



# **Biotechnology Investing**

**Patrick Adams, CFA**

**January 2023**

# I. Why Biotechnology?

---

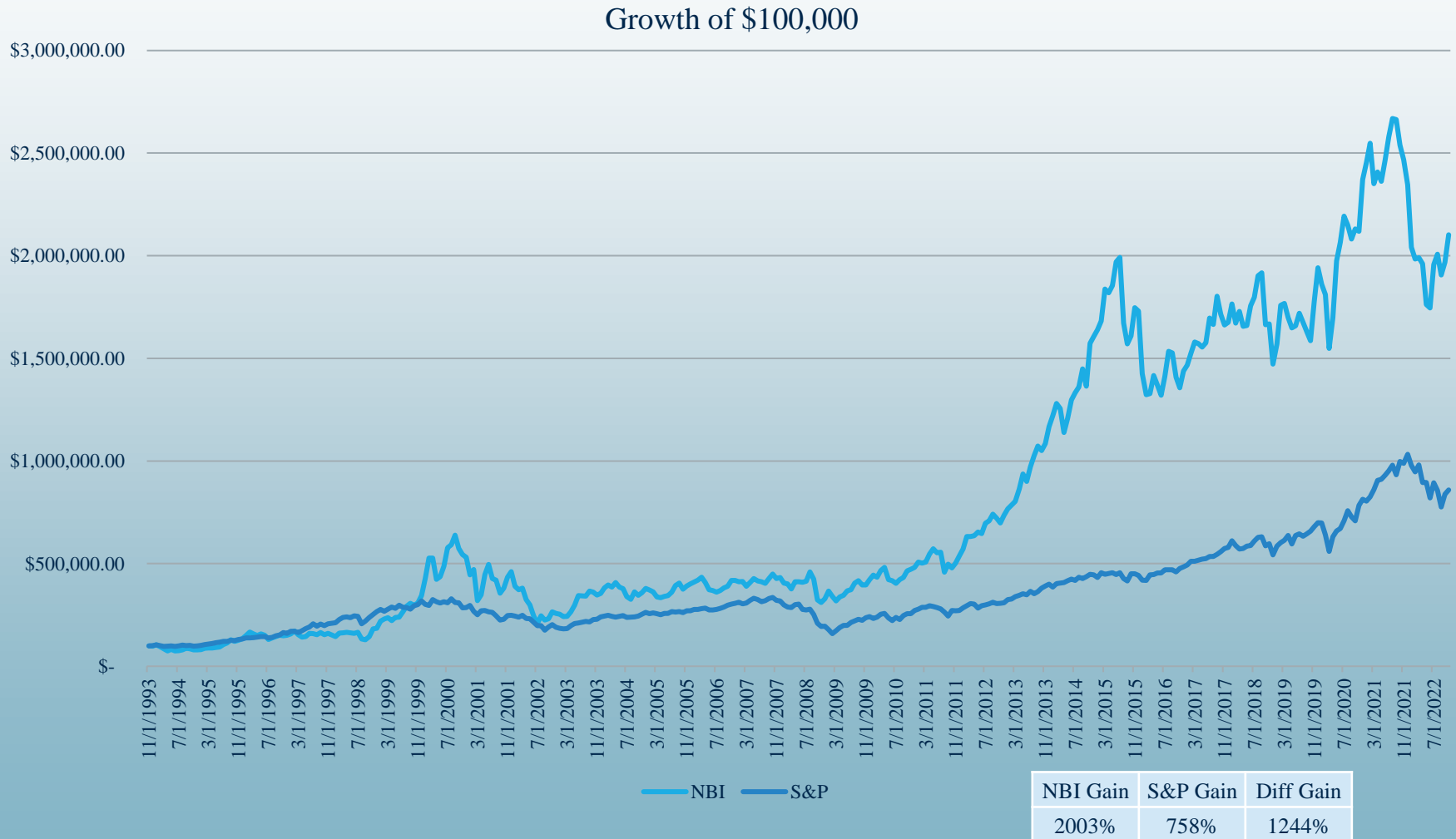
## Timely Opportunity to Invest

### ➤ **Small and Microcap Emerging Biotech Stocks**

- From February 2020 to June 2022 the Index declined -65%, a historic bear market
- Valuations are very attractive, with Phase 3 assets valued like phase 1 or 2, cash to market caps are significant, investors are getting very discounted valuations that venture capital or other very significant healthcare investors may have invested at much higher levels
- Drug companies are flush with cash and desire to replace pipelines via acquisitions
- Healthcare is a growth sector, biotech is the strongest area of growth
- The science is vastly improved
- Approvals are more predictable with more drugs being approved
- Computer Science is being incorporated into drug development accelerating the time to approval, and improving the success rate
- Return potential is very high, need to be selective, the number of IPOs in 2020 were 77 a record, and 96 in 2021

## Historically, Biotechnology has Outperformed as a Sector

- Since the Nasdaq Biotech Index's (NBI) inception in 1993, NBI's performance has exceeded the S&P Composite's performance by 1244%, even with a massive bear market for the sector in the last year.



## Major Breakthroughs in Biotechnology- The Science is Vastly Improved

- Mapping of the Genome
  - In October 1990, began mapping the genome, achieved completion in April 2003
  - Now able to link conditions to genetic predispositions
  - Easier to determine the correct targets for a disease and demonstrate efficacy
  - Drug treatment is further customized- 50% of cancers have P53 mutations, new therapies are being developed for these specific cancers
- Integration of AI
  - Patient response markers and responding patient types can be identified quickly
  - It is easier to develop viable drug targets for specific conditions
  - The amount of necessary testing time has decreased
  - A single compound out of millions of drug candidates can be selected for a certain disease area
- Improved Science and Increased Approvals
  - Time until approval is accelerating, something that might take 10 years to develop might only take 3 years now
  - More drugs getting approved

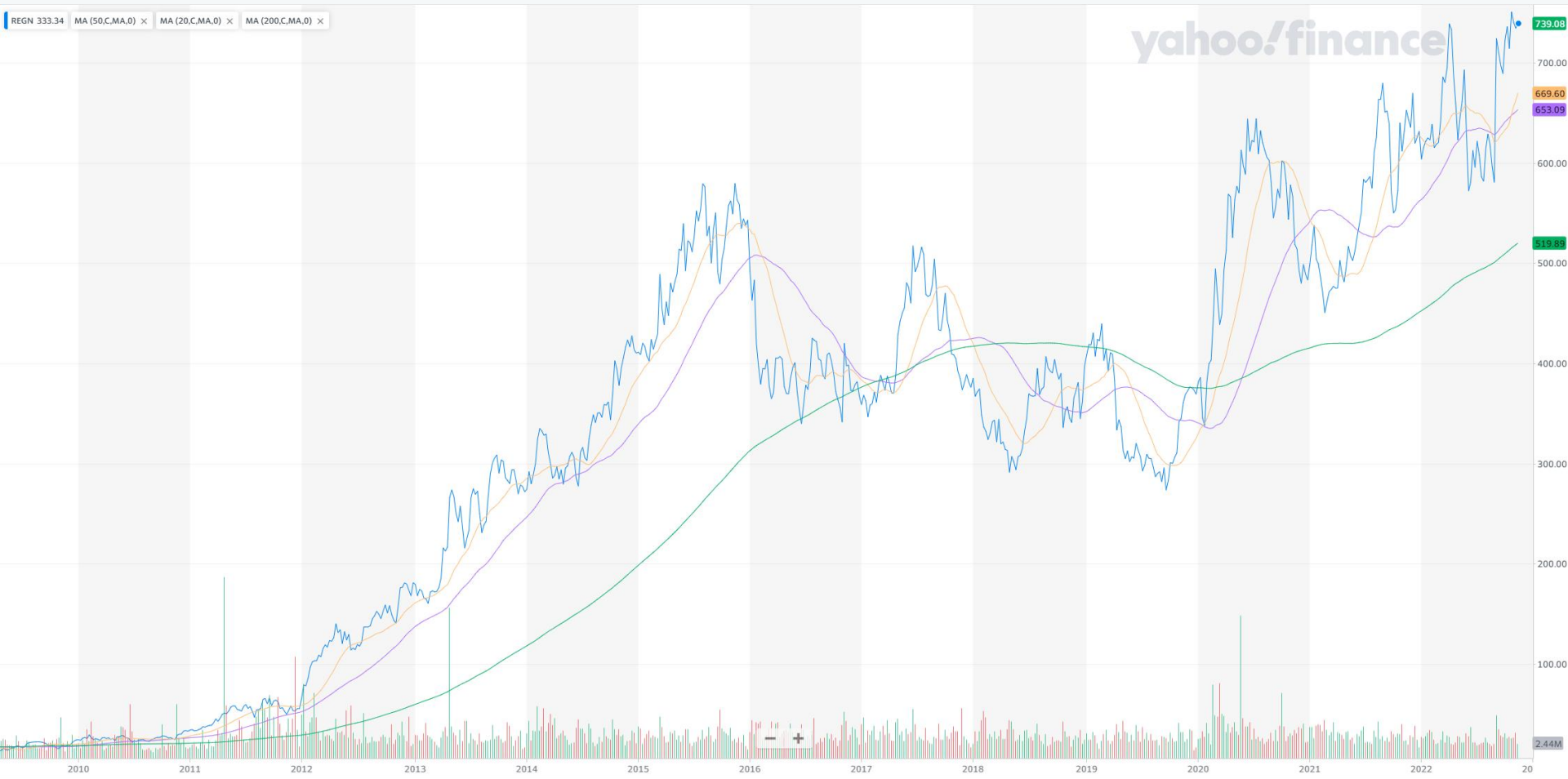
# AXSM- \$3.00 to \$100 Stock Price in One Year

- Since the beginning of 2019, Axsome Therapeutics is up 1,887%. If you had invested \$1,000, you would have \$19,800 today or over \$35,000 if sold in December 2019.



# REGN- Very Significant Long-Term Returns in Biotech

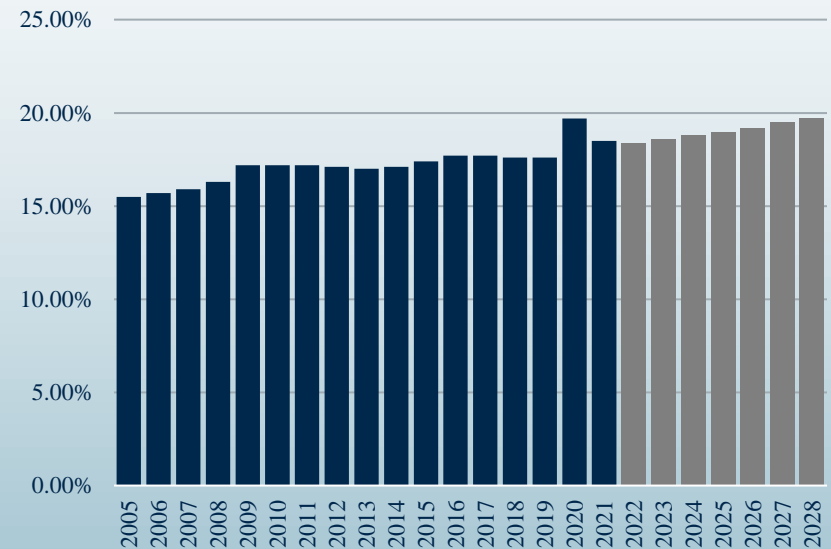
➤ Regeneron Pharmaceuticals is up just about 3,000% since 2010. If you had invested just \$1,000 you would have \$30,000 today.



## Significant Growth Opportunities and the Aging American Population

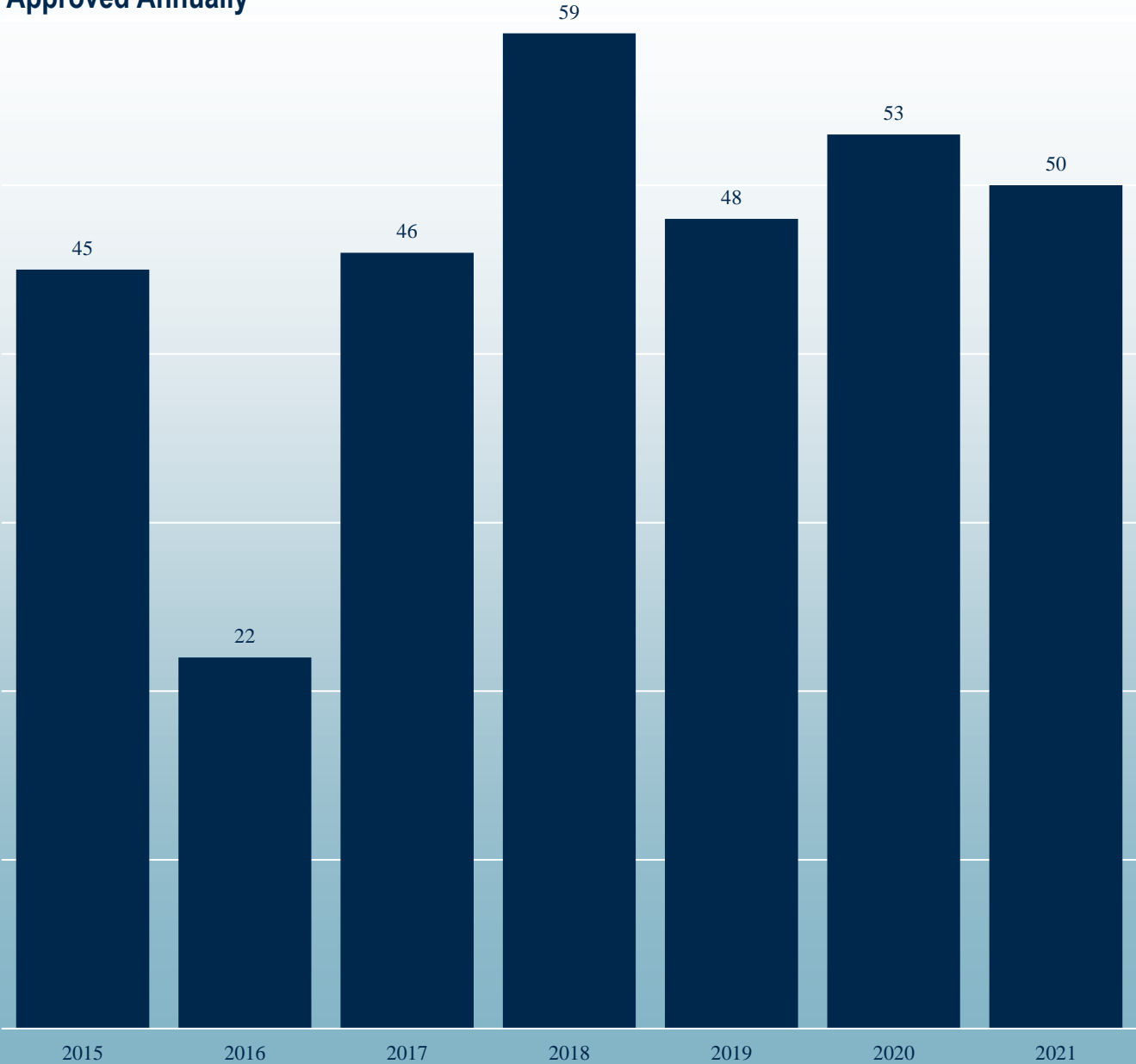
- U.S. healthcare expenditures accounted for 19.7% of Gross Domestic Product (GDP) in 2020, Nearly 1/5<sup>th</sup> of U.S. GDP.
- Healthcare spending averaged \$12,530 per person
- Healthcare spending increased 9.7% from 2019 to 2020, reaching 4.1 trillion U.S. Dollars, double the 4.3% growth rate in 2019
- It is expected that healthcare expenditure will accumulate to about 6.2 trillion U.S. Dollars by 2028
- Growth is amplified as baby boomers are all beginning to enter the 65+ population
- Lifespans are getting longer, but baby boomers are experiencing higher rates of chronic conditions that require health services

**U.S. Healthcare Spend as % of GDP**





# New Drugs FDA Approved Annually



## **II. How to Invest**

---

## Biotechnology Investing Strategies

- Index vs Individual Stocks
  - Passively Managed Index- Do it yourself- XBI, BBI
  - Individual Stocks- Potential for very big returns
    - Actively Managed Portfolio- Option A- 10 stocks with 5x-10x upside
    - Actively Managed Portfolio- Option B- 25 stocks with 3x-5x upside
- Benefits of Actively Managed Stock Portfolio
  - Provides enormous opportunity to outperform the index
  - More exposure to small-cap companies that historically produce higher returns
  - Indexes largely mimic the returns of the market
  - Managers can limit the downside during market corrections
  - Tax loss harvesting

## FDA Phase Overview and Where We Fit

- We generally look for opportunities in Phase II or Phase III
- Generally, Phase I trials don't have as great of a return, drug assumed to be safe
- Phase II trials hold most risk, previous data is key to choosing stocks
- Limit binary risk by not waiting until Phase III trial ends, or buy when the valuation incorporates the risk
- If a big opportunity occurs, we can hold on to the company for more return
- Look for Phase III completed drugs/stocks with Phase II valuations

\$500 Million Valuation



PHASE III - Open

\$100 Million Valuation





PHASE II – Proof/Efficacy

\$25 Million Valuation



PHASE I - Safety

 = Opportunity

 = More Risk

## Probability of Success

- We calculate probability of success based on historic success rates
- The tables below show, on average, the probability a drug candidate will successfully move to the next phase trial and the likelihood of approval from each phase

PROBABILITY OF SUCCESS	Phase 1 to 2	Phase 2 to 3	Phase 3 to NDA/BLA	NDA/BLA to Approval
Oncology	48.8%	24.6%	47.7%	92.0%
Non-Oncology	53.9%	31.2%	61.3%	90.2%
All	52.0%	28.9%	57.8%	90.6%

LIKELIHOOD OF APPROVAL	Phase 1 to Approval	Phase 2 to Approval	Phase 3 to Approval	NDA/BLA to Approval
Oncology	5.3%	10.8%	43.9%	92.0%
Non-Oncology	9.3%	17.3%	55.3%	90.2%
All	7.9%	15.1%	52.4%	90.6%

Phase Success	Phase 1 to 2	Phase 2 to 3	Phase 3 to NDA/BLA	NDA/BLA to Approval
Hematology	69.6%	48.1%	76.8%	93.1%
Urology	40.9%	15.0%	69.2%	84.6%
Endocrine	43.3%	26.6%	66.2%	86.3%
Autoimmune	55.2%	31.4%	65.3%	94.1%
Allergy	56.4%	28.3%	64.7%	100.0%
Respiratory	55.9%	21.9%	64.5%	95.6%
Infectious Disease	57.8%	38.4%	64.0%	92.9%
Metabolic	61.8%	45.0%	63.6%	87.5%
Other	63.6%	38.6%	60.0%	88.4%
All Indications	52.0%	28.9%	57.8%	90.6%
Gastroenterology	46.7%	34.2%	57.1%	90.9%
Psychiatry	52.7%	26.8%	56.3%	91.2%
Cardiovascular	50.0%	21.0%	55.2%	82.5%
Neurology	47.7%	26.8%	53.1%	86.7%
Ophthalmology	71.6%	35.5%	51.2%	91.1%
Oncology	48.8%	24.6%	47.7%	92.0%

- NDA- New Drug Application
- BLA- Biologic License Application

## Stock Selection Criteria

Our Goal is to sort the Universe of 700+ Publicly Traded Biotech Stocks down to Names that Fit our Criteria

- Pipeline of drugs probability of success
- Sufficient cash to develop their drug pipeline
- Information on trials from conversations with management
- Potential upside for the stock relative to probability of success
- Sort of universe down to names that fit criteria
- Portfolio of stocks with large upside potential with high confidence of success



## Investment Focus and Opportunities

- **Cancer-** The next generation of immunotherapy are quickly moving through the approval process
- **Alzheimer's Disease-** The science is better understood, very large unmet medical need with a minimum of 6 million in the U.S., including agitation with over 100 million episodes per year.
- **Cardiology-** Heart Disease is the leading cause of death in the U.S., with few new Cardio drugs developed, and old antiquated treatments. This is a very large market and highly desired by large pharma.
- **NASH-** Non-Alcoholic Fatty Liver Disease is a large disease area with no approved drugs yet, but it has many highly effective potential candidates. There are estimates that there are over 13 million people suffering from NASH.
- **Rare Diseases-** There is roughly 5,000 total rare diseases with no approved drugs, with patient populations in the U.S. of less than 200,000 in each disease. Typically, the FDA is very favorable in granting approval and pricing of the drugs are very high, providing the developer with a lot of incentive.

## Top Ideas with 5x-10x Return Potential

- **GTHX and ALRN-** These companies' drugs protect against the side-effects of chemotherapy.
- **BTAI-** uses artificial intelligence to improve drug development, with an approved drug in 3.5 years. Will have phase 3 topline results in 2023 for Alzheimer's Agitation, a very large market with episodes 100 million per year. Well financed.
- **SCPH, MIST, and WINT-** all are developing cardio drugs; SCPH is approved, MIST had positive phase 3 results, and WINT had positive phase 2 and has a very low market cap.
- **VKTX-** appears to have the best NASH drug in terms of efficacy, also has an obesity drug, well financed.
- **SYBX-** is focused on Phenylketonuria (PKU) a rare inherited disorder that is a rare disease. Trades less than their cash and an impressive shareholder base.
- **CKPT-** is filing for approval of immunotherapy, similar to Merck's Keytruda and 5 other similar drugs in a very large market but has much better efficacy. VERY low valuation.

## Disclosures

*This presentation is not a solicitation or an offer to sell or buy securities. There is no investment advice given or paid for from this information. If you buy or sale any securities mentioned in the presentation it is solely your responsibility.*

*To become an investor with PVG Asset Management Corporation, the investor will need to sign an advisory agreement, pay fees, and need to review the company's ADV, Privacy Policy, and form CRS. Investing in stocks is highly risky and even more so in emerging healthcare stocks. Investors must be willing to accept significant losses when investing in these types of securities.*