability to taper patients off steroids while controlling disease symptoms in the ATYR1923 treatment groups is particularly compelling and supports advancement of ATYR1923 into the next phase of development," said Daniel Culver, D.O., Chair of the Department of Pulmonary Medicine and Director of Diffuse Parenchymal Lung Disease at The Cleveland Clinic.

Key Safety and Clinical Efficacy Findings for ATYR1923

- Safe and well-tolerated at all doses
 - No dose-relationship with most common adverse events associated with underlying disease
 - o No drug-related serious adverse events
 - o No signal of immunogenicity
- Dose response and consistent positive findings across key efficacy endpoints
 - Steroid reduction of 58% overall from baseline and 22% relative reduction compared to placebo in steroid usage post taper in the 5.0 mg/kg treatment group
 - o Complete steroid taper to 0 mg achieved and maintained for 33% of patients in the 5.0 mg/kg treatment group compared to no patients in any other group
 - O Absolute improvement in forced vital capacity (FVC) as a measure of lung function at week 24 of 3.3% in the 5.0 mg/kg treatment group compared to placebo, with an improvement in FVC of > 2.5% considered clinically meaningful
 - Clinically meaningful improvement over placebo observed for dyspnea (shortness of breath), cough, fatigue and the King's Sarcoidosis Scores for Lung and General Health in 5.0 mg/kg treatment group
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 - o FDG-PET-CT was not evaluable due to incomplete data primarily caused by operational issues related to the COVID-19 pandemic

Phase 1b/2a Clinical Trial in Patients with Pulmonary Sarcoidosis

The Phase 1b/2a study was a randomized, double-blind, placebo-controlled, multiple-ascending dose clinical trial in 37 patients with pulmonary sarcoidosis. The trial consisted of three cohorts testing doses of 1.0 mg/kg, 3.0 mg/kg and 5.0 mg/kg of ATYR1923 or placebo, dosed intravenously every month for six months. The primary objective of the study was to evaluate the safety, tolerability, immunogenicity and pharmacokinetic profile of multiple doses of ATYR1923 compared to placebo. Secondary objectives included the potential steroid-sparing effects of ATYR1923, in addition to other exploratory assessments of efficacy, such as lung function.

Conference Call and Webcast

aTyr Pharma will host a conference call and webcast to discuss the results today, September 13th at 8:30am ET/5:30am PT. Interested parties may access the call by dialing toll-free 844-358-9116 from the US, or 209-905-5951 internationally and using conference ID 1957829. Links to a live webcast and replay may be accessed on the aTyr website events page at: http://investors.atyrpharma.com/events-and-webcasts. A replay will be available for at least 90 days following the event

About Pulmonary Sarcoidosis and Other ILD

Pulmonary sarcoidosis is an inflammatory disease characterized by the formulation of granulomas, clumps of inflammatory cells, in one or more organs of the body. Approximately 200,000 Americans live with pulmonary sarcoidosis and the prognosis ranges from benign and self-limiting to chronic, debilitating disease, permanent loss of lung function and death. Current treatment options include corticosteroids and other immunosuppressive therapies, which have limited efficacy and are associated with serious side-effects that many patients cannot tolerate long-term.

Pulmonary sarcoidosis is a major form of ILD, which is an umbrella term used for a large group of diseases that cause scarring (fibrosis) of the lung. The scarring causes stiffness in the lungs which makes it difficult to breathe and get oxygen to the bloodstream. Lung damage from ILD is often irreversible and gets worse over time. Other major forms of ILD include connective-tissue disease related ILD (e.g., scleroderma-related ILD), chronic hypersensitivity pneumonitis and idiopathic pulmonary fibrosis (IPF).

About ATYR1923

aTyr is developing ATYR1923 as a potential therapeutic for patients with severe inflammatory lung diseases. ATYR1923, a fusion protein comprised of the immuno-modulatory domain of histidyl-tRNA synthetase fused to the FC region of a human antibody, is a selective modulator of neuropilin-2 that downregulates innate and adaptive immune response in inflammatory disease states. aTyr's lead indication for ATYR1923 is pulmonary sarcoidosis, a major form of interstitial lung disease. Clinical proof-of-concept for ATYR1923 was recently established in a Phase 1b/2a multiple-ascending dose, placebo-controlled study of ATYR1923 in patients with pulmonary sarcoidosis, which demonstrated safety and a consistent dose response and trends of benefit of ATYR1923 compared to placebo on key efficacy endpoints, including steroid reduction, lung function, clinical symptoms and inflammatory biomarkers.

About aTyr

aTyr is a biotherapeutics company engaged in the discovery and development of innovative medicines based on novel biological pathways. aTyr's research and development efforts are concentrated on a newly discovered area of biology, the extracellular functionality and signaling pathways of tRNA synthetases. aTyr has built a global intellectual property estate directed to a potential pipeline of protein compositions derived from 20 tRNA synthetase genes and their extracellular targets. aTyr's primary focus is ATYR1923, a clinical-stage product candidate which binds to the neuropilin-2 receptor and is designed to down-regulate immune engagement in inflammatory lung diseases. For more information, please visit http://www.atyrpharma.com.

Forward-Looking Statements

This press release contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Forward-looking statements are usually identified by the use of words such as "anticipates," "believes," "estimates," "expects," "intends," "may," "plans," "projects," "seeks," "should," "will," and variations of such words or similar expressions. We intend these forward-looking statements to be covered by such safe harbor provisions for forward-looking statements and are making this statement for purposes of complying with those safe harbor provisions. These forward-looking statements include statements regarding potential therapeutic benefits and applications of ATYR1923; timelines and plans with respect to certain development activities (such as the timing of additional clinical trials and planned interactions with regulatory authorities); and certain development goals. These forward-looking statements also reflect our current views about our plans, intentions, expectations, strategies and prospects, which are based on the information currently available to us and on assumptions we have made. Although we believe that our plans, intentions, expectations, strategies and prospects, as reflected in or suggested by these forward-looking statements, are reasonable, we can give no assurance that the plans, intentions, expectations or strategies will be attained or achieved. All forward-looking statements are based on estimates and assumptions by our management that, although we believe to be reasonable, are inherently uncertain. Furthermore, actual results may differ materially from those described in these forward-looking statements and will be affected by a variety of risks and factors that are beyond our control including, without limitation, uncertainty regarding the COVID-19 pandemic, risks associated with the discovery, development and regulation of our product candidates, the risk that we or our partners may cease or delay preclinical or clinical development activities for any of



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 ATYR2810, and development programs, including our NRP2 antibody program and our tRNA synthetase program; the ability to successfully advance our product candidates and undertake certain development activities (such as the initiation of clinical trials enrollment, the conduct of clinical trials and announcement of clinical results) and accomplish certain development goals, and the timing of such events; the potential market opportunity for our product candidates; 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 presentati

We own various U.S. federal trademark applications and unregistered trademarks, including our company name. All other trademarks or trade names referred to in this presentation are the property of their respective owners. Solely for convenience, the trademarks and trade names in this presentation are referred to without the symbols [®] and [™], but such references should not be construed as any indicator that their respective owners will not assert, to the fullest extent under applicable law, their rights thereto.

aTyr

Phase 1b/2a Data Supports ATYR1923 Proof-of-Concept and Clinical Advancement

- The trial met its primary endpoint: ATYR1923 was safe and well-tolerated
- 58% overall steroid reduction from baseline and 22% relative reduction in steroid utilization post taper in the
 5.0 mg/kg treatment group
- 33% of patients able to taper completely off steroids in the 5.0 mg/kg treatment group
- 3.3% absolute improvement in lung function as measured by FVC % predicted at week 24 in the 5.0 mg/kg treatment group
- Dose-dependent clinically meaningful improvement in all sarcoidosis symptom measures in the 5.0 mg/kg treatment group
- Dose-dependent improvement on inflammatory biomarkers including IL-6, MCP-1, IFN- γ , IP-10 and TNF α as well as sarcoidosis markers ACE, IL-2Ra and SAA with tightest control in the 5.0 mg/kg treatment group

Platform and Target Validation

First tRNA synthetase derived and NRP2 targeting compound to demonstrate clinical POC

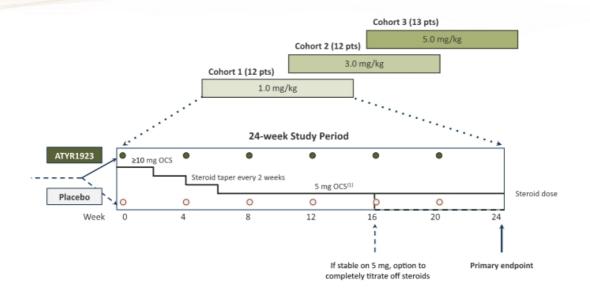
All improvements and relative reductions are compared to placebo



Trial Design

Design	 Randomized (2:1), double-blind, placebo-controlled, multiple ascending dose 24 week study: 6 monthly IV doses of ATYR1923 being tested at 1.0, 3.0, and 5.0 mg/kg Forced steroid taper to 5.0 mg by week 8; amendment to allow taper to 0 mg at week 16 in responders
Population	 37 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: Lung function (FVC and other PFTs); sarcoidosis symptom scores and quality of life scales; inflammatory and sarcoidosis biomarkers; FDG-PET/CT imaging





aTyr

Baseline Demographics and Disease Characteristics Generally Balanced

Demographics	Placebo N=12	1 mg/kg N=8	3 mg/kg N=8	5 mg/kg N=9
Age (Years); mean (SD), >=65	52.5 (10.2), 0	54.5 (11.3), 1	51.8 (11.4), 2	50.8 (9.2), 0
Sex (Male); n (%)	5 (42)	4 (50)	4 (50)	4 (44)
Race; White / African American	9/3	5/3	6/2	3/6
Disease characteristics Mean (SD)				
FVC (% predicted)	77.3 (11.5)	68.3 (9.7)	83.8 (7.3)	83.8 (16.6)
Duration of disease (Years)	4.2 (3.3)	7.4 (6.1)	5.9 (5.1)	7.7 (9.9)
Baseline Dyspnea Index Score	4.8 (2.0)	4.3 (1.8)	7.6 (3.0)	6.3 (2.5)
Background Therapy				
Steroid dose (mg/day), mean	13.3	11.3	14.4	13.9
Immunomodulator; n (%)	6 (50)	3 (38)	1 (13)	4 (44)





Monthly Dosing of ATYR1923 was Safe and Well-Tolerated

n (%)	Placebo N=12	1 mg/kg N=8	3 mg/kg N=8	5 mg/kg N=9
AEs	10 (83)	8 (100)	7 (88)	8 (89)
Drug-related AEs	4 (33)	3 (38)	1 (13)	3 (33)
Severe AEs (Grade 3 or 4)	4 (33)	2 (25)	0	2 (22)
SAEs	1 (8)	1 (13)	0	0

- · No new or unexpected findings with repeat dosing
- · No dose-response relationship observed
- · Most frequent AEs were consistent with underlying disease: Cough, fatigue, wheezing
- · No signal of immunogenicity
- No drug related SAEs
- No deaths

Safety population, Table 14.3.1.1



Dose-dependent Reduction in Steroid Utilization Compared with Placebo

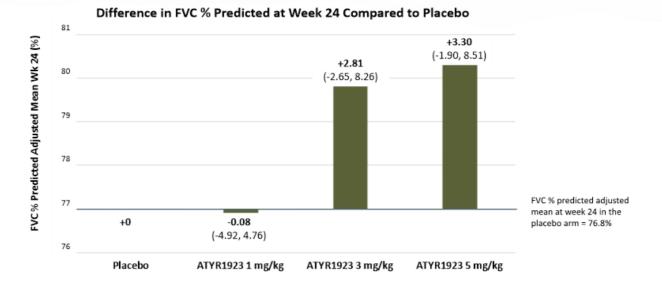
Post-taper Period	Placebo N=12	ATYR1923 1 mg/kg N=8	ATYR1923 3 mg/kg N=8	ATYR1923 5 mg/kg N=9
Average daily dose (mg), adjusted mean	7.17	6.83	6.54	5.62
- relative reduction vs placebo (%)	-	-5%	-9%	-22%
Change from baseline (%), mean	-46	-41	-49	-58
- difference in adjusted means (%), mean (95% CI)	-	1.2 (-20, 22)	-2.3 (-23, 19)	-12.3 (-33, 8)
Tapered to 0 mg and maintained taper, n (%)	0	0	0	3 (33)

- 58% overall steroid reduction from baseline and 22% relative reduction compared to placebo in steroid utilization post taper in the 5.0 mg/kg treatment group
- 33% of patients able to taper off of steroids completely in 5.0 mg/kg treatment group while controlling disease symptoms

8 Table 14.2.1.1.3.1; D51-EOS; adjusted mean refers to least squares mean from ANCOVA adjusting for baseline steroid use



Dose-dependent Improvement in FVC % Predicted Compared with Placebo





Dose-dependent Clinically Meaningful Symptom Improvements Compared with Placebo

Differences in Adjusted Means vs Pbo at Week 24	ATYR1923 1 mg/kg N=8	ATYR1923 3 mg/kg N=8	ATYR1923 5 mg/kg N=9
• Dyspnea	-0.76	3.33	4.49
• Cough	-3.49*	2.98*	2.05
• Fatigue	0.76	-4.78	-7.77*
 King's Sarcoidosis Score: Lung 	-6.41	11.29	16.17*
King's Sarcoidosis Score: General Health	-5.1	2.13	18.33*

= clinically meaningful improvement based on published MCID



^{*}p<0.05 on difference between adjusted means from MMRM; Pbo = Placebo
MCIDs: TDI - Witek 2003; LCQ - Raj 2009; FAS - de Kleijin 2011 (Negative score is better for Fatigue); KSQ Lung - Baughman 2021; KSQ Lung - Baughman 2021
TDI: Table 14.2.20.1.1; LCQ: Table 14.2.22.1.1, FAS: Table 14.2.23.1.1, Gen Health: Table 14.2.21.1.1, Lung: Table 14.2.21.1.1

Phase 1b/2a Data Supports ATYR1923 Proof-of-Concept and Clinical Advancement

- ATYR1923 was safe and well-tolerated
- Strong suggestion of efficacy: Dose-response and consistent positive trends across key efficacy endpoints and multiple analysis populations
- · Clinically meaningful symptom improvements in dyspnea, cough, fatigue and King's Sarcoidosis scores
- · Dose dependent control of inflammatory biomarkers confirms anti-inflammatory effect

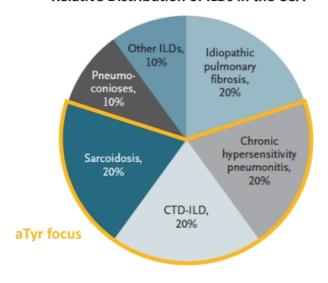
Planned next steps:

- End of Phase 2 meeting with FDA
 - · Publish data
- Advance into registrational trial in pulmonary sarcoidosis

aTyr

ILD Market Opportunity

Relative Distribution of ILDs in the USA(1)



- (2) All ILDs individually have potential for orphan status
 aTyr estimates for ATYR1923 in Pulmonary Sarcoidosis, CHP, CTD-ILD; excludes IPF

- >200 types of ILD: 4 major types comprise 80% of patients
- · IPF is the archetypal fibrotic lung disease, but fibrosis occurs in all types - immune pathology is common to all
- Poor outcomes with limited therapeutic options - immunomodulatory therapy remains SOC outside of IPF
- · aTyr focused on 3 main immune-driven types: >500k US patients⁽²⁾; ~3m globally
- \$2-3b global market opportunity⁽³⁾



