Up to \$1,000,000



Common Stock

We have entered into an At The Market Offering Agreement (the "sales agreement") with H.C. Wainwright & Co., LLC ("Wainwright") relating to shares of our common stock, par value \$0.001 per share, offered by this prospectus supplement and the accompanying prospectus. In accordance with the terms of the sales agreement, we may offer and sell shares of our common stock having an aggregate offering price of up to \$1,000,000 from time to time through Wainwright acting as our agent.

Our common stock is listed on The Nasdaq Capital Market under the symbol "APRE". On February 1, 2024, the last reported sale price of our common stock on The Nasdaq Capital Market was \$5.70 per share.

Sales of our common stock, if any, under this this prospectus supplement and the accompanying prospectus will be made in sales deemed to be "at the market offerings" as defined in Rule 415 promulgated under the Securities Act of 1933, as amended (the "Securities Act"). Wainwright is not required to sell any specific amount of securities, but will act as our sales agent using commercially reasonable efforts consistent with its normal trading and sales practices, on mutually agreed terms between Wainwright and us. There is no arrangement for funds to be received in any escrow, trust or similar arrangement.

The compensation to Wainwright for sales of common stock sold pursuant to the sales agreement will be an amount equal to 3% of the gross proceeds of any shares of common stock sold under the sales agreement. In connection with the sale of the common stock on our behalf, Wainwright will be deemed to be an "underwriter" within the meaning of the Securities Act and the compensation of Wainwright will be deemed to be underwriting commissions or discounts. See "Plan of Distribution" beginning on page S-15 for additional information regarding the compensation to be paid to Wainwright. We have also agreed to provide indemnification and contribution to Wainwright with respect to certain liabilities, including liabilities under the Securities Act or the Securities Exchange Act of 1934, as amended (the "Exchange Act").

As of January 25, 2024, the aggregate market value of our common stock held by our non-affiliates pursuant to General Instruction I.B.6 of Form S-3, or public float, was \$19,685,702, based on 3,164,904 shares of outstanding common stock held by non-affiliates as of such date and a price of \$6.22 per share, which was the last reported sale price of our common stock on the Nasdaq Capital Market on January 9, 2024. We have offered or sold \$5,521,926 of securities pursuant to General Instruction I.B.6 of Form S-3 during the prior 12 calendar month period that ends on and includes the date of this prospectus (excluding this offering). Pursuant to General Instruction I.B.6 of Form S-3, in no event will we sell securities in a registered offering with a value exceeding more than one-third of our "public float" (the market value of our common stock held by our non-affiliates) in any 12-month period so long as our public float remains below \$75.0 million

We are an "emerging growth company" and a "smaller reporting company" under federal securities laws and as such, have elected to comply with reduced public company reporting requirements for this prospectus and the documents incorporated by reference herein and may elect to comply with reduced public company reporting requirements in future filings. See "Summary — Implications of Being an Emerging Growth Company and Smaller Reporting Company."

Our business and an investment in our common stock involve significant risks. These risks are described under the caption "Risk Factors" beginning on page <u>S-6</u> of this prospectus and in the documents incorporated by reference into this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

H.C. Wainwright & Co.

February 2, 2024

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ABOUT THIS PROSPECTUS

This prospectus is part of a shelf registration statement on Form S-3 that we filed with the Securities and Exchange Commission (the "SEC"). Under the shelf registration process, we may offer shares of our common stock having an aggregate offering price of up to \$1,000,000 from time to time under this prospectus and the accompanying base prospectus at prices and on terms to be determined by market conditions at the time of the offering.

We provide information to you about this offering of shares of our common stock in two separate documents that are bound together: (1) this At The Market Offering Agreement prospectus, which describes the specific details regarding this offering; and (2) the accompanying base prospectus, which provides general information, some of which may not apply to this offering. Generally, when we refer to this "prospectus," we are referring to both documents combined. If information in this At The Market Offering Agreement prospectus is inconsistent with the accompanying base prospectus, you should rely on this prospectus. However, if any statement in one of these documents is inconsistent with a statement in another document having a later date — for example, a document incorporated by reference in this prospectus — the statement in the document having the later date modifies or supersedes the earlier statement as our business, financial condition, results of operations and prospects may have changed since the earlier dates.

You should rely only on the information contained in, or incorporated by reference into, this prospectus and in any free writing prospectus that we may authorize for use in connection with this offering. We have not, and Wainwright has not, authorized any other person to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. We are not, and Wainwright is not, making an offer to sell or soliciting an offer to buy our securities in any jurisdiction in which an offer or solicitation is not authorized or in which the person making that offer or solicitation is not qualified to do so or to anyone to whom it is unlawful to make an offer or solicitation. You should assume that the information appearing in this prospectus, the documents incorporated by reference into this prospectus, and in any free writing prospectus that we may authorize for use in connection with this offering, is accurate only as of the date of those respective documents. Our business, financial condition, results of operations and prospects may have changed since those dates. You should read this prospectus, the documents incorporated by reference into this prospectus, and any free writing prospectus that we may authorize for use in connection with this offering, in their entirety before making an investment decision. You should also read and consider the information in the documents to which we have referred you in the sections of this prospectus entitled "Where You Can Find More Information" and "Incorporation by Reference."

We are offering to sell, and seeking offers to buy, shares of common stock only in jurisdictions where offers and sales are permitted. The distribution of this prospectus and the offering of the common stock in certain jurisdictions may be restricted by law. Persons outside the United States who come into possession of this prospectus must inform themselves about, and observe any restrictions relating to, the offering of the common stock and the distribution of this prospectus outside the United States. This prospectus does not constitute, and may not be used in connection with, an offer to sell, or a solicitation of an offer to buy, any securities offered by this prospectus by any person in any jurisdiction in which it is unlawful for such person to make such an offer or solicitation.

In this prospectus, the terms "Aprea," "Company," "we," "us," "our" and similar terms refer to Aprea Therapeutics, Inc., a Delaware corporation, and its subsidiaries unless the context otherwise requires.

This prospectus and the information incorporated herein by reference include trademarks, service marks and trade names owned by us or other companies. All trademarks, service marks and trade names included or incorporated by reference in this prospectus are the property of their respective owners.

MARKET DATA

This prospectus and the documents incorporated by reference herein include market and industry data and forecasts concerning our business and the markets for certain cancers, including data regarding the estimated size of those markets and the incidence and prevalence of certain medical conditions, that we have derived from independent consultant reports, publicly available information, various industry, medical and general publications, other published industry sources, government data and our internal data and estimates. Independent consultant reports, industry publications and other published industry sources generally indicate that the information contained therein was obtained from sources believed to be reliable. Our internal data and estimates are based upon information obtained from trade and business organizations and other contacts in the markets in which we operate and our management's understanding of industry conditions.

PROSPECTUS SUMMARY

This summary highlights certain information about us, this offering and selected information contained elsewhere in or incorporated by reference into this prospectus. This summary is not complete and does not contain all of the information that you should consider before deciding whether to invest in the securities covered by this prospectus. For a more complete understanding of Aprea and this offering, we encourage you to read and consider carefully the more detailed information in this prospectus, including the information incorporated by reference in this prospectus and the information included in any free writing prospectus that we have authorized for use in connection with this offering, including the information referred to under the heading "Risk Factors" in this prospectus beginning on page S-6.

Overview

We are a clinical-stage biopharmaceutical company focused on precision oncology through synthetic lethality. Our approach is built upon a platform of integrated discovery technologies to enrich our pipeline with novel targets in synthetic lethality and cancer treatment. Together with our expertise in small molecule drug discovery, we are applying the capabilities of our discovery platform to the development of new precision oncology therapies and the identification of patient populations most likely to benefit.

On May 16, 2022, we acquired Atrin Pharmaceuticals Inc. ("Atrin"), in accordance with the terms of the Agreement and Plan of Merger dated May 16, 2022 (the "Merger Agreement"), by and among us, ATR Merger Sub I Inc., a Delaware corporation and our wholly owned subsidiary ("First Merger Sub"), ATR Merger Sub II LLC, a Delaware limited liability company and wholly owned subsidiary of Aprea ("Second Merger Sub") and Atrin. Pursuant to the Merger Agreement, First Merger Sub merged with and into Atrin, pursuant to which Atrin was the surviving corporation and became a wholly owned subsidiary of Aprea (the "First Merger"). Immediately following the First Merger, Atrin merged with and into the second Merger Sub, pursuant to which Second Merger Sub was the surviving entity. The former Atrin business is now our business.

We believe that synthetic lethality has the potential to impact patients' lives and treatment strategies for a wide range of cancer types. When a gene in the DNA damaged response ("DDR") pathway is damaged or fails, related genes make up for its loss of function. Our approach is to inhibit these genes, thereby specifically killing cancer cells with specific mutations. This approach is called synthetic lethality. Using synthetic lethality, our product candidates are designed to selectively kill cancer cells while minimizing the effect on normal, unmutated cells, decreasing the toxicity normally associated with cancer treatment. We aspire to become a leader in this emerging field and are establishing a pipeline of clinical and preclinical programs that we believe may have broad application to cancer treatment.

Our most advanced synthetic lethality product candidate is ATRN-119, a clinical-stage small molecule inhibitor of ataxia telangiectasia and Rad3-related, or ATR, a kinase that plays a critical role in DDR. ATR is one of several key regulators of the response to defective DNA replication and DNA damage, which occurs more commonly in cancer cells than in normal cells. We are enrolling patients into a Phase 1/2a clinical trial to evaluate ATRN-119 under an investigational new drug application, or IND. The first four dose cohorts have been completed, and patients with advanced solid tumors having mutations in defined DDR-related genes continue to be enrolled into additional cohorts of the Phase 1 dose escalation part of the trial. The primary endpoint of this Phase 1 part is to evaluate the tolerability and pharmacokinetics of ATRN-119 when administered orally on a continuous, once-daily schedule. We anticipate ATRN-119 tolerability and pharmacokinetic data from Phase 1 to be available in the second half of 2024.

We have several additional, wholly owned preclinical synthetic lethality programs. We are targeting WEE1, a kinase that is a key regulator of multiple phases of the cell cycle. Our lead WEE1 inhibitor product candidate is ATRN-1051, and we anticipate clearance of the IND for ATRN-1051 by the end of the first quarter of 2024. In addition, we have a preclinical research program directed at a second-generation ATR inhibitor, APR-354. Finally, we also have an early preclinical research program, which is aimed at identification of novel inhibitors of a distinct protein involved in DDR.

In addition to development of these drugs as single agents, we are evaluating potential expansion opportunities for our product candidates through twice a day administration (BID) as well as combination

with other agents such as poly (ADP-ribose) polymerase inhibitors, or PARPi, where we believe a combination of therapeutic agents may enhance synthetic lethality. We are also evaluating combination opportunities within our pipeline, including research on the combination of ATRN-119 and ATRN-1051 that is supported by a Phase II SBIR grant from the National Cancer Institute.

Prior to the acquisition of Atrin, we were engaged in the clinical development of cancer therapeutics that reactivate the mutant p53 tumor suppressor protein. Our lead product candidate was APR-246, or eprenetapopt. Following our failed pivotal Phase 3 trial in December 2020, we engaged in a thorough evaluation of strategic options leading to the acquisition of Atrin and shifting our focus to the Atrin assets. We do not currently have any ongoing preclinical studies or clinical trials involving our reactivators of mutant p53 and our primary focus is on the discovery and development of molecules targeting DDR pathways in oncology through synthetic lethality.

We have assembled a team with extensive experience in the discovery, development and commercialization of oncology drugs to support our mission of developing novel synthetic lethality-based cancer therapeutics.

Implications of Being an Emerging Growth Company and Smaller Reporting Company

We are an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. We may take advantage of certain exemptions from various public company reporting requirements, including not being required to have our internal control over financial reporting audited by our independent registered public accounting firm under Section 404 of the Sarbanes-Oxley Act of 2002 reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and any golden parachute payments. We may take advantage of these exemptions until December 31, 2024 or until we are no longer an "emerging growth company," whichever is earlier. We will cease to be an emerging growth company prior to the end of such period if certain earlier events occur, including if we become a "large accelerated filer" as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended, or Exchange Act, our annual gross revenues exceed \$1.235 billion or we issue more than \$1.0 billion of non-convertible debt in any three-year period.

In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This provision allows an emerging growth company to delay the adoption of accounting standards that have different effective dates for public and private companies until those standards would otherwise apply to private companies. We have not elected to avail ourselves of this exemption and, therefore, we will be subject to the same new or revised accounting standards as other public companies that are not "emerging growth companies."

We are also a "smaller reporting company" as defined in the Exchange Act. We may continue to be a smaller reporting company even after we are no longer an emerging growth company. We may take advantage of certain of the scaled disclosures available to smaller reporting companies and will be able to take advantage of these scaled disclosures for so long as our voting and non-voting common stock held by non-affiliates is less than \$250.0 million measured on the last business day of our second fiscal quarter, or our annual revenue is less than \$100.0 million during the most recently completed fiscal year and our voting and non-voting common stock held by non-affiliates is less than \$700.0 million measured on the last business day of our second fiscal quarter.

Corporate Information

Our principal executive offices are located at 3805 Old Easton Road, Doylestown, PA 18902, and our telephone number is (617) 463-9385. Our website address is www.aprea.com. The information contained on or accessible through our website is not incorporated by reference into this prospectus, and you should not consider any information contained on, or that can be accessed through, our website as part of this prospectus or in deciding whether to purchase our common stock.

Our filings with the SEC are posted on our website at www.aprea.com. The information found on or accessible through our website is not part of this or any other report we file with or furnish to the SEC. The public can also obtain copies of these filings by accessing the SEC's website at http://www.sec.gov.

The Offering

Common stock offered by us

Shares having an aggregate offering price of up to \$1,000,000.

Common stock to be outstanding after

this offering

Up to 3,912,111 shares, assuming the sale of \$1,000,000 of shares at a sales price of \$5.70 per share, which was the last reported sale price on The Nasdaq Capital Market on February 1, 2024. The actual number of shares issued and outstanding will vary depending on the sales price under this offering.

Manner of offering

"At-the-market" offering that may be made from time to time through our sales agent, Wainwright. See "Plan of Distribution" on page S-15 of this prospectus.

Use of proceeds

Our management will retain broad discretion regarding the allocation and use of the net proceeds from this offering. We currently intend to use the net proceeds from this offering, if any, for general corporate purposes, including for preclinical studies and clinical trials and the advancement of our product candidates. See "Use of Proceeds" on page S-10 of this

prospectus.

NASDAQ Capital Market symbol

"APRE"

Risk factors

Investing in our securities involves a high degree of risk. See "Risk Factors" beginning on page S-6 of this prospectus and the other information included in, or incorporated by reference into, this prospectus for a discussion of certain factors that you should carefully consider before deciding to invest in shares of our common stock.

The number of shares of common stock shown above to be outstanding immediately following this offering is based on 3,736,673 shares outstanding as of September 30, 2023 and excludes:

 28,112 shares of common stock issuable upon conversion of our outstanding Series A Preferred Stock.

This prospectus reflects and assumes no exercise of outstanding options or warrants.

RISK FACTORS

Investing in our securities involves risk. You should carefully consider the specific risks discussed or incorporated by reference into the applicable prospectus supplement, together with all the other information contained in the prospectus or incorporated by reference into this prospectus and the applicable prospectus supplement. You should also consider the risks, uncertainties and assumptions discussed under the caption "Risk Factors" included in our Annual Report on Form 10-K for the year ended December 31, 2022 and in our Quarterly Reports on Form 10-Q for the periods ended March 31, June 30 and September 30, 2023, and in subsequent filings, which are incorporated by reference into this prospectus. These risk factors may be amended, supplemented or superseded from time to time by other reports we file with the SEC in the future or by a prospectus supplement relating to a particular offering of our securities. These risks and uncertainties are not the only risks and uncertainties we face. Additional risks and uncertainties not presently known to us, or that we currently view as immaterial, may also impair our business. If any of the risks or uncertainties described in our SEC filings or any prospectus supplement or any additional risks and uncertainties actually occur, our business, financial condition and results of operations could be materially and adversely affected. In that case, the trading price of our securities could decline and you might lose all or part of your investment.

Risks Relating to this Offering

Management will have broad discretion as to the use of the proceeds from this offering and may not use the proceeds effectively.

We cannot specify with certainty all of the particular uses of the net proceeds of this offering. Our management will have significant flexibility in applying the net proceeds from this offering, and you will not have the opportunity as part of your investment decision to assess whether the net proceeds are being used appropriately. Investors may not agree with our decisions on the use of proceeds of this offering, and our use of the proceeds may not yield any return on your investment. Because of the number and variability of factors that will determine our use of the net proceeds from this offering, their ultimate use may vary substantially from their currently intended use. Our management may use the net proceeds for purposes that may not improve our financial condition or market value. Our failure to apply the net proceeds of this offering effectively could impair our ability to pursue our growth strategy or could require us to raise additional capital. Pending their use, we intend to invest the net proceeds from the offering in investment-grade, interest-bearing instruments, such as money market accounts, certificates of deposit, commercial paper and guaranteed obligations of the U.S. government. These investments may not yield a favorable return to our stockholders.

Future sales of substantial amounts of our common stock, or the possibility that such sales could occur, could adversely affect the market price of our common stock.

We may issue up to \$1.0 million of shares of common stock from time to time in this offering. The issuance from time to time of shares in this offering, as well as our ability to issue such shares in this offering, could have the effect of depressing the market price or increasing the market price volatility of our common stock.

It is not possible to predict the actual number of shares we will sell under the sales agreement, or the gross proceeds resulting from those sales.

Subject to certain limitations in the sales agreement and compliance with applicable law, we have the discretion to deliver a placement notice to the sales agent at any time throughout the term of the sales agreement. The number of shares that are sold through the sales agent after delivering a placement notice will fluctuate based on a number of factors, including the market price of the common stock during the sales period, the limits we set with the sales agent in any applicable placement notice, and the demand for our common stock during the sales period. Because the price per share of each share sold will fluctuate during the sales period, it is not currently possible to predict the number of shares that will be sold or the gross proceeds to be raised in connection with those sales.

The common stock offered hereby will be sold in "at the market offerings," and investors who buy shares at different times will likely pay different prices.

Investors who purchase shares in this offering at different times will likely pay different prices, and so they may experience different levels of dilution and different outcomes in their investment results. We will

have discretion, subject to market demand, to vary the timing, prices, and numbers of shares sold in this offering. In addition, there is no minimum or maximum sales price for shares to be sold in this offering. Investors may experience a decline in the value of the shares they purchase in this offering as a result of sales made at prices lower than the prices they paid.

You may experience immediate and substantial dilution.

If the offering price per share you pay in this offering exceeds the net tangible book value per share of our common stock, you will be immediately diluted to the extent of the difference between the amount you pay per share and the as adjusted net tangible book value per share of our common stock after giving effect to this offering. Assuming we sell an aggregate amount of \$1.0 million in this offering at an assumed public offering price of \$5.70 per share, the closing price per share of our common stock on The Nasdaq Capital Market on February 1, 2024, and after deducting commissions and estimated aggregate offering expenses payable by us, you would experience immediate dilution in net tangible book value of \$0.31 per share, representing a difference between the assumed public offering price per share and our as adjusted net tangible book value per share after this offering. To the extent that outstanding options are exercised or outstanding restricted stock units vest and settle, investors purchasing our common stock in this offering may experience further dilution. See the section entitled "Dilution" for a more detailed illustration of the dilution you may incur if you participate in this offering.

You may experience future dilution as a result of future equity offerings.

In order to raise additional capital, we may in the future offer additional shares of our common stock or other securities convertible into or exchangeable for our common stock. We may not be able to sell shares or other securities in any other offering at a price per share that is equal to or greater than the price per share paid by investors in this offering, and investors purchasing shares or other securities in the future could have rights superior to existing stockholders. The price per share at which we sell additional shares of our common stock or other securities convertible into or exchangeable for our common stock in future transactions may be higher or lower than the price per share in this offering.

If securities or industry analysts fail to continue publishing research about our business, if they change their recommendations adversely or if our results of operations do not meet their expectations, our stock price and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline. In addition, it is likely that in some future period our operating results will be below the expectations of securities analysts or investors. If one or more of the analysts who cover us downgrade our stock, or if our results of operations do not meet their expectations, our stock price could decline.

Because we do not intend to declare cash dividends on our shares of common stock in the foreseeable future, stockholders must rely on appreciation of the value of our common stock for any return on their investment.

We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends in the foreseeable future. In addition, the terms of any existing or future debt agreements may preclude us from paying dividends. As a result, we expect that only appreciation of the price of our common stock, if any, will provide a return to investors in this offering for the foreseeable future.

FORWARD-LOOKING STATEMENTS

This prospectus includes and incorporates by reference "forward-looking statements" within the meaning of the U.S. Private Securities Litigation Reform Act of 1995 and releases issued by the SEC and within the meaning of Section 27A of the Securities Act, and Section 21E of the Exchange Act. All statements other than statements of historical fact are "forward-looking statements" for purposes of this prospectus. In some cases, you can identify forward-looking statements by terminology such as "may," "could," "will," "would," "should," "expect," "plan," "anticipate," "believe," "estimate," "intend," "predict," "seek," "contemplate," "project," "continue," "potential," "ongoing," "goal," or the negative of these terms or other comparable terminology. These forward-looking statements include, but are not limited to, statements about:

- our ability to continue to operate as an integrated company subsequent to our acquisition of Atrin Pharmaceuticals Inc.;
- estimates of our expenses, capital requirements and our needs for additional financing;
- business interruptions, including delays in enrollment, patient follow-up and data collection of clinical trials, resulting from a public health emergency or pandemic;
- the prospects of our product candidates, all of which are still in development;
- outcome and results of ongoing or future preclinical studies and clinical trials of our product candidates;
- our expectations regarding our ability to identify, discover or acquire additional suitable product candidates;
- the design of our ongoing and planned clinical trials, including the sample size, trial duration, endpoint definition, event rate assumptions and eligibility criteria;
- our ability to enroll patients in clinical trials, to timely and successfully complete those trials and to receive necessary regulatory approvals;
- our expectations regarding the timing of initiation of data readout from our clinical trials;
- market acceptance or commercial success of any product candidate we develop and the degree of
 acceptance among physicians, patients, patient advocacy groups, healthcare payors and the medical
 community;
- our expectations regarding competition, potential market size, the size of the patient populations for our product candidates, if approved for commercial use, and market acceptance;
- our ability to obtain regulatory approval of our product candidates, and any restrictions, limitations and/or warnings in their labels, if approved;
- the scope of protection we are able to establish and maintain for intellectual property rights covering our product candidates;
- potential claims relating to our intellectual property and third-party intellectual property;
- the duration of our intellectual property estate that will provide protection for our product candidates;
- developments relating to our competitors and our industry;
- our sales, marketing or distribution capabilities and our ability to commercialize our product candidates, if we obtain regulatory approval;
- current and future agreements with third parties in connection with conducting clinical trials, as well
 as the manufacturing of our product candidates;
- our expectations regarding the ability of our current contract manufacturing partners to produce our product candidates in the quantities and timeframe that we will require;
- our expectations regarding our future costs of goods;
- our ability to attract, retain and motivate key personnel and increase the size of our organization;

- our ability to establish collaborations in lieu of obtaining additional financing;
- the impact of government laws and regulations;
- · our financial performance; and
- our expectations regarding the time during which we will be an emerging growth company under the JOBS Act or a smaller reporting company under the Exchange Act.

These statements relate to future events or to our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by these forward-looking statements. In evaluating such forward-looking statements, you should specifically consider various factors that may cause actual results to differ materially from current expectations, including the risks outlined under the heading "Risk Factors" contained in this prospectus and any related free writing prospectus, and in any other documents incorporated herein or therein. Any forward-looking statement in this prospectus reflects our current view with respect to future events and is subject to these and other risks, uncertainties and assumptions relating to our operations, results of operations, industry and future growth. Given these uncertainties, you should not place undue reliance on these forward-looking statements. Except as required by law, we assume no obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future.

This prospectus and the documents incorporated by reference, may also contain estimates, projections and other information concerning our industry, our business and the markets for certain drugs, including data regarding the estimated size of those markets, their projected growth rates and the incidence of certain medical conditions. Information that is based on estimates, forecasts, projections or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances reflected in this information. Unless otherwise expressly stated, we obtained these industry, business, market and other data from reports, research surveys, studies and similar data prepared by third parties, industry, medical and general publications, government data and similar sources. In some cases, we do not expressly refer to the sources from which these data are derived.

USE OF PROCEEDS

We may issue and sell shares of our common stock having aggregate sales proceeds of up to \$1,000,000 from time to time. The amount of proceeds from this offering will depend upon the number of shares of our common stock sold and the market price at which they are sold. Because there is no minimum offering amount required as a condition of this offering, the actual total public offering amount, commissions and proceeds to us, if any, are not determinable at this time. There can be no assurance that we will be able to sell any shares under, or fully utilize, the sales agreement with Wainwright as a source of financing.

We will retain broad discretion over the use of the net proceeds from the sale of the securities offered hereby. We currently intend to use the net proceeds from this offering, if any, for general corporate purposes, including for preclinical studies and clinical trials and the advancement of our product candidates. The amount and timing of these expenditures will depend on a number of factors, such as the timing, scope, progress and results of our research and development efforts, the timing and progress of any partnership efforts, and the competitive environment for our product candidates.

As of the date of this prospectus, we cannot specify with certainty all of the particular uses for the net proceeds to us from this offering, if any. As a result, our management will have broad discretion regarding the timing and application of the net proceeds from this offering. Pending the application of the net proceeds, we intend to invest the net proceeds in short-term, investment grade, interest-bearing securities.

DILUTION

If you invest in our common stock, you will experience dilution to the extent of the difference between the price per share you pay in this offering and the net tangible book value per share of our common stock immediately after this offering. Our net tangible book value as of September 30, 2023 was approximately \$20.3 million or \$5.42 per share of our common stock. Net tangible book value per share as of September 30, 2023 is equal to our total tangible assets minus total liabilities and the carrying value of Series A convertible preferred stock, all divided by the number of shares of common stock outstanding as of September 30, 2023.

After giving effect to the sale of \$1,000,000 of shares of our common stock in this offering at an assumed offering price of \$5.70 per share, the last reported sale price of our common stock on The Nasdaq Capital Market on February 1, 2024, and after deducting estimated offering commissions and expenses payable by us, our as adjusted net tangible book value would have been approximately \$20.9 million or \$5.39 per share of common stock, as of September 30, 2023. This represents an immediate decrease in net tangible book value of approximately \$0.03 per share to existing stockholders and an immediate dilution of approximately \$0.31 per share to investors in this offering. The following table illustrates this calculation on a per share basis.

	Assumed public offering price per share		\$5.70
	Net tangible book value per share as of September 30, 2023	\$5.42	
	Decrease in net tangible book value per share attributable to this offering	\$0.03	
As adjusted net tangible book value per share as of September 30, 2023, after giving effect			
	to this offering		\$5.39
	Dilution per share to new investors purchasing shares in this offering		\$0.31

The number of shares of common stock shown above to be outstanding immediately following this offering is based on 3,736,673 shares outstanding as of September 30, 2023 and excludes:

 28,112 shares of common stock issuable upon conversion of our outstanding Series A Preferred Stock.

The above illustration of dilution per share to investors participating in this offering assumes no exercise of outstanding options or warrants to purchase our common stock. The exercise of outstanding options or warrants having an exercise price per share that is less than the offering price per share in this offering will increase dilution to investors in this offering.

DESCRIPTION OF CAPITAL STOCK

The following description is a general summary of the terms of the shares of common stock or shares of preferred stock that we may issue. The description below and in any prospectus supplement does not include all of the terms of the shares of common stock or shares of preferred stock and should be read together with our Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws, copies of which have been filed previously with the SEC. For more information on how you can obtain copies of our Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws, see "Where You Can Find More Information."

General

Our charter authorizes us to issue up to 400,000,000 shares of common stock, par value \$0.001 per share, and 40,000,000 shares of preferred stock, par value \$0.001 per share. The following summary sets forth some of the general terms of our common stock. Because this is a summary, it does not contain all of the information that may be important to you. For a more detailed description of our common stock, you should read our amended and restated certificate of incorporation and the amended and restated bylaws, each of which is an exhibit to our Annual Report on Form 10-K to which this summary is also an exhibit, and the applicable provisions of the Delaware General Corporation Law (the "DGCL").

Common stock

As of November 9, 2023, we had outstanding 3,736,673 shares of common stock.

Voting Rights

Holders of our common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders and do not have cumulative voting rights. An election of directors by our stockholders will be determined by a plurality of the votes cast by the stockholders entitled to vote on the election. Other matters shall be decided by the affirmative vote of our stockholders having a majority in voting power of the votes cast by the stockholders present or represented and voting on such matter, except as otherwise disclosed below.

Dividends

Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend rights of outstanding preferred stock.

Liquidation

In the event of our liquidation or dissolution, the holders of common stock are entitled to receive proportionately all assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any outstanding preferred stock. Holders of common stock have no preemptive, subscription, redemption or conversion rights.

Rights and Preferences

The rights, preferences and privileges of holders of common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future.

Preferred stock

Our board of directors is authorized to issue shares of preferred stock in one or more series without stockholder approval. Our board of directors has the discretion to determine the rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation preferences, of each series of preferred stock. You should refer to the applicable certificate of designation for complete information regarding a series of preferred stock to be issued under this prospectus and the applicable prospectus supplement.

The purpose of authorizing our board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions, future financings and other corporate purposes, could have the effect of making it more difficult for a third party to acquire, or could discourage a third party from seeking to acquire, a majority of our outstanding voting stock. As of September 30, 2023, there were 56,227 shares of Series A Preferred Stock outstanding. We have no present plans to issue any additional shares of preferred stock.

Anti-Takeover effects of Delaware law and our charter and bylaws

Delaware law, our certificate of incorporation and our bylaws contain provisions that could have the effect of delaying, deferring or discouraging another party from acquiring control of us. These provisions, which are summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors.

Staggered board; removal of directors

Our certificate of incorporation and bylaws divides our board of directors into three classes with staggered three-year terms. In addition, a director may only be removed for cause and only by the affirmative vote of the holders of a majority of the votes that all of our stockholders would be entitled to cast in an annual election of directors. Any vacancy on our board of directors, including a vacancy resulting from an enlargement of our board of directors, will only be able to be filled by vote of a majority of our directors then in office. The classification of our board of directors and the limitations on the removal of directors and filling of vacancies could make it more difficult for a third party to acquire, or discourage a third party from seeking to acquire, control of our company.

Stockholder action by written consent; special meetings

Our certificate of incorporation provides that any action required or permitted to be taken by our stockholders must be effected at a duly called annual or special meeting of such holders and may not be effected by any consent in writing by such holders. Our certificate of incorporation and bylaws also provide that, except as otherwise required by law, special meetings of our stockholders can only be called by our chairman of the board, our Chief Executive Officer or our board of directors.

Advance notice requirements for stockholder proposals

Our bylaws establish an advance notice procedure for stockholder proposals to be brought before an annual meeting of stockholders, including proposed nominations of persons for election to our board of directors. Stockholders at an annual meeting are only able to consider proposals or nominations specified in the notice of meeting or brought before the meeting by or at the direction of our board of directors or by a stockholder of record on the record date for the meeting who is entitled to vote at the meeting and who has delivered timely written notice in proper form to our secretary of the stockholder's intention to bring such business before the meeting. These provisions could have the effect of delaying until the next stockholder meeting stockholder actions that are favored by the holders of a majority of our outstanding voting securities.

Delaware business combination statute

We are subject to Section 203 of the DGCL. Subject to certain exceptions, Section 203 prevents a publicly held Delaware corporation from engaging in a "business combination" with any "interested stockholder" for three years following the date that the person became an interested stockholder, unless the interested stockholder attained such status with the approval of our board of directors or unless the business combination is approved in a prescribed manner. A "business combination" includes, among other things, a merger or consolidation involving us and the "interested stockholder" and the sale of more than 10% of our assets. In general, an "interested stockholder" is any entity or person beneficially owning 15% or more of our outstanding voting stock and any entity or person affiliated with or controlling or controlled by such entity or person.

Amendment of certificate of incorporation and bylaws

DGCL provides generally that the affirmative vote of a majority of the shares entitled to vote on any matter is required to amend a corporation's certificate of incorporation or bylaws, unless a corporation's certificate of incorporation or bylaws, as the case may be, requires a greater percentage. Our bylaws may be amended or repealed by a majority vote of our board of directors or by the affirmative vote of the holders of at least 75% of the votes that all of our stockholders would be entitled to cast in any annual election of directors. In addition, the affirmative vote of the holders of at least 75% of the votes that all of our stockholders would be entitled to cast in any annual election of directors is required to amend or repeal or to adopt any provisions inconsistent with any of the provisions of our certificate of incorporation described above under "Staggered board; removal of directors" and "Stockholder action by written consent; special meetings."

Exclusive forum selection

Our certificate of incorporation provides, unless we consent in writing to the selection of an alternative forum, to the fullest extent permitted by law, the Court of Chancery of the State of Delaware (or if the Court of Chancery does not have jurisdiction, the federal district court for the District of Delaware) shall be the sole and exclusive forum for (1) any derivative action or proceeding brought on behalf of our company under Delaware law, (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or employees to our company or our stockholders, (3) any action asserting a claim against our company arising pursuant to any provision of the DGCL or our certificate of incorporation or bylaws, (4) any action asserting a claim against our company governed by the internal affairs doctrine or (5) any other action asserting an "internal corporate claim," as defined in Section 115 of the DGCL. These exclusive-forum provisions do not currently apply to claims under the Securities Act of 1933, as amended, or the Exchange Act. Any person or entity purchasing or otherwise acquiring any interest in our securities shall be deemed to have notice of and consented to this provision. Although we believe these provisions benefit us by providing increased consistency in the application of Delaware law for the specified types of actions and proceedings, the provisions may have the effect of discouraging lawsuits against us or our directors and officers.

Listing on The Nasdaq Capital Market

Our common stock is listed on The Nasdaq Capital Market under the symbol "APRE."

Authorized but unissued shares

The authorized but unissued shares of common stock and preferred stock are available for future issuance without stockholder approval, subject to any limitations imposed by the listing requirements of The Nasdaq Capital Market. These additional shares may be used for a variety of corporate finance transactions, acquisitions and employee benefit plans. The existence of authorized but unissued and unreserved common stock and preferred stock could make it more difficult or discourage an attempt to obtain control of us by means of a proxy contest, tender offer, merger or otherwise.

Transfer agent and registrar

The transfer agent and registrar for our common stock is Computershare Trust Company, N.A. The transfer agent and registrar's address is 150 Royall St., Canton, MA 02021.

PLAN OF DISTRIBUTION

We have entered into a sales agreement with H.C. Wainwright & Co., LLC ("Wainwright") under which we may issue and sell from time to time up to \$1,000,000 of our common stock through Wainwright as our sales agent. Sales of our common stock, if any, will be made at market prices by any method that is deemed to be an "at the market" offering as defined in Rule 415 under the Securities Act, including sales made directly on The Nasdaq Capital Market or any other existing trading market in the United States for our common stock, sales made to or through a market maker other than on an exchange or otherwise, directly to Wainwright as principal, in negotiated transactions at market prices prevailing at the time of sale or at prices related to such prevailing market prices and/or in any other method permitted by law.

Wainwright will offer our common stock subject to the terms and conditions of the sales agreement on a daily basis or as otherwise agreed upon by us and Wainwright. We will designate the maximum amount of common stock to be sold through Wainwright on a daily basis or otherwise determine such maximum amount together with Wainwright. Subject to the terms and conditions of the sales agreement, Wainwright will use its commercially reasonable efforts consistent with its normal trading and sales practices to sell on our behalf all of the shares of common stock requested to be sold by us. We may instruct Wainwright not to sell common stock if the sales cannot be effected at or above the price designated by us in any such instruction. Wainwright or we may suspend the offering of our common stock being made through Wainwright under the sales agreement upon proper notice to the other party. We or Wainwright may suspend the offering of the common stock being made through Wainwright under the sales agreement upon proper notice to the other party.

The aggregate compensation payable to Wainwright as sales agent is equal to 3.0% of the gross sales price of the shares sold through it pursuant to the sales agreement. Pursuant to the terms of the sales agreement, we agreed to reimburse Wainwright for the reasonable fees and expenses of its legal counsel incurred in connection with entering into the sales agreement in an amount not to exceed \$50,000 in the aggregate, in addition to up to \$2,500 per due diligence update session for Wainwright's counsel's fees. We estimate that the total expenses of the offering payable by us, excluding commissions payable to Wainwright under the sales agreement, will be approximately \$125,000.

The remaining sales proceeds, after deducting any expenses payable by us and any transaction fees imposed by any governmental, regulatory, or self-regulatory organization in connection with the sales, will equal our net proceeds for the sale of such common stock.

Wainwright will provide written confirmation to us following the close of trading on The Nasdaq Capital Market on each day in which common stock is sold through it as sales agent under the sales agreement. Each confirmation will include the number of shares of common stock sold through it as sales agent on that day, the volume weighted average price of the shares sold, the percentage of the daily trading volume and the net proceeds to us.

To the extent any sales are made, we will report at least quarterly the number of shares of common stock sold through Wainwright under the sales agreement, the net proceeds to us and the compensation paid by us to Wainwright in connection with the sales of common stock.

Settlement for sales of common stock will occur on the second business day or such shorter settlement cycle as may be in effect under Exchange Act Rule 15c6-1 from time to time, following the date on which any sales are made, or on some other date that is agreed upon by us and Wainwright in connection with a particular transaction, in return for payment of the net proceeds to us. Sales of our common stock as contemplated in this prospectus supplement and the accompanying prospectus will be settled through the facilities of The Depository Trust Company or by such other means as we and Wainwright may agree upon. There is no arrangement for funds to be received in an escrow, trust or similar arrangement.

In connection with the sales of our common stock on our behalf, Wainwright may be deemed to be an "underwriter" within the meaning of the Securities Act, and the compensation paid to Wainwright may be deemed to be underwriting commissions or discounts. We have agreed in the sales agreement to provide indemnification and contribution to Wainwright against certain liabilities, including liabilities under the Securities Act.

Our common stock is listed on The Nasdaq Capital Market and trades under the symbol "APRE." The transfer agent of our common stock is Computershare.

To the extent required by Regulation M, Wainwright will not engage in any market making activities involving our shares of common stock while the offering is ongoing under this prospectus supplement.

Wainwright and/or its affiliates have provided, and may in the future provide, various investment banking and other financial services for us for which services they have received and, may in the future receive, customary fees.

In addition, in the ordinary course of its business activities, Wainwright and its affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for their own account and for the accounts of their customers. Such investments and securities activities may involve securities and/or instruments of ours or our affiliates. Wainwright and its affiliates may also make investment recommendations and/or publish or express independent research views in respect of such securities or financial instruments and may hold, or recommend to clients that they acquire, long and/or short positions in such securities and instruments.

LEGAL MATTERS

Certain legal matters in connection with the securities offered hereby will be passed upon for us by DLA Piper LLP (US), Philadelphia, Pennsylvania. Ellenoff Grossman & Schole LLP, New York, New York, is counsel for Wainwright in connection with this offering.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our <u>Annual Report on Form 10-K for the year ended December 31, 2022</u>, as set forth in their report, which is incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP's report, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We have filed with the SEC a registration statement on Form S-3 under the Securities Act of 1933, as amended (the "Securities Act"), with respect to the securities offered by this prospectus. This prospectus does not contain all of the information set forth in the registration statement, of which it is a part, and its exhibits and schedules in accordance with SEC rules and regulations. For further information with respect to us and the securities being offered by this prospectus, you should read the registration statement, including its exhibits and schedules. Statements contained in this prospectus, including documents that we have incorporated by reference, as to the contents of any contract or other document referred to are not necessarily complete, and, with respect to any contract or other document filed as an exhibit to the registration statement or any other such document, each such statement is qualified in all respects by reference to the corresponding exhibit. You should review the complete contract or other document to evaluate these statements. You may obtain copies of the registration statement and its exhibits via the SEC's website at http://www.sec.gov.

We are subject to the information and periodic reporting requirements of the Exchange Act, and we file annual, quarterly and current reports, proxy statements and other documents with the SEC. The SEC maintains a website that contains reports, proxy and information statements and other information regarding issuers, including us, that file electronically with the SEC. You may obtain documents that we file with the SEC at http://www.sec.gov.

We also make these documents available on our website at www.aprea.com. Our website and the information contained or accessible through our website is not incorporated by reference in this prospectus, and you should not consider it part of this prospectus.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

SEC rules permit us to incorporate information by reference in this prospectus and any applicable prospectus supplement. This means that we can disclose important information to you by referring you to another document filed separately with the SEC. The information incorporated by reference is considered to be part of this prospectus and any applicable prospectus supplement, except for information superseded by information contained in this prospectus or any applicable prospectus supplement itself or in any subsequently filed incorporated document. This prospectus and any applicable prospectus supplement incorporate by reference the documents set forth below that we have previously filed with the SEC, other than information in such documents that is deemed to be furnished and not filed. These documents contain important information about us and our business and financial condition.

- Annual Report on Form 10-K for the year ended December 31, 2022, filed with the SEC on March 30, 2023 (as amended by Amendment No. 1 to our Annual Report on Form 10-K filed with the SEC on April 28, 2023)
- Quarterly Report on Form 10-Q for the period ended March 31, 2023, filed with the SEC on May 15, 2023;
- Quarterly Report on Form 10-Q for the period ended June 30, 2023, filed with the SEC on August 10, 2023;
- Quarterly Report on Form 10-Q for the period ended September 30, 2023, filed with the SEC on November 9, 2023;
- Current Reports on Form 8-K, filed with the SEC on <u>January 30, 2023</u>, <u>February 13, 2023</u>, <u>February 24, 2023</u>, <u>March 30, 2023</u>, <u>April 18, 2023</u>, <u>May 8, 2023</u>, <u>May 15, 2023</u> (other than the information furnished pursuant to Item 2.02), <u>July 5, 2023</u>, <u>August 10, 2023</u> (other than the information furnished pursuant to Item 2.02), <u>August 24, 2023</u>, <u>September 11, 2023</u>, <u>October 13, 2023</u>, <u>October 16, 2023</u>, <u>November 9, 2023</u> (other than the information furnished pursuant to Item 2.02), <u>January 4, 2024</u> and February 2, 2024; and
- the description of our Common Stock contained in our Registration Statement on Form 8/A, dated September 30, 2019, including any amendments or reports filed for the purpose of updating such description.

All documents that we file (but not those that we furnish) pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act, after the date of the initial registration statement of which this prospectus is a part and prior to the effectiveness of the registration statement shall be deemed to be incorporated by reference into this prospectus and will automatically update and supersede the information in this prospectus, and any previously filed documents. All documents that we file (but not those that we furnish) pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act on or after the date of this prospectus and prior to the termination of the offering of any of the securities covered under this prospectus shall be deemed to be incorporated by reference into this prospectus and will automatically update and supersede the information in this prospectus, the applicable prospectus supplement and any previously filed documents.

Any statement contained herein or in a document incorporated or deemed to be incorporated by reference in this prospectus or any applicable prospectus supplement shall be deemed to be modified or superseded for purposes of this prospectus and such applicable prospectus supplement to the extent that a statement contained in this prospectus or such applicable prospectus supplement, or in any other subsequently filed document which also is or is deemed to be incorporated by reference in this prospectus and such applicable prospectus supplement, modifies or supersedes such earlier statement. Any statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this prospectus or such applicable prospectus supplement.

You can obtain any of the filings incorporated by reference into this prospectus or any applicable prospectus supplement through us or from the SEC through the SEC's website at http://www.sec.gov. Upon request, we will provide, without charge, a copy of any or all of the reports and documents referred to above which have been incorporated by reference into this prospectus or any applicable prospectus supplement.

Prospective investors may obtain documents incorporated by reference in this prospectus or any applicable prospectus supplement by requesting them in writing or by telephone from us at our executive offices at:

Aprea Therapeutics, Inc. 3805 Old Easton Road Doylestown, PA 18902 (617) 463-9385

Our reports and documents incorporated by reference herein may also be found in the "Investor Relations" section of our website at www.aprea.com. The content of our website and any information that is linked to or accessible from our website (other than our filings with the SEC that are incorporated by reference, as set forth under "Incorporation of Certain Documents by Reference") is not incorporated by reference into this prospectus or any applicable prospectus supplement and you should not consider it a part of this prospectus, any applicable prospectus supplement, or the registration statement.

Up to \$1,000,000



Common Stock

PROSPECTUS

H.C. Wainwright & Co.

February 2, 2024