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

SCHEDULE 14A INFORMATION

Proxy Statement Pursuant to Section 14(a) of the Securities Exchange Act of 1934
(Amendment No.)

Filed by the Registrant ☒ Filed by a Party other than the Registrant o

Check the appropriate box:

o Preliminary Proxy Statement

o Confidential, for Use of the Commission Only (as permitted by Rule 14a-6(e)(2))

o Definitive Proxy Statement

☒ Definitive Additional Materials

o Soliciting Material under §240.14a-12

ATYR PHARMA, INC.

(Name of Registrant as Specified In Its Charter)

(Name of Person(s) Filing Proxy Statement, if other than the Registrant)

Payment of Filing Fee (Check the appropriate box):

☒ No fee required.

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(1) Amount Previously Paid:

(2) Form, Schedule or Registration Statement No.:

(3) Filing Party:

(4) Date Filed:

April 2016

To our stockholders,

It is a privilege to address you in our first annual letter as a public company, and to thank you for your support to date.

At aTyr Pharma, our mission is to relentlessly pursue transformational science in order to make meaningful medicines with the potential to provide positive outcomes for patients in need of treatment options.

I am very pleased to update you on our significant progress in these efforts during 2015 – including the initiation of three additional Phase 1b/2 trials for Resolaris™, our first development candidate, in rare myopathies; advancement of our manufacturing program; the selection of our second IND candidate, iMod.Fc, for the treatment of rare lung diseases; and two successful rounds of equity financing, including our initial public offering. In addition, we recently achieved a major milestone in 2016 by announcing results from our initial Phase 1b/2 clinical trial of Resolaris in adult patients with FSHD, or facioscapulohumeral muscular dystrophy, the first clinical trial of a Physiocrine-based investigational new drug in patients. This is a landmark achievement for potentially a new class of therapeutics.

We have made strides toward bringing these first Physiocrine-based therapies to patients and realizing the potential of this groundbreaking science; and we believe that 2016 will be an essential part of that journey.

Physiocrine Platform – Source of New Hope

Our potentially life-changing therapies are based on Physiocrine biology, a set of novel and previously untapped biological mechanisms that we believe help modulate numerous physiological processes. The extensive research of our scientific founders and aTyr identified this naturally-occurring class of proteins that promote homeostasis within the human body – a fundamental process of restoring stressed or diseased tissue to a healthier state.

The range of applications and potential disease associations for these Physiocrines is broad, and we have focused our initial development strategy on those Physiocrines that act as endogenous modulators of the immune or fibrotic systems.

Resolaris Program – For Rare Muscle Diseases

Resolaris is an intravenous, potentially first-in-class protein therapeutic, and our first clinical product candidate to come from the Physiocrine platform. Through our development work to date, we believe that it has the potential to play an important role in promoting skeletal muscle health and may provide a therapeutic benefit to patients suffering from rare myopathies with an immune component (RMICs), characterized by excessive immune cell involvement. We were pleased to present some of this data in October 2015 at the International World Muscle Congress.

Following a successful Phase 1 study in healthy volunteers in 2014, we launched a clinical program evaluating Resolaris in RMICs – specifically FSHD. During 2015, we completed dosing in three cohorts of our initial Phase 1b/2 trial in adult patients with FSHD and initiated three additional trials, including a long term safety extension study in adult FSHD, a study in adult patients with FSHD or limb girdle muscular dystrophy (LGMD) 2B, a second rare genetic myopathy, and a study in patients with early onset FSHD. This past year, we were also pleased to announce that Resolaris received orphan drug designation from the FDA and EMA for the treatment of FSHD – underscoring the severe unmet need in these patient populations.

In March 2016, we announced results from three cohorts in our Phase 1b/2 clinical trial of Resolaris in adult patients with FSHD. We believe the safety, tolerability, immunogenicity and activity profile of Resolaris as demonstrated in this study warrants advancing our program in adult FSHD patients and potentially other rare diseases. We intend to expand our experience with Resolaris through additional enrollment of adult FSHD patients in a new or existing clinical trial to build on the data from these first three cohorts and to integrate the data from our other ongoing trials in the fourth quarter of this year.

This integrated data set will allow us to make strategic development decisions. We are excited to update you on these other studies later this year, and look forward to detailing our later-stage plans for these RMIC indications once we have the full range of data in hand.

Expanding Our Pipeline

To complement our first candidate, Resolaris, we are focused on building a fully-integrated biopharmaceutical company that invests in the potential of our new class of proteins. We have discovered more than 300 Physiocrines that have potential applications across a wide variety of conditions, and we strongly believe that we are just beginning to realize the potential of this new class of therapeutics.

Toward that end, in November 2015, we announced the selection of our second IND candidate from the Physiocrine platform based on an immuno-modulatory and fibro-modulating domain fused to an Fc region of a human antibody, iMod.Fc. The selected iMod.Fc molecule is intended to treat patients with severe pulmonary diseases with an immune and fibrotic component, and has shown promising results in an established preclinical rodent model of lung inflammation and pulmonary fibrosis, including in comparison to approved drugs in those indications.

We have since started our manufacturing preparation along with preclinical IND-enabling studies, and based on results to date, we anticipate initiating a clinical program for this candidate in rare pulmonary diseases with an immune component (RPICs) in 2017.

Building for the Future

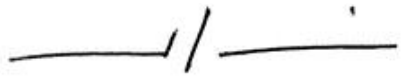
In May 2015, we successfully completed our initial public offering, the net proceeds of which totaled $75.9 million for the Company. The initial public offering followed a strong Series E financing in March 2015 that included a number of leading life sciences investors.

These successful raises have put us in a strong financial position, and we ended 2015 with cash and investments of approximately $125.3 million. This has allowed us to execute on our development plan, invest in our broader pipeline, and make key hires to our core leadership team as our clinical operations continue to expand. In the past year, we have strengthened our leadership team by adding John Blake as Vice President, Finance, Ashraf Amanullah as Vice President, Manufacturing, Sanuj Ravindran as Chief Business Officer and Sanjay Shukla as Chief Medical Officer.

While 2015 was a very productive year, I hope you can see why we are excited about the future as we work to bring Resolaris and other Physiocrine-based therapeutics to patients in desperate need of treatment options.

Alongside the patients, we would also like to extend our sincere gratitude to our employees, clinicians, board members and stockholders. We look forward to updating you later on this year.

Sincerely,



John D. Mendlein, Ph.D.
Chief Executive Officer