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

FORM 6-K

Report of Foreign Private Issuer
Pursuant to Rule 13a-16 or 15d-16
under the Securities Exchange Act of 1934

For the month of **April 2022**

Commission File Number: 001-40106

4D pharma plc

(Translation of Registrant's name into English)

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(Address of principal executive offices)

Indicate by check mark whether the registrant files or will file annual reports under cover of Form 20-F or Form 40-F. Form 20-F ☒ Form 40-F ☐

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(1): ____

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(7): ____

4D pharma Reports Full Year 2021 Financial Results, Operational Highlights, and Guidance for Key Milestones in 2022

On April 1, 2022, 4D pharma plc (the "Company") issued a press release to announce that the Annual Report for the year ended December 31, 2021 (the "Annual Report") has been reported and that its key corporate objectives for 2022 have been highlighted.

A copy of the press release is attached as Exhibit 99.1 to this current report on Form 6-K and is incorporated by reference herein. The information in Exhibit 99.1 relates to the Company's IFRS results, US GAAP details can be found in the Company's form 20-F filed with the SEC.

SIGNATURES

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, thereunto duly authorized.

4D pharma plc

Date: April 4, 2022

/s/ Duncan Peyton

Duncan Peyton
Chief Executive Officer

INDEX TO EXHIBITS

Exhibit Number	Exhibit Title
99.1	Press Release, dated April 1, 2022.

Exhibit 99.1

4D pharma Reports Full Year 2021 Financial Results, Operational Highlights, and Guidance for Key Milestones in 2022

Leeds, UK, April 1, 2022 – 4D pharma plc (AIM: DDDD, NASDAQ: LBPS), a pharmaceutical company leading the development of Live Biotherapeutic products (LBPs), a novel class of drug derived from the microbiome, today reported financial results for the full year ending December 31, 2021 and highlighted its key corporate objectives for 2022.

"2021 was a productive year for 4D pharma. We reported promising signals in the clinic from our lead candidates in immuno-oncology and inflammatory disease, and entered into our second clinical collaboration in oncology, further validating the potential for single strain Live Biotherapeutics to treat systemic disease and the MicroRx platform. Additionally, we completed the merger with Longevity Acquisition Corporation which led to 4D pharma being listed on the NASDAQ exchange, providing us access and visibility across the US capital markets," said Duncan Peyton, Chief Executive Officer of 4D pharma. "Already in 2022 we have continued this progress, and look forward to updating shareholders as we execute on our corporate objectives throughout the year."

Full Year 2021 Financial Highlights

- Cash and cash equivalents of £15.5 million as of 31 December 2021 (2020: £8.8 million)
- Net assets of £23.2 million as of 31 December 2021 (2020: £28.0 million)
- Loss and total comprehensive income for the full year 2021 was £54.7 million (2020: £25.9 Million)
- Research and Development Expenses was £19.8 million (2020: 22.0 million); General and Administrative Expense was £7.3 million (2020: £6.0 million)
- Listed on the NASDAQ Global Market under ticker symbol 'LBPS' after completing the merger with Longevity Acquisition Corporation, a special purpose acquisition company (SPAC) on 22 March 2021
- Along with the Longevity Acquisition Corporation merger we completed a concurrent private placement, raising total gross proceeds of approximately $39.8 million.
- Entered into a senior secured credit facility for up to $30 million with Oxford Finance LLC, including the initial drawdown of the first tranche for $12.5 million, with the remaining $7.5 million and $10 million tranches dependent on the achievement of certain milestones.

Full Year 2021 Operational Highlights

- Provided an update on the ongoing clinical trial portfolio for lead oncology candidate MRx0518. This included the first announcement of signals of anti-tumor activity for the combination of MRx0518 with Keytruda® in bladder cancer, adding to the previously reported activity in renal cell carcinoma and non-small cell lung cancer.

- Announced a clinical trial collaboration and supply agreement with Merck KGaA, Darmstadt, Germany, and Pfizer Inc., under which 4D pharma will conduct a clinical trial to evaluate MRx0518 in combination with Bavencio® (avelumab), an anti-PD-L1 immune checkpoint inhibitor, as a first-line maintenance therapy for patients with locally advanced or metastatic urothelial carcinoma that has not progressed with first-line platinum-containing chemotherapy. This study is expected to commence in 2022.

- Presented additional clinical mechanistic data for MRx0518 at the European Society for Medical Oncology (ESMO) Congress, as both a monotherapy and in combination with Keytruda® (pembrolizumab). The results identified baseline biomarkers associated with clinical benefit in patients with solid tumors resistant to immune checkpoint inhibitors (ICIs) treated with MRx0518 in combination with pembrolizumab; and gene and metagene signature changes in solid tumors following treatment with MRx0518 monotherapy.

- Presented further analyses of the completed Phase II clinical trial of Blautix® in patients with irritable bowel syndrome with constipation (IBS-C) or with diarrhea (IBS-D) at Digestive Disease Week (DDW) 2021. The post-hoc analyses revealed strong and statistically significant activity on the key symptom of bowel habit, a potential FDA-approvable primary endpoint. In addition, analysis of the data by geographical region shows that earlier topline results were impacted by an unusually high placebo response in patients in the UK and Ireland, and enhanced positive signals were seen in the larger US population.

- Subsequently, the company presented additional mechanistic clinical data for Blautix® at Gastro 2021. The results show treatment with Blautix® led to structural changes in the gut microbiota and greater increases in interconnectivity between taxa than placebo, in patients with both IBS-C and/or IBS-D.

- Reported topline results from Part A of our Phase I/II randomized, double-blind, placebo-controlled clinical trial of MRx-4DP0004 as a treatment for asthma. Part A met the primary endpoint showing MRx-4DP0004 was safe and well tolerated. In addition, MRx-4DP0004 generated promising signals of clinical activity which support progression into Part B of the study.

- Published preclinical research relating to second-generation immuno-oncology LBP MRx1299 improving the activity of CAR-T in animal models of cancer, in collaboration with Philipps-University Marburg, Germany, and Universitätsklinikum Würzburg, Germany.

- Announced the appointments of Paul Maier as Non-Executive Director and John Beck as Chief Financial Officer (CFO). Later in the year the Company was saddened to announce the passing of John Beck.

Subsequent Events Since the 2021 Period End

- On 3 January 2022 announced the appointment of John Doyle as Chief Financial Officer (CFO)
- On 22 February 2022 the Company announced that the U.S. Food and Drug Administration (FDA) has cleared investigational new drug (IND) applications for MRx0005 and MRx0029 for the treatment of Parkinson's disease. The Company expects to initiate a first-in-human Phase I clinical trial in people with Parkinson's disease in mid-2022.
- On 23 March 2022 the company announced that in Part B of the ongoing Phase I/II study of MRx0518 and Keytruda® in patients with solid tumors that have progressed on a prior immune checkpoint inhibitor (ICI), the renal cell carcinoma (RCC) group met its primary efficacy endpoint ahead of enrolment completion.

Anticipated Development Milestones and Key Objectives for 2022

- First patient dosing in our Phase II study of MRx0518 & Bavencio® as a first-line maintenance therapy for urothelial carcinoma expected in Q2 2022
- Complete enrollment of Phase I study of MRx0518 in pancreatic cancer expected to be Q2 2022
- Presentation of data from the Phase I/II Part A Study in Asthma at The American Thoracic Society conference in May 2022
- Part B of ongoing Phase I/II trial of MRx-4DP0004 in asthma, expected to commence in 2H 2022
- Phase I trial of MRx0005 and MRx0029 in people with Parkinson's disease expected to commence in 2H 2022
- Provide update and guidance on Phase II study of Blautix® in patients with irritable bowel syndrome (IBS)
- Provide update on next steps in Phase I/II study of MRx0518 and Keytruda® in the Renal Cell Carcinoma (RCC) group

About 4D pharma

4D pharma is a world leader in the development of Live Biotherapeutics, a novel and emerging class of drugs, defined by the FDA as biological products that contain a live organism, such as a bacterium, that is applicable to the prevention, treatment or cure of a disease. 4D pharma has developed a proprietary platform, MicroRx®, that rationally identifies Live Biotherapeutics based on a deep understanding of function and mechanism.

4D pharma's Live Biotherapeutic products (LBPs) are orally delivered single strains of bacteria that are naturally found in the healthy human gut. The Company has five clinical programs, namely a Phase I/II study of MRx0518 in combination with KEYTRUDA® (pembrolizumab) in solid tumors, a Phase I study of MRx0518 in a neoadjuvant setting for patients with solid tumors, a Phase I study of MRx0518 in patients with pancreatic cancer, a Phase I/II study of MRx-4DP0004 in asthma, and Blautix® in irritable bowel syndrome (IBS) which has completed a successful Phase II trial. A Phase I study of MRx0005 and MRx0029 in patients with Parkinson's disease is expected to commence in 2022. Additional preclinical-stage programs include candidates for CNS disease, immune-inflammatory conditions and cancer. The Company has a research collaboration with MSD (Merck & Co., Inc., Kenilworth, NJ, USA), to discover and develop Live Biotherapeutics for vaccines.

For more information, refer to https://www.4dpharmaplc.com.

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Forward-Looking Statements

This announcement contains "forward-looking statements." All statements other than statements of historical fact contained in this announcement, including without limitation statements regarding the Company's anticipated development milestones and key objectives for 2022, the anticipated timing of a first-in-human Phase I clinical trial in people with Parkinson's disease and the anticipated timing of a clinical trial to evaluate, are forward-looking statements within the meaning of Section 27A of the United States Securities Act of 1933, as amended (the "Securities Act"), and Section 21E of the United States Securities Exchange Act of 1934, as amended (the "Exchange Act"). Forward-looking statements are often identified by the words "believe," "expect," "anticipate," "plan," "intend," "foresee," "should," "would," "could," "may," "estimate," "outlook" and similar expressions, including the negative thereof. The absence of these words, however, does not mean that the statements are not forward-looking. These forward-looking statements are based on the Company's current expectations, beliefs and assumptions concerning future developments and business conditions and their potential effect on the Company. While management believes that these forward-looking statements are reasonable as and when made, there can be no assurance that future developments affecting the Company will be those that it anticipates.

All of the Company's forward-looking statements involve known and unknown risks and uncertainties, some of which are significant or beyond its control, and assumptions that could cause actual results to differ materially from the Company's present expectations or projections. The foregoing factors and the other risks that could cause actual results to differ materially include the risk that the Company changes its expected strategy and plans, risk related to safety of investigational therapeutics, clinical development risk, and those additional risks and uncertainties described in the documents filed by the Company with the US Securities and Exchange Commission ("SEC"). The Company wishes to caution you not to place undue reliance on any forward-looking statements, which speak only as of the date hereof. The Company undertakes no obligation to publicly update or revise any of its forward-looking statements after the date they are made, whether as a result of new information, future events or otherwise, except to the extent required by law.

Chairperson and CEO's statement

4D pharma is committed to unlocking the power of the microbiome to develop safe and innovative therapies for serious diseases. With our MicroRx® platform we have been able to do just that, discovering and developing Live Biotherapeutic Products (LBPs) demonstrating systemic functionality, for example by influencing the immune system and modulating the gut-brain axis.

It is well known that a significant proportion of drug candidates fail in the clinic due to safety concerns. One of the core attractions of LBPs as a novel class of drug was the expectation that they would have attractive safety profiles, significantly reducing this major development risk. We have now dosed over 300 patients representing diverse disease areas, and to date all our clinical-stage LBPs have shown placebo-like safety and tolerability. This is a paradigm shift for drug development.

In 2021 we expanded this evidence base, announcing the first safety data for MRx-4DP0004 in asthma patients. Importantly, we continued to demonstrate LBPs can work alongside existing cornerstone medications without creating additional safety and toxicity issues, which resonates with clinicians and patients alike. Moreover, such a profile may position our therapeutics to be prescribed earlier in the treatment pathway and provides opportunities to potentially treat disease earlier.

Drugs not only need to be safe, but also effective. In the past year we generated more clinical data supporting our function-based approach to developing single strains of bacteria as pharmaceutical therapeutics. Building on our ground-breaking data in oncology, demonstrating that a single strain LBP can modulate the immune system to treat cancer, we provided the first clinical data in asthma for MRx-4DP0004. Not only was this an important milestone for 4D pharma, but also represents the first clinical data indicating the efficacy of a Live Biotherapeutic in this setting.

Outside the clinic, March 2021 featured another significant milestone for 4D pharma as we obtained our US listing on Nasdaq under the ticker 'LBPS'. This was a major achievement of a long-term goal for the Company. However, no one predicted that the capital market was on the precipice of an unprecedented rout of life sciences stocks. During 2020 and the early part of 2021, capital was flowing into biotech at an unprecedented rate, driven in part by the pandemic. However, from February 2021 the biotech capital markets entered a period of dramatic decline. By the end of the 2021, whilst the main market had gained (for example the S&P 500 Index was up by around 23%), the biotech market, as measured by reference to the S&P Biotechnology Select Industry Index (XBI), was down over 30%. In the early months of 2022, this trend in life sciences stocks has continued.

Within this general decline across the biotech sector, small cap and emerging areas were hit particularly hard. Microbiome companies encountered challenges, and as a maturing field, readthrough was applied to other public companies under the microbiome umbrella.

However, as 4D pharma and others in the field have continued to educate stakeholders, there is a growing appreciation of the differences of approach and an understanding that not all companies working on microbiome therapeutics are the same, as has been common for other new modalities or therapeutic approaches. Our rapidly evolving field is pursuing a multitude of approaches, from faecal material transplant (FMT) and bacterial consortia of varying complexities, to single strain LBPs, engineered strains, microbial metabolites and compounds targeting bacteria or their products. As the field matures and generates more clinical data, we may see that some approaches are particularly suited to different applications. For example, using FMT and complex consortia as an ecological agent to outcompete an infectious pathogen in the gut has proven to be effective in preventing recurrence of C. difficile infection. This is, though, a very different approach to identifying bacteria that exert systemic therapeutic impacts on human biology, for use in the treatment of systemic diseases such as cancer and asthma.

The latter is the approach taken by 4D pharma. Our hypothesis is that by understanding how bacteria impact host cells, we can use a single strain to modulate specific, disease-relevant pathways to develop safe and innovative therapies for serious systemic diseases. Irrespective of external factors and prevailing market conditions, throughout 2021 we generated more evidence supporting this hypothesis.

Oncology

Throughout 2021 and early 2022 we have continued our progress as a leader in the field of oncology microbiome therapeutics. New clinical biomarker data from multiple studies in different treatment settings has continued to develop our understanding of the mechanism of action of lead immuno-oncology Live Biotherapeutic MRx0518. This complements our preclinical data, an important validation not only of the translational value of the MRx0518 preclinical work, but of the MicroRx® platform more broadly, with positive implications across our pipeline. In conjunction with promising clinical outcomes in our combination study with Keytruda®, this data provides clinical proof of concept of our single strain LBP approach and the ability of gut-targeted single strains of bacteria to exert clinically meaningful effects on systemic diseases away from the gut.

Early in 2021 we reported on the continued progress of our two-part Phase I/II study of MRx0518 in combination with immune checkpoint inhibitor Keytruda® (pembrolizumab) in patients who had developed resistance to a prior checkpoint inhibitor, in collaboration with MSD (tradename of Merck & Co., Inc., Kenilworth, N.J., USA). Part A of the study was focused on demonstrating the safety and tolerability of MRx0518 in combination with a checkpoint inhibitor, but also gave us the first insight into the potential impact of Live Biotherapeutics in the fight against cancer.

Following the successful completion of Part A and progression into Part B in 2020, in early 2021 we reported target tumor reductions in Part B patients at the first scheduled restaging timepoint. Importantly, these included the first signals of anti-tumor activity for the combination in patients with bladder cancer, adding to the activity previously reported in patients in Part A with renal cell carcinoma (RCC) and non-small cell lung cancer (NSCLC). Additionally, three Part A patients that were previously reported to have experienced clinical benefit were continuing on study, with two of these patients continuing on treatment for over 18 months (as of February 2021) and exhibiting further target tumor reductions or durable disease control.

The results in the clinic also further strengthened the translational value of the preclinical data and the MicroRx® platform. At the European Society for Medical Oncology (ESMO) Congress, we presented biomarker data from two clinical studies, the combination study with Keytruda® and a study of MRx0518 as a neoadjuvant monotherapy in treatment of naïve patients with a variety of solid tumors.

Fundamentally, these results further demonstrate the ability of MicroRx® to identify single strains of bacteria that can impact systemic disease. For MRx0518, the data indicated its ability to safely engage the immune system, with a mechanism of action potentially able to overcome important mechanisms of resistance to checkpoint inhibitors, a major unmet need in cancer treatment. The biomarker data also raises the potential to identify patients most likely to respond to MRx0518 combination therapy. This data will inform the subsequent clinical development strategy for MRx0518, including taking this LBP into earlier lines of treatment.

Oncology (continued)

As part of this strategy, in February 2021, 4D pharma announced a new clinical collaboration with Merck KGaA, Darmstadt, Germany, and Pfizer Inc. to evaluate MRx0518 as a first-line maintenance treatment for patients with locally advanced or metastatic urothelial carcinoma in combination with Bavencio® (avelumab), the first and only checkpoint immunotherapy approved in this setting. Based on our clinical and biomarker data generated to date, supported by emerging evidence in the scientific literature, we believe MRx0518 has the potential to enhance the positive clinical outcomes achieved by Bavencio® for patients in this treatment setting. We have now commenced clinical trial initiation activities and at the time of writing are screening patients.

In addition to our progress in the clinic and our collaborations with MRx0518, we also believe our approach using MicroRx® to select single strains could have impacts in other oncology treatment settings. Expanding our oncology portfolio, in July 2021 we announced the publication of preclinical research in Nature Communications (Luu, *et al.,* 2021) relating to the ability of MRx1299 to enhance the anti-tumor efficacy of cancer cell therapies such as CAR-T in animal models.

Asthma

Having previously presented clinical data supporting the use of MicroRx® to identify LBPs to stimulate the immune system via the gut for the treatment of cancers, in 2021 we generated the first clinical data validating the use of MicroRx® to identify and select single strain LBPs which have an *anti-inflammatory* effect, with lead clinical program MRx-4DP0004 for the treatment of asthma. Preclinically, of particular interest was the ability of MRx-4DP0004 to reduce levels of both neutrophils and eosinophils in the lung. These cells represent the two major inflammatory pathways associated with asthma.

Asthma represents a serious global health burden affecting over 260 million people worldwide (WHO, 2021). It is a heterogeneous disease consisting of numerous clinical phenotypes, driven by different underlying biology and inflammatory processes. Current therapeutic options are not effective in all patients, and biologics approved for more severe patients mainly address inflammation associated with eosinophils. Thus, there remains a significant unmet need for new treatment options. The goal for asthma patients and the clinicians who treat them is better control and reduced reliance on rescue medications such as short acting beta agonists (SABA), and ultimately a better quality of life for patients.

In December 2021, we reported topline clinical results from Part A of our Phase I/II placebo-controlled trial of MRx-4DP0004 in patients with partly controlled asthma. MRx-4DP0004 was dosed alongside patients' regular medication of inhaled corticosteroid (ICS) with or without long-acting beta agonist (LABA).

As a first-in-human study, the primary goal of Part A was to demonstrate the safety and tolerability of MRx-4DP0004 as an add-on therapy, but we were also able to investigate a number of secondary endpoints evaluating its clinical activity in patients. The trial achieved the primary endpoint, showing MRx-4DP0004 to be safe and well tolerated, as has been the case for all 4D pharma's clinical-stage LBPs to date.

Further, the results also showed that, compared to placebo, those receiving MRx-4DP0004 had improved quality of life and greater control of their asthma, demonstrated by a reduction of SABA rescue inhaler use and a greater proportion of patients showing a reduction in ACQ-6 score (a clinically validated tool widely used to measure asthma control in trials and clinical practice) from baseline. The improvements in ACQ-6 are particularly encouraging, as although Part A was not intended to be powered for significance, the proportion of patients with improvements in ACQ-6 scores was statistically significant across all timepoints. This gives us confidence as we move into Part B, in which the primary endpoint will be the proportion of patients showing a reduction in the ACQ-6 score.

Following these topline results, in early 2022 we hosted a virtual event with Key Opinion Leader (KOL) and Chief Investigator of the MRx-4DP0004 Phase I/II study, Professor Chris Brightling, which highlighted the potentially broad utility of MRx-4DP0004 across the spectrum of asthma severity and different inflammatory phenotypes.

These highly encouraging clinical results for MRx-4DP0004 are not only a world first and important milestone for the microbiome therapeutics field in respiratory disease, but also provide clinical validation of the potential of the MicroRx® platform to identify and develop single strain LBPs with potent systemic activity on the human immune system.

Irritable Bowel Syndrome (IBS)

In late 2020, we announced topline results from our Phase II placebo-controlled signal finding study in IBS patients to evaluate the efficacy of Blautix®, uniquely in both IBS-C (constipation predominant) and IBS-D (diarrhea predominant).

In 2021, at Digestive Disease Week (DDW), we presented further analyses of the clinical data which revealed particularly strong activity on the key symptom of abnormal bowel habit (stool frequency in IBS-C or stool consistency in IBS-D). This is particularly pertinent because published FDA guidelines state that bowel habit can serve as an approvable primary endpoint in pivotal studies.

The additional analyses also revealed that the topline results were impacted by a high placebo response rate in patients in the UK and Ireland, with enhanced positive signals seen in the larger US patient population representing approximately two-thirds of the patients enrolled in the Phase II trial. The activity of Blautix® relative to placebo in this study was competitive with approved therapeutics for IBS-C and IBS-D, though Blautix® is the only potential therapeutic with activity in both subtypes, while demonstrating a highly favorable placebo-like safety profile.

Following the successful Phase II trial 4D pharma has engaged with regulators and potential partners regarding next steps for Blautix® towards a potential pivotal program in IBS, seeking to address a significant unmet need for a safe and innovative therapy across IBS subtypes.

Parkinson's

Over 10 million people are currently living with Parkinson's, and this figure is only expected to grow as the global population ages. The cornerstone of Parkinson's treatment for over half a century has been focused on replacing deficient dopamine in the brain caused by the loss of the nerves which normally produce it. This has some success in treating the symptoms but does not address the underlying causes of neurodegeneration. Its effects also tend to wear off over time and their long-term use results in significant side effects. There is therefore a great need for new and more effective treatments which address the underlying causes of the condition, not simply the symptoms.

4D pharma is seeking to impact key disease processes via the gut-brain axis. Key targets in the drive to develop a novel therapeutic include addressing mitochondrial dysfunction and oxidative stress, neuroinflammation, production of neurotrophic factors, and ultimately neuroprotection. Using MicroRx®, 4D pharma has identified two unique strains, MRx0029 and MRx0005, which have shown activity in preclinical animal models of Parkinson's disease, with positive impacts on these key aspects of Parkinson's pathology.

Throughout 2021 and into 2022, we have continued to make great progress towards the clinic, and in February 2022 the FDA cleared the investigational new drug (IND) applications for both MRx0005 and MRx0029 for the treatment of Parkinson's. We now expect to start our first-in-human clinical trial of both candidates in people with Parkinson's in 2022.

At 4D pharma we recognize the need to involve people affected by Parkinson's at every stage of research in order to bring novel and transformational treatment to people with Parkinson's. We are proud to have entered into collaborations with leading partners, with The Michael J. Fox Foundation as an Industry Partner of the Parkinson's Progression Markers Initiative, and with Parkinson's UK to establish a Patient Advisory Board to better understand Parkinson's disease and provide vital insight to help guide the development of our LBP candidates.

Other research and development activity

In addition to our progress in the clinic on multiple fronts generating in-patient data to support our thesis of using single strains to drive therapeutic activity, we continue to use our MicroRx® platform to both support our internal pipeline and to collaborate with the pharmaceutical industry.

We continue to advance our ground-breaking collaboration with MSD in the field of vaccines. This collaboration, which is associated with potential milestone payments totaling over $1 billion across up to three undisclosed indications, utilizes MicroRx® to discover and develop Live Biotherapeutics for vaccines. In 2021 we continued to make good progress in this collaboration.

As with any new pharmaceutical modality, reliable, consistent, scalable, clinical-grade manufacturing can be a hurdle to progress. At 4D pharma, we invested early in understanding and resolving this issue, investing in our in-house cGMP-certified production facility. We have successfully conducted the manufacturing optimization and scale-up of multiple unique LBPs, allowing us to progress four candidates into clinical trials to date. Our LBPs are produced by a reliable, repeatable process, delivering a consistent and stable product.

As Live Biotherapeutics advance into later stages of clinical trials and towards commercialization, the knowledge, skills and facilities needed to produce cGMP clinical product is increasingly being seen as a true advantage for developers. This also provides further evidence to support the thesis of single strain LBPs in particular, as we continue to show a leading position in our strategy and capabilities for the manufacturing of LBPs.

Impact of COVID-19

As with many industries, our Company felt the impact of the ongoing COVID-19 pandemic during 2021. Recruitment and retention of patients into clinical trials, dosing, and collection of data were negatively impacted by lockdowns and other government enforced restrictions, precautions and staff shortages at clinical sites and external providers such as CROs, and general reluctance among the patient population during the pandemic.

These factors have led to delays in readouts from some of our clinical trials and regulatory interactions. For example, enrolment for our Phase I/II clinical trial of MRx-4DP0004 in asthma was impacted due to factors associated with the COVID-19 pandemic, which delayed expected preliminary data for this clinical trial. Similarly, regulatory interactions regarding next steps for Blautix® in IBS were delayed as a result of the pandemic.

As we have seen with the arrival and spread of new variants over the last two years, the trajectory of the pandemic remains uncertain. We continue to assess the impact that COVID-19 will have going forward on our ability to effectively conduct business operations as planned. We continue to take steps to mitigate disruption where possible, for example enabling a significant proportion of our employees to telecommute and implementing other technology solutions to minimize disruption.

Corporate development activities

In March we completed our merger with special purpose acquisition company (SPAC) Longevity Acquisition Corp. and Nasdaq listing (Nasdaq: LBPS), accessing $14.8 million in the process. In conjunction, we completed a private placement raising gross proceeds of approximately $25 million, with an additional subscription by Duncan Peyton (Chief Executive Officer) and Dr. Alex Stevenson (Chief Scientific Officer) for an additional $2.0 million of new ordinary shares.

In addition to capital raised during the Nasdaq listing, 4D pharma further strengthened its financial position closing a senior secured credit facility for up to $30 million. The initial $12.5 million tranche was drawn down at closing, with an additional $17.5 million available on achievement of certain milestones.

Alongside the Company's progression onto Nasdaq, we looked to strengthen our management team and Board of Directors with additional expertise and experience of the US market. In March 2021 we appointed John Beck as Chief Financial Officer (CFO) and it was with great sadness that John suddenly passed away in July. John truly believed that 4D was pioneering and brought his invaluable financial and pharmaceutical experience in bringing 4D to Nasdaq. He left an indelible mark on the 4D community and is missed by the entire team.

Since the period end, in January 2022 we announced the appointment of John Doyle as our new CFO. John brings over 15 years of experience leading and developing the financial operations, strategy and investor relations functions at public healthcare companies and has already made valuable contributions to the Company's strategic outlook.

Further strengthening our Board, we appointed Paul Maier as Non-Executive Director, with Mr. Maier also serving as a member of our Audit and Risk Committee and the Company's 'audit committee financial expert' under AIM, SEC and Nasdaq rules.

Future outlook

We look ahead to building on our understanding of how 4D pharma can unlock the power of the microbiome to develop safe and innovative novel therapeutics for serious disease.

Building on a strong foundation of clinical data in multiple diverse indications validating our single strain LBP approach, in 2022 and beyond we will continue to generate yet more data demonstrating the potential of this new class of drug to treat serious systemic diseases.

Meanwhile we will continue our innovative research, driven by the MicroRx® platform and our in-house development and manufacturing capabilities, to explore additional opportunities for Live Biotherapeutics such as our pioneering work in new areas of cancer therapy, and working with world-leading partners in innovative collaborations.

With net proceeds from the Longevity Merger completed in March 2021, the fundraise completed in March 2021, the overdraft facility in Spain, and first tranche of the credit facility with Oxford Finance announced in July 2021, 4D pharma is funded to the fourth quarter of 2022, providing the Company sufficient balance sheet strength and runway to deliver on a number of our short to medium term clinical and strategic goals.

The work we do both clinically and preclinically is delivering on the promise of using the microbiome to treat systemic disease and building long-term value in the MicroRx® platform. We look forward to the continued positive evolution we have observed in the wider field in recent months, such as an increased appreciation of the need for mechanistic understanding for the future of LBP development, and awareness of the critical importance of reliable manufacturing in delivering this as a viable new class of drug.

Prof. Axel Glasmacher
Non-Executive Chairperson
31 March 2022

Duncan Peyton
Chief Executive Officer
31 March 2022

Financial outlook

We have financed our operations to date primarily through proceeds from issuing our ordinary shares. We have incurred losses and generated negative cash flows from operations since inception. To date we have not generated significant revenue, and we do not expect to generate significant revenues from the sale of our product candidates in the near future. In order to capture the potential of the platform and maximize value creation, we are actively pursuing additional research collaborations, pairing our expertise in LBP discovery and development and access to our library of well characterized bacterial isolates with the disease-specific expertise of partners. The amounts that we actually spend for any specific purpose may vary significantly and will depend on a number of factors, including, but not limited to, our research and development activities and programs, clinical testing, regulatory approval, market conditions, and changes in or revisions to our business strategy and technology development plans. Investors will be relying on the judgement of our management regarding the application of the proceeds from the sale of our ordinary shares.

As of 31 December 2021, our cash and cash equivalents were £15.5 million. After the year end, but before the signing of these financial statements, the Group received research and development tax credits of £3.2 million on its UK entities. Excluding possible income from warrants, we believe that this additional cash the Spanish loan facility, along with existing cash and cash equivalents but before restrictive covenants on the Oxford loan are sufficient to fund our projected operating requirements until the fourth quarter of 2022. The Directors are continuing to explore sources of finance that are available to the Group and have a reasonable expectation that they will be able to secure sufficient cash inflows into the Group to continue its activities for not less than twelve months from the date of approval of these accounts. However, because the additional finance is not committed at the date of approval of these financial statements, these circumstances represent a material uncertainty as to the Group's ability to continue as a going concern. Should the Group be unable to obtain further finance such that the going concern basis of preparation were no longer appropriate, adjustments would be required including to reduce the balance sheet values of assets to their recoverable amounts, and to provide for future liabilities that may arise.

We currently anticipate that we will require approximately £20.4 million for research and development activities over the course of the next 18 months based on the execution of existing programs but also dependent on exchange rates. We also anticipate that we will require approximately £13.7 million for general and administrative costs over such 18-month period, which consists primarily of expenditures for staff costs, legal and other professional fees and other administrative expenses. We also anticipate receiving approximately £7.2 million in cash for research and development tax credit refunds over this 18-month period and to make around £1.7 million on payments towards loans and interest during this period.

4D pharma plc

Group statement of total comprehensive income
For the year ended 31 December 2021

	Notes	**31 December 2021**	31 December 2020
		£000	£000
Revenue		**522**	534
Research and development costs		**(19,818)**	(22,041)
Administrative expenses		**(7,283)**	(5,969)
Foreign currency gains		**441**	363
Other income		**36**	45
Operating loss before non-recurring items		**(26,102)**	(27,068)
Non-recurring items	3	**(44,381)**	(3,110)
Operating loss after non-recurring items		**(70,483)**	(30,178)
Finance income		**1**	5
Finance expense		**(610)**	(173)
Fair value adjustment on warrants and units		**13,627**	—
Loss before taxation		**(57,465)**	(30,346)
Taxation	4	**3,505**	4,383
Loss for the year		**(53,960)**	(25,963)
Other comprehensive income:			
Exchange differences on translating foreign operations		**(714)**	110
Loss for the year and total comprehensive loss for the year		**(54,674)**	(25,853)
Loss per share			
Basic and diluted for the year	5	**(31.83)p**	(22.80)p

The basic and diluted loss per share are the same as the effect of share options and warrants is anti-dilutive.

4D pharma plc

Group statement of financial position
At 31 December 2021

	Notes	At 31 December 2021 £000	At 31 December 2020 £000
Assets			
Non-current assets			
Property, plant and equipment:			
– Owned assets		**2,885**	3,659
– Right-of-use assets		**677**	835
Intangible assets		**13,686**	14,025
Taxation receivables		**199**	177
		17,447	18,696
Current assets			
Inventories		**272**	291
Trade and other receivables		**2,167**	3,223
Taxation receivables		**7,557**	4,436
Cash and cash equivalents		**15,497**	8,775
		25,493	16,725
Total assets		**42,940**	35,421
Liabilities			
Current liabilities			
Trade and other payables		**4,810**	6,379
Lease liabilities		**80**	73
		4,890	6,452
Non-current liabilities			
Lease liabilities		**889**	986
Loans	6	**8,961**	—
Warrants and units	7	**4,992**	—
Deferred tax		**10**	13
		14,852	999
Total liabilities		**19,742**	7,451
Net assets		**23,198**	27,970
Capital and reserves			
Share capital	8	**451**	329
Share premium account	8	**185,703**	136,278
Merger reserve		**958**	958
Translation reserve		**(159)**	555
Other reserve		**(864)**	(864)
Share-based payments reserve	9	**3,717**	3,497
Retained earnings		**(166,608)**	(112,783)
Total equity		**23,198**	27,970

4D pharma plc

Group cash flow statement
For the year ended 31 December 2021

	Notes	**Year to 31 December 2021 £000**	Year to 31 December 2020 £000
Loss after taxation		**(53,960)**	(25,963)
Adjustments for:			
Depreciation of property, plant and equipment		**889**	1,003
Amortization of intangible assets		**87**	203
Loss on disposal of property, plant and equipment		**14**	—
Short-term rentals included in the Income Statement		**104**	135
Finance income		**(1)**	(5)
Finance expense		**610**	173
Fair value adjustments on equity, warrants and units		**32,323**	3,110
Share-based compensation		**583**	224
Cash outflows from operations before movements in working capital		**(19,351)**	(21,120)
Changes in working capital:			
Decrease/(increase) in inventories		**19**	(93)
Increase in trade and other receivables		**(415)**	(2,105)
(Increase)/decrease in taxation receivables		**(3,143)**	1,697
Decrease in trade and other payables		**(2,192)**	(1,052)
Cash outflow from operating activities		**(25,082)**	(22,673)
Cash flows from investing activities			
Purchases of property, plant and equipment		**(203)**	(163)
Purchase of software and other intangibles		**—**	(15)
Net cash outflow from investing activities		**(203)**	(178)
Cash flows from financing activities			
Proceeds from issues of ordinary share capital		**27,904**	29,740
Expenses on issue of shares		**(4,217)**	(1,594)
Loan income received		**8,990**	—
Lease and short-term rentals payments		**(176)**	(188)
Interest received		**1**	5
Interest paid		**(495)**	(173)
Net cash inflow from financing activities		**32,007**	27,790
Increase in cash and cash equivalents		**6,722**	4,939
Cash and cash equivalents at the start of the year		**8,775**	3,836
Cash and cash equivalents at the end of the year		**15,497**	8,775

4D pharma plc

Group statement of changes in equity
For the year ended 31 December 2021

	Share capital £000	Share premium £000	Merger reserve £000	Translation reserve £000	Other reserve £000	Share-based payment reserve £000	Retained earnings £000	Total equity £000
At 1 January 2020	164	108,296	958	446	(864)	367	(87,024)	22,343
Issue of share capital (net of expenses)	165	27,906	—	—	—	—	—	28,071
Issue of warrants (net of expenses)	—	—	—	—	—	3,110	—	3,110
Exercise of warrants	—	76	—	—	—	(11)	—	65
Total transactions with owners recognized in equity for the year	165	27,982	—	—	—	3,099	—	31,246
Loss and total comprehensive loss for the year	—	—	—	109	—	—	(25,963)	(25,854)
Lapsed options	—	—	—	—	—	(204)	204	—
Issue of share-based compensation	—	—	—	—	—	235	—	235
At 31 December 2020	**329**	**136,278**	**958**	**555**	**(864)**	**3,497**	**(112,783)**	**27,970**
Issue of shares as part of merger on 22 March 2021 (net of expenses)	78	31,270	—	—	—	—	—	31,348
Issued and assumed warrants on merger on 22 March 2021	—	—	—	—	—	18,517	—	18,517
Reclassification of warrants as liabilities	—	—	—	—	—	(18,517)	—	(18,517)
Share issue and placing on 22 March 2021 (net of expenses)	41	16,551	—	—	—	—	—	16,592
Directors' subscription for shares on 16 April 2021	3	1,446	—	—	—	—	—	1,449
Exercise of share options	—	94	—	—	—	(224)	—	(130)
Exercise of warrants	—	64	—	—	—	(4)	—	60
Total transactions with owners recognized in equity for the year	122	49,425	—	—	—	(228)	—	49,319
Loss and total comprehensive loss for the year	—	—	—	(714)	—	—	(53,960)	(54,674)
Lapsed options	—	—	—	—	—	(135)	135	—
Issue of share-based compensation	—	—	—	—	—	583	—	583
At 31 December 2021	**451**	**185,703**	**958**	**(159)**	**(864)**	**3,717**	**(166,608)**	**23,198**

Notes to the financial statements
For the year ended 31 December 2021

1. Basis of preparation

The financial information set out herein does not constitute statutory accounts as defined in Section 434 of the Companies Act 2006. The financial information for the year ended 31 December 2021 has been extracted from the Company's audited financial statements which were approved by the Board of Directors on 31 March 2022 and which, if adopted by the members at the Annual General Meeting, will be delivered to the Registrar of Companies for England and Wales.

The report of the auditor on the financial statements for the year ended 31 December 2020 was unqualified, did not contain a statement under Section 498(2) or Section 498(3) of the Companies Act 2006, and did not include a matter to which the auditors drew attention by way of emphasis without qualifying their report.

The report of the auditor on the 31 December 2021 financial statements was unqualified, did not contain a statement under Section 498(2) or Section 498(3) of the Companies Act 2006 but did include a matter to which the auditors drew attention by way of emphasis without qualifying their report relating to the basis of preparation which is reproduced below:

Material uncertainty related to going concern

We draw attention to the accounting policy on going concern [reproduced in note 2 below] from page 69 in the financial statements, which indicates that the group currently does not have sufficient funds to enable it to meet all of its planned operating expenditure as set out in the detailed forecasts prepared by management for a period of at least twelve months from the date of approval of these financial statements and will therefore have to raise additional funds over and above the level of those already announced and included in those forecasts. As stated in the accounting policy on going concern, these events or conditions, along with the other matters as set forth in note 2c of the financial statements [reproduced in note 2 below], indicate that a material uncertainty exists that may cast significant doubt on the group's and parent company's ability to continue as a going concern. Our opinion is not modified in respect of this matter.

In auditing the financial statements, we have concluded that the director's use of the going concern basis of accounting in the preparation of the financial statements is appropriate. Our evaluation of the directors' assessment of the entity's ability to continue to adopt the going concern basis of accounting included:

- challenging the directors on the key assumptions in their forecasts including the timing of cash inflows and outflows;
- considering the directors assessment of the sensitivity of the conclusions drawn in the forecasts to changes in the assumptions; and
- reviewing evidence of the significant transactions occurring following the year end date and how they impact on the directors' forecasts.

No matters came to our attention to indicate that the directors' assumptions with regard to contractual cashflows were unreasonable, nor that the expected cash inflows arising from fundraising and business combination activities were inconsistent with the information available to support these transactions.

Our responsibilities and the responsibilities of the directors with respect to going concern are described in the relevant sections of this report**.**

2. Going concern

The Group and parent company are subject to a number of risks similar to those of other development stage pharmaceutical companies. These risks include, amongst others, generation of revenues in due course from the development portfolio and risks associated with research, development and obtaining regulatory approvals of its products. Ultimately, the attainment of profitable operations is dependent on future uncertain events which include obtaining adequate financing to fulfil the Group's commercial and development activities and generating a level of revenue to support the Group's cost structure.

The Directors have prepared detailed financial forecasts and cash flows looking beyond 12 months from the date of the approval of these financial statements. In developing these forecasts, the Directors have made assumptions based upon their view of the current and future economic conditions that are expected to prevail over the forecast period and believe that the current cash position of the Group will be sufficient to support the Group into quarter four of 2022.The Directors are continuing to explore sources of finance available to the Group and have a reasonable expectation that they will be able to secure sufficient cash inflows into the Group to continue its activities for not less than 12 months from the date of approval of these accounts. They have therefore prepared the financial statements on a going concern basis.

Because the additional finance is not committed at the date of approval of these financial statements, these circumstances represent a material uncertainty as to the Group's ability to continue as a going concern. Should the Group be unable to obtain further finance such that the going concern basis of preparation were no longer appropriate, adjustments would be required including to reduce the balance sheet values of assets to their recoverable amounts, and to provide for future liabilities that may arise.

3. Non-recurring costs

	Year to 31 December 2021 £000	Year to 31 December 2020 £000
Fair value adjustments on warrants issued February 2020 in connection with the issue of equity	**—**	3,110
Fair value adjustments on completion of the merger with Longevity Acquisition Corporation are made up as follows:		
– Shares	**34,153**	—
– Public warrants	**5,589**	—
– Private warrants	**1,236**	—
– Representative units	**2,339**	—
– Backstop warrants	**9,353**	—
Less: cash received (after deduction of liabilities)	**(8,419)**	—
Fair value adjustment on warrants issued with loans	**130**	—
Total non-recurring costs	**44,381**	3,110

4. Taxation

The tax credit is made up as follows:

	Year to 31 December 2021 £000	Year to 31 December 2020 £000
Current income tax		
Corporation tax income for the year	**(3,496)**	(3,475)
Corporation tax expense for the year	**14**	2
Adjustment in respect of prior years	**(21)**	42
Total income tax credit recognized in the year	**(3,503)**	(3,431)
Current deferred tax		
Previously recognized deferred tax gains offset against losses	**—**	(940)
Current year charge	**(2)**	(12)
Total deferred tax	**(2)**	(952)
Total income tax credit recognized in the year	**(3,505)**	(4,383)

The enacted UK corporation tax rate 25.00% forms the basis for the UK element of the deferred tax calculation noted below, the equivalent rates used for Ireland and Spain were 12.50% and 25.00% respectively and for the USA the federal tax rate used was 21.00% and average state tax rate used was 8.84%.

At 31 December 2021, the Group had tax losses available for carry forward of approximately £85.0 million (31 December 2020: £66.6 million). The Group has not recognized deferred tax assets relating to such earned forward losses of approximately £21.0 million (31 December 2020: £12.6 million).

Group management considers that there is insufficient evidence of future taxable income, taxable temporary differences and feasible tax-planning strategies to utilize all of the cumulative losses and therefore it is not considered certain that the deferred tax assets will be realized in full. If future income differs from current projections, this could significantly impact the tax charge or benefit in future years.

5. Loss per share

(a) Basic and diluted

	Year to 31 December 2021 £000	Year to 31 December 2020 £000
Loss for the year attributable to equity shareholders	**(53,960)**	**(25,963)**
Weighted average number of shares		
Ordinary shares in issue	**169,520,003**	**113,851,960**
Basic loss per share (pence)	**(31.83)p**	**(22.80)p**

The basic and diluted loss per share are the same as the effect of share options and warrants is anti-dilutive.

(b) Adjusted

Adjusted loss per share is calculated after adjusting for the effect of non-recurring income and expenses arising from fair value adjustments on the issue of warrants and merger with Longevity Acquisition Corporation.

Reconciliation of adjusted loss after tax:

	Year to 31 December 2021 £000	Year to 31 December 2020 £000
Reported loss after tax	**(53,960)**	**(25,963)**
Non-recurring costs	**44,381**	**3,110**
Adjusted loss after tax	**(9,579)**	**(22,853)**
Adjusted basic loss per share (pence)	**(5.65)p**	**(20.07)p**

6. Loans

	31 December 2021 £000	31 December 2020 £000
Current liabilities	**—**	—
Non-current liabilities	**8,961**	—
Net loan balance	**8,961**	—

The loans are made up as follows:

	31 December 2021 £000	31 December 2020 £000
Term loan	**9,241**	—
Capitalized debt issue costs	**(280)**	—
Net loan balance	**8,961**	—

On 29 July 2021 the Group entered a loan agreement with Oxford Finance S.A.R.L. for up to $30 million maturing on 1 July 2026 and secured against substantially all of the assets of the Group and drawing down the first tranche for $12.5 million or £8.990 million at that date.

Interest-only monthly payments will be made until either 1 September 2023 or 1 September 2024 dependent on certain milestones. In addition, a 6.0% or 6.5% final payment fee will be charged, the latter being dependent on the extension of the interest only period, though this fee may be discounted to between 3% and 1% if the loan is repaid before the maturity date depending on certain criteria.

In addition to the interest and final payment fee, warrants were issued for 212,568 shares at an exercise price of $1.18. Further warrants become available on drawdown of loan tranches at a rate of 2% of the loan value with an exercise price based on the lower of the preceding day's share price and the 10-day average share price prior to the further loan. All warrants have a five-year exercise period from the date of issuance.

The loan includes a restrictive covenant that requires the Group to maintain a cash balance of at least $7.5 million if the Group does not meet the conditions of the equity event. The equity event requires the issue of equity securities and other receipt of income from other partnering transactions, in certain combinations, of at least $45 million before 1 April 2022.

The loan includes various customary covenants limiting the Group's ability to perform certain functions that may affect recoverability of the loan, as well as providing penalties and repayment provisions in the event of a default. A copy of the loan agreement and further details can be found as an exhibit to our F-1 filings with the SEC, a link to which is provided on our website.

7. Financial instruments

Warrants and units included in liabilities	**31 December 2021 £000**	31 December 2020 £000
Current liabilities	**—**	—
Non-current liabilities	**4,992**	—
	4,992	—

The warrants and units included in liabilities are made up as follows:

	31 December 2021 £000	31 December 2020 £000
Opening balance	**—**	—
Additions:		
- Arising on merger with Longevity Acquisition Corporation	**18,517**	—
- Arising on drawdown of loans	**130**	—
Change in fair value during the period	**(13,655)**	—
Closing balance	**4,992**	—

Warrants and units

The Group has the following warrant and unit option schemes:

a) Recognized on acquisition of Longevity Acquisition Corporation

On 22 March 2021 the Group completed their merger with Longevity Acquisition Corporation and assumed the existing warrants and recognized the backstop warrants issued in the funding of the transaction. The transaction was subject to an exchange ratio of 7.5315 4D pharma plc shares for each Longevity Acquisition Corporation share with the warrants and units detailed as follows:

i. Public warrants

Public warrants are traded on Nasdaq as LBPSW. At acquisition there were 4,000,000 public warrants which convert to half of a Longevity share (pre-acquisition) or 15,063,000 4D pharma plc ordinary shares at the exchange ratio. The public warrants are exercisable until the fifth anniversary of the transaction and have an exercise price of $11.50 per public warrant; they also include a redemption price of $18.00 and a cashless redemption feature. As the exercise price is expressed in USD but the Company's functional currency is GBP they have been treated as financial liabilities in the financial statements under IAS 32 with periodic gains and losses on fair value adjustment included in the Income Statement. As publicly traded financial instruments the fair value has been assessed using a Type 1 valuation method which uses their publicly traded value.

ii. Private warrants

At acquisition there were 320,000 private warrants which converted to half of a Longevity share (pre-acquisition) or 1,205,040 4D pharma plc ordinary shares at the exchange ratio. The private warrants are exercisable until the fifth anniversary of the transaction and have an exercise price of $11.50 per private warrant; in addition there is no redemption clause, provided certain conditions are maintained or convert to public warrants with the same characteristics as private warrants if the conditions are not met, and cashless redemption features are also present. As the exercise price is expressed in USD but the Company's functional currency is GBP they have been treated as financial liabilities in the financial statements under IAS 32 with periodic gains and losses on fair value adjustment included in the Income Statement. As publicly traded prices are not available the fair value has been assessed using a Type 2, Black Scholes valuation model linked to the terms, conditions and observable market data at issue.

iii. Representative units

At acquisition there were 240,000 representative units. Pre-acquisition each unit converted 1.1 Longevity shares and one public warrant or 1,988,316 4D pharma plc ordinary shares and 903,780 4D pharma shares in public warrants at the exchange ratio. The representative units are exercisable until 28 August 2023 and have an exercise price of $11.50 per unit and underlying redemption clauses associated with the public warrants if exercised. As the exercise price is expressed in USD but the Company's functional currency is GBP they have been treated as financial liabilities in the financial statements under IAS 32 with periodic gains and losses on fair value adjustment included in the Income Statement. As publicly traded prices are not available the fair value has been assessed using a Type 2, Black Scholes valuation model linked to the terms, conditions and observable market data at issue.

iv. Backstop warrants

Backstop warrants were issued to guarantors who provided financial support for the merger with Longevity Acquisition Corporation and came into effect on completion of the transaction. At acquisition 7,530,000 backstop warrants were issued for one 4D pharma plc ordinary share per warrant. The backstop warrants are exercisable for 60 days following the exercise period of the assumed warrants detailed in (i) and (ii) above. They have an exercise at par value but are indexed to the exercise of the assumed warrants, such that they only vest in proportion to the percentage of these assumed warrants. They include a cashless redemption feature and as the exercise price is indexed to these factors they have been treated as financial liabilities in the financial statements under IAS 32 with periodic gains and losses on fair value adjustment included in the Income Statement. As publicly traded prices are not available and multiple elements factor into the fair value it has been assessed using a Type 3, Monte Carlo valuation model linked to the terms, conditions and observable market data at issue.

b) Loan warrants

On 29 July 2021 the Group issued 212,568 warrants to Oxford Finance S.A.R.L. on the drawdown of the first $12.5 million of a loan facility for up to $30 million. Further warrants become available on drawdown of loan tranches at a rate of 2% of the loan value with an exercise price based on the lower of the preceding day's share price and the 10-day average share price prior to the further loan. Each warrant entitles the holder to subscribe for one ordinary share at a price of $1.18 at any time up to the fifth anniversary of the issue. As the exercise price is expressed in USD but the Groups functional currency is GBP they have been treated as financial liabilities in the financial statements under IAS 32 with periodic gains and losses on fair value adjustment included in the Income Statement. Since they are not publicly traded the fair value was assessed using a Type 2, Black Scholes valuation model linked to the terms, conditions and observable market data at issue.

Year ended 31 December 2021

Warrants and units	Exercise period	Exercise price per share Pence	Number: At 31 December 2020	Granted	Exercised	Non-vesting or lapsed	**At 31 December 2021**	Exercisable
Included in liabilities								
Public warrants	2021–2026	110.27-152.69	—	15,063,000	—	—	**15,063,000**	15,063,000
Private warrants	2021–2026	110.27-152.69	—	1,205,040	—	—	**1,205,040**	1,205,040
Representative units	2021–2023	103.38-105.97	—	2,892,096	—	—	**2,892,096**	2,892,096
Backstop warrants	2021–2026	0.25	—	7,530,000	—	—	**7,530,000**	—
Loan warrants	2021–2026	84.80-87.36	—	212,568	—	—	**212,568**	212,568
Included in equity								
18 February 2020	2020–2025	100.00	**21,924,307**	—	(31,859)	—	**21,892,448**	**21,892,448**
			21,924,307	26,902,704	(31,859)	—	**48,795,152**	41,265,152
Weighted average exercise price of options (pence)			100.00	91.51	100.00	—	**95.32**	112.67

Year ended 31 December 2020

Warrants and units	Exercise period	Exercise price pershare Pence	Number: At 31 December 2019	Granted	Exercised	Non-vesting or lapsed	**At 31 December 2020**	Exercisable
Included in equity								
18 February 2020	2020–2025	100.00	—	22,000,000	(75,693)	—	**21,924,307**	**21,924,307**
			—	22,000,000	(75,693)	—	**21,924,307**	**21,924,307**
Weighted average exercise price of options (pence)			—	100.00	100.00	—	100.00	100.00

31,859 warrants were exercised during the year (31 December 2020: 75,693) and 41,265,152 warrants were exercisable at the year end (31 December 2020: 21,924,307).

The following table lists the assumptions used in calculating the fair value of warrants and units:

	Date of issue	Expected volatility percentage range	Risk-free interest rate percentage range	Dividend yield %	Expected life of options years	Weighted average exercise price	Weighted average share price at date of grant	Number of options originally granted
Included in liabilities								
Public warrants	22 March 2021	n/a	n/a	0.0	5.00 to 4.22	131.48p	137.00p	15,063,000
Private warrants	22 March 2021	90.2–94.8	0.86–1.15	0.0	5.00 to 4.22	131.48p	137.00p	1,205,040
Representative units	22 March 2021	96.0–106.1	0.43–0.78	0.0	2.44 to 1.66	104.68p	137.00p	2,892,096
Backstop warrants	22 March 2021	70.0–85.0	0.87–1.14	0.0	5.00 to 4.22	0.25p	137.00p	7,530,000
Loan warrants	29 July 2021	90.3–94.8	0.74–1.15	0.0	5.00 to 4.58	86.08p	88.00p	212,568
Included in equity								
18 February 2020	18 February 2020	59.3	0.46	0.0	5.00	100.00p	46.00p	22,000,000

The expected life of the warrants and units is based on historical data and is not necessarily indicative of exercise patterns that may occur. The expected volatility reflects the assumption that the historical volatility is indicative of future trends, which may also not necessarily be the actual outcome.

No dividends were assumed to be paid in the foreseeable future.

The models assume, within the calculation of the charge, delivery of options that are dependent on a judgemental comparison to the total shareholder return against a specified comparator group of companies upon passing of the vesting period.

No other features of warrants and units granted were incorporated into the measurement of fair value.

Share option schemes

The Group operates the following unapproved share option schemes:

a) 2015 Long Term Incentive Plan (LTIP)

Share options were granted to staff members under the '2015 Long Term Incentive Plan' on 10 November 2015, 11 May 2016, 24 May 2017, 26 October 2018 and 5 July 2019. Share options are awarded to management and key staff as a mechanism for attracting and retaining key employees. These options vest over a period of up to three years from the date of grant and are exercisable until the 10th anniversary of the award. Exercise of the award is subject to the employee remaining a full-time member of staff at the point of exercise and the vesting conditions being met. Vesting conditions are based on a mixture of the Company's TSR performance, relative to an appropriate comparator group, and certain individual performance criteria. The fair value is assessed using a Type 2, Black Scholes valuation model, linked to the terms, conditions and observable market data at issue and included in equity in the share-based payment reserve, and vesting conditions are based on a mixture of the Company's TSR performance, relative to an appropriate comparator group, and certain individual performance criteria.

b) 2021 Long Term Incentive Plan (LTIP)

Share options were granted to staff members under the '2021 Long Term Incentive Plan' on 17 December 2021. Share options are awarded to management and staff as a mechanism for attracting and retaining key employees. These options vest subject to members of staff remaining employees on each vesting date and on exercise, with one-quarter of the options awarded vesting on the anniversary of the vesting start date with the remaining vesting dates and number of remaining options occurring evenly over the remainder of a four-year period from vesting start date. The fair value is assessed using a Type 2, Black Scholes valuation model, linked to the terms, conditions and observable market data at issue and included in equity in the share-based payment reserve.

Year ended 31 December 2021

Date of grant	Exercise period	Exercise price per share Pence	Number					
			At 31 December 2020	Granted	Exercised	Non-vesting or lapsed	**At 31 December 2021**	Exercisable
Issued under the 2015 LTIP								
11 May 2016	2019–2026	0.25	**9,686**	—	(9,686)	—	**—**	—
24 May 2017	2020–2027	0.25	**36,930**	—	(36,930)	—	**—**	—
26 October 2018	2021–2028	0.25	**57,962**	—	(21,353)	—	**36,610**	36,610
5 July 2019	2022–2029	0.25	**446,004**	—	—	(176,706)	**269,298**	—
Issued under the 2021 LTIP								
17 December 2021	2021–2031	52.35	—	7,520,152	—	—	**7,520,152**	530,289
			550,582	7,520,152	(67,969)	(176,706)	**7,826,060**	566,899
Weighted average exercise price of options (pence)			0.25	52.35	0.25	0.25	**50.31**	48.99

Year ended 31 December 2020

Date of grant	Exercise period	Exercise price per share Pence	Number					
			At 31 December 2019	Granted	Exercised	Non-vesting or lapsed	**At 31 December 2020**	Exercisable
Issued under the 2015 LTIP								
11 May 2016	2019-2026	0.25	9,686	—	—	—	**9,686**	9,686
24 May 2017	2020-2027	0.25	110,817	—	—	(73,887)	**36,930**	36,930
26 October 2018	2021-2028	0.25	400,391	30,961	—	(373,390)	**57,962**	
5 July 2019	2022-2029	0.25	538,596	—	—	(92,592)	**446,004**	21,353
			1,059,490	30,961	—	(539,869)	**550,582**	67,969
Weighted average exercise price of options (pence)			0.25	0.25	—	0.25	**0.25**	0.25

67,969 share options had been exercised at the year end (31 December 2020: nil) and 566,289 (31 December 2020: 67,969) share options were exercisable at the year end.

The following table lists the assumptions used in calculating the fair value of options:

Date of grant	Expected volatility %	Risk-free interest rate %	Dividend yield %	Expected life of options years	Weighted average exercise price	Weighted average share price at date of grant	Number of options originally granted
Issued under the 2015 LTIP							
11 May 2016	52.50	1.40	0.00	3.00	0.25p	771p	60,147
24 May 2017	52.50	0.41	0.00	3.00	0.25p	321p	240,406
26 October 2018	50.96	0.72	0.00	3.00	0.25p	141p	746,779
5 July 2019	69.62	0.57	0.00	3.00	0.25p	93p	538,596
Issued under the 2021 LTIP							
17 December 2021	86.64	1.22	0.00	5.84	86.64p	52.3p	7,520,152

The expected life of the options is based on historical data and is not necessarily indicative of exercise patterns that may occur. The expected volatility reflects the assumption that the historical volatility is indicative of future trends, which may also not necessarily be the actual outcome.

No dividends were assumed to be paid in the foreseeable future.

The models assume, within the calculation of the charge, delivery of options that are dependent on a judgemental comparison to the total shareholder return against a specified comparator group of companies upon passing of the vesting period.

No other features of options granted were incorporated into the measurement of fair value.

8. Share capital

Group	Ordinary shares Number	Share capital £000	Share premium £000	Total £000
Allotted, called up and fully paid ordinary shares of 0.25p				
Ordinary shares at 1 January 2020	65,493,842	164	108,296	108,460
Placing and subscription on 18 February 2020	44,000,000	110	21,890	22,000
Expenses of placing and subscription on 18 February 2020	—	—	(1,065)	(1,065)
Placing and subscription on 13 July 2020	21,898,400	55	7,610	7,665
Expenses of placing and subscription on 13 July 2020	—	—	(529)	(529)
Warrants exercised (issued 18 February 2020)	75,693	—	76	76
Ordinary shares at 31 December 2020	131,467,935	329	136,278	136,607
Issued in connection with Longevity merger on 22 March 2021	31,048,192	78	34,075	34,153
Expenses of merger	—	—	(2,805)	(2,805)
Placing and issue on 22 March 2021	16,367,332	41	17,963	18,004
Expenses of placing	—	—	(1,412)	(1,412)
Directors' subscription on 16 April 2021	1,317,680	3	1,446	1,449
Warrants exercised	31,859	—	64	64
Share options exercised	67,969	—	94	94
Ordinary shares at 31 December 2021	**180,300,967**	**451**	**185,703**	**186,154**

The balances classified as share capital and share premium include the total net proceeds (nominal value and share premium respectively) on issue of the Groups equity share capital. The entire share capital consists of 0.25 pence ordinary shares.

Each ordinary 0.25 pence share is entitled:

- to one vote in any circumstances;
- pari passu to dividend payments or any other distribution; and
- pari passu to participate in a distribution arising from a winding up of the Company.

Significant transactions

On 18 February 2020 the Group raised £22.0 million in gross proceeds (£20.9 million net) from a placing of 16,820,080 new ordinary shares and a subscription of 27,179,920 new ordinary shares at an issue price of 50 pence per share. In addition, one warrant was allotted for every two ordinary shares subscribed in the fundraising. As a result, a total of 22,000,000 warrants were allotted. Each warrant entitles the holder to subscribe for one ordinary share at an exercise price of 100 pence at any time up to the fifth anniversary of admission.

On 13 July 2020 the Group raised £7.7 million in gross proceeds (£7.1 million net) from a placing of 16,807,616 new ordinary shares and a subscription of 5,090,784 new ordinary shares at an issue price of 35 pence per share.

On 22 March 2021 the Group completed the merger with Longevity Acquisition Corporation, listed on Nasdaq and gained access to its cash balance of $14.9 million which equated to $11.6 million or £8.4 million after the settling liabilities. Since Longevity is a cash shell with no future trade or income it did not qualify as a business and is not subject to the treatment for business combination under IFRS 3; as such the transaction has been treated as the issue of 31,048,192 shares at a price of £1.10 per share,

On 22 March 2021 the Group raised £18.0 million in gross proceeds (£16.6 million net) from a placing of 16,367,332 new ordinary shares at an issue price of £1.10 per share.

On 16 April 2021 the Group raised £1.4 million in proceeds through the sale of 1,317,680 new ordinary shares to Directors, who were unable to invest in the placing, at a price of £1.10 per share.

9. Share-based payment reserve

	Share-based compensation £000	Warrants £000	Total £000
At 31 December 2019	367	—	367
Lapsed options	(204)	—	(204)
Lapsed options relating to investment in subsidiaries	—	—	—
Issued	235	3,110	3,345
Issued to investment in subsidiaries	—	—	—
Exercised	—	(11)	(11)
At 31 December 2020	**398**	**3,099**	**3,497**
Warrants issued or assumed in connection with the merger with Longevity Acquisition Corporation	18,517	—	18,517
Warrants re-classified as liabilities	(18,517)	—	(18,517)
Lapsed options	(135)	—	(135)
Issued	583	—	583
Exercised	(224)	(4)	(228)
At 31 December 2021	**622**	**3,095**	**3,717**

10. Related party transactions

During the year the Group undertook two capital raises through the issue of shares and warrants. Details of the Directors' participation in these raises and other share acquisitions is as follows:

Executive Directors	Duncan Peyton CEO			Dr. Alex Stevenson CSO		
Shares and warrants	Number of shares	Number of warrants	£	Number of shares	Number of warrants	£
At 1 January 2020	6,455,075	—		6,413,136	—	
Subscription on 18 February 2020 at £0.50 per share	1,333,332	666,666	666,666	1,333,332	666,666	666,666
Subscription on 13 July 2020 at £0.35 per share	571,428	—	200,000	571,428	—	200,000
Total at 31 December 2020	8,359,835	666,666	866,666	8,317,896	666,666	866,666
Backstop shares issued in connection with the acquisition of Longevity on 22 March 2021*	496,096	—		381,728	—	
Subscription on 6 April 2021 at $1.10 per share	658,840	—	724,724	658,840	—	724,724
Total at 31 December 2021	**9,514,771**	**666,666**	**1,591,390**	**9,358,464**	**666,666**	**1,591,390**
Percentage of enlarged share capital at 31 December 2021	6.36%			6.33%		

Non-Executive Directors	Prof. Axel Glasmacher NED		
Shares and warrants	Number of shares	Number of warrants	£
At 1 January 2020	—	—	
Subscription on 13 July 2020 at £0.35 per share	30,000	—	10,500
Total at 31 December 2020 and 31 December 2021	**30,000**	**—**	**10,500**
Percentage of enlarged share capital at 31 December 2021	0.02%		

* Excludes backstop warrants.

No warrants had been exercised by the existing Directors at 31 December 2021 or at 31 December 2020.

Merger with Longevity Acquisition Corporation

On 22 March 2021 the Group completed its merger with Longevity Acquisition Corporation ('Longevity'), a Special Purpose Acquisition Company, and listed on Nasdaq.

To secure the merger a backstop agreement was put in place involving certain of the Directors and significant shareholders (the 'Backstop Investors'). The details of the agreement were as follows:

Backstop arrangements and related party transactions

The Longevity shareholders had the right to redeem their shareholding in Longevity, even if the requisite majority of Longevity shareholders approved the merge with $14.6 million held in a trust account by Longevity to fund redemptions. Any redemptions by Longevity shareholders would have reduce the capital available to the enlarged group so Backstop agreements were executed by Longevity, the Company and Whale Management Corporation (the 'SPAC Sponsor') with certain investors, including Duncan Peyton and Dr. Alex Stevenson (together, the 'Backstop Investors').

The Backstop Investors committed to subscribing for Longevity shares prior to completion to ensure that Longevity held at least $14.6 million in cash in the event of redemptions by Longevity shareholders. To secure the backstop arrangements, Longevity agreed to allot 700,000 Longevity shares to the Backstop Investors, Whale agreed to transfer 200,000 Longevity shares to the Backstop Investors, and the Group agreed to allot up to 7,530,000 4D ordinary shares to the Backstop Investors if and to the extent outstanding warrants issued by Longevity were exercised.

The Backstop Investors also agreed to loan Longevity $1.86 million, the proceeds of which were used to repay Whale for loans previously made by Whale to Longevity to fund its launch costs. At completion, the enlarged group repaid this sum to the Backstop Investors.

Related party transactions

The participation by Duncan Peyton (in the amount of $1,075,862) and Dr. Alex Stevenson (in the amount of $827,856) in the backstop arrangements constitutes a related party transaction for the purposes of the AIM Rules. In addition, Steve Oliveira and connected parties, a substantial shareholder of the Company (as defined by the AIM Rules), participated in the backstop arrangements in the amount of $5 million (in aggregate). The participation by Steve Oliveira and connected parties in the backstop arrangements also constitutes a related party transaction for the purposes of the AIM Rules.

The 4D independent Directors, having consulted with the Groups nominated advisor, N+1 Singer, consider that the terms of the related party transactions are fair and reasonable insofar as shareholders are concerned. In providing their advice to the 4D independent Directors, N+1 Singer has taken into account the commercial assessments of the 4D independent Directors.

Lock-up agreements

Duncan Peyton and Dr. Alex Stevenson, being the Chief Executive Officer and Chief Scientific Officer respectively, entered into lock-up agreements at completion. Under the terms of the lock-up agreement, each of Mr. Peyton and Dr. Stevenson agreed that, subject to certain limited exceptions, they will not sell any consideration shares due to them under the terms of the merger for a period of 12 months.