SIGA Technologies (NASDAQ: SIGA)

Final Summative

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ADM4350 [C]

Executive Summary

- **Ticker Symbol: (NASDAQ: SIGA)**
- **Market Price: $6.27 usd (21-Nov-2024)**
- **Recommendation: Buy**
- **Reconciled Price per Share: $14.49 (p.70)**
- **DCF Price: $15.53 (p.58)**
- **RV Price: $12.93 (p.69)**
- Listed on the Nasdaq
- Fiscal Year End: December 31
- Last Quarterly Results: November 5, 2024
- Expected Next Quarterly Results: March 11, 2025 (FY2024)
- Every Financial Statement is in U.S. Dollars

- Impact of COVID p.5 and p.39
- WACC (8.97%) p.29
- Last Twelve Months Revenue ($173.74m) p.43
- NCWC Worksheet p.56
- Terminal Growth (2%) p.59
- Funded Debt p.25
- DCF Matrix p.58

Firm Description

- SIGA Technologies, Inc. is a public, commercial-stage pharmaceutical company based in New York City, specializing in innovative solutions for emerging infectious diseases. Founded in 1995, SIGA is best known for its antiviral drug TPOXX (tecovirimat is the active ingredient), approved by the FDA in 2018 for treating orthopoxvirus infections, including smallpox and monkeypox. The company focuses on biodefense and collaborates with government agencies like BARDA to enhance public health preparedness. With a robust pipeline and a commitment to addressing unmet medical needs, SIGA is dedicated to advancing antiviral therapies and safeguarding communities from bioterrorism and infectious disease outbreaks. GPT: "SIGA Tech 100-word business description"
- TPOXX (Tecovirimat) is offered in Oral or Intravenous administration. The mechanism of action (MOA) for Tecovirimat consists of inhibiting the VP37 orthopoxvirus protein (envelope wrapping protein), which stops the spread of virions to other cells in the body. The VP37 protein, encoded by the F13 gene, is present in almost every orthopoxvirus and leads me to believe that the drug is also effective against mpox (see scientific analysis at the very end of the PPT). TPOXX is FDA approved to treat smallpox **and mpox (only under expanded access protocol, this does mean it's fully approved yet, but does allow for its use in case of an outbreak),** approved by Health Canada to treat smallpox, **approved by the EU and the MHRA (UK) to treat both smallpox and mpox.** Tecovirimat Mechanism of Action? Perplexity AI
- **TPOXX Posology and Estimated Price**: 3 x 200mg capsules every 12 hours (6 pills per 24-hour period) for 2 weeks straight. TPOXX is sold in "Packs" of 2 bottles per pack (each bottle contains 42 pills, or enough for the entire two-week treatment for ONE PERSON). The capsules have a shelf life of 5 years which is why I estimate the government contracts to NEVER go over 6-7 years (I expect 6–7-year contracts and not 5-year contracts, because options are exercised when Governments see fit and not all at once).
- I estimated a price for Oral TPOXX to be roughly $321 usd and of IV TPOXX to be ~$281 usd (see calculations on the right).
- UK's MHRA Summary and Posology of Tecovirimat

21-Nov, millions USD

Price	6.27
Shares	71.40
Mkt Cap	**447.70**
Cash	99.27
Debt	1.53
EV	**349.96**

millions USD	MRQ	FY 2023
Revenue	10.01	139.92
Net Income	1.35	68.07

TPOXX Estimated Price

under 19C BARDA contract, 1,488,000 Oral TPOXX and 212,000 IV TPOXX

Total contract value in 2018 = 546,000,000

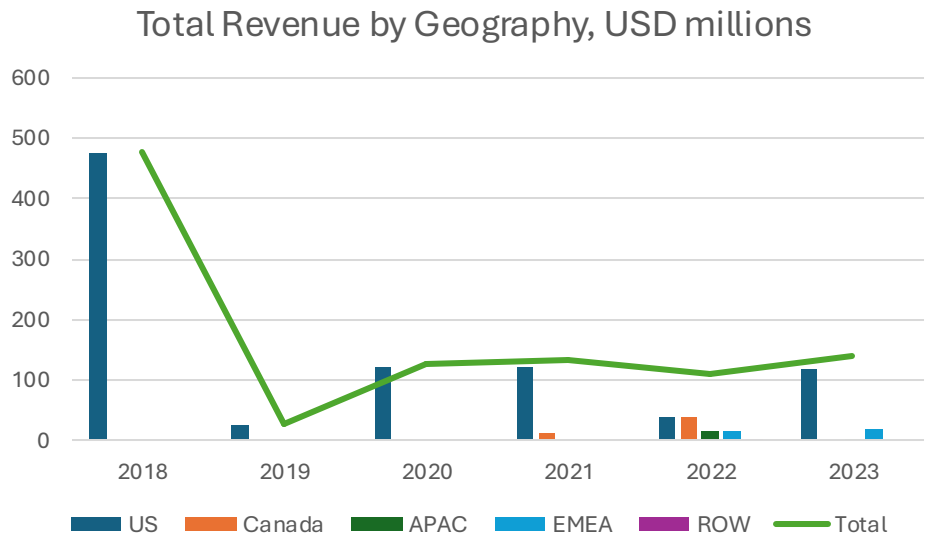
Oral	1,488,000	88%	477,910,588	$ 321.18
IV	212,000	12%	59,598,262	$ 281.12
Total courses	1,700,000	100%	59,598,262	

Firm Description Detailed

- The company has **ONE** main business segment which is the sale and service of their novel drug TPOXX, which cures and prevents Smallpox. The other marginal revenue segment is research & development.
- **Business model:** SIGA's business model consists of procuring TPOXX (in both oral and intravenous form) to Government agencies worldwide. The firm mainly supplies US Government agencies in preparation of potential bioterrorist attacks from countries such as Russia and China, who have alluded to their manufacturing of Smallpox viruses. The company also sells TPOXX to other countries like Canada, Morocco, the UK and others in the EU. SIGA also has an R&D segment to which the US Gov grants money to the firm to develop novel drugs against other variants of Smallpox or Mpox.
- TPOXX is sold in over 25 countries. Revenue share is 79% US and 21% international. The only product available is TPOXX to treat Smallpox. Yet, TPOXX is approved to treat MPOX in Canada, the EU and the UK. US FDA approval is expected in 2025
- In sum, the company generates revenue by signing procurement contracts (generally 6-to-10-year contracts) of Tecovirimat with international governments to defend against potential smallpox outbreaks.

Revenue by Geographical Segment

millions USD	2018	2019	2020	2021	2022	2023
US	477.1	26.7	122.4	120.7	39.8	118.7
Canada			2.5	13	38.9	
APAC					14.9	1
EMEA					16.3	20.3
ROW					1	
Total	**477.1**	**26.7**	**124.9**	**133.7**	**110.9**	**140**



USD m's	**2019**	**2020**	**2021**	**2022**	**2023**
TPOXX	11.19	115.47	126.8	86.66	130.67
% Revenue	*41.85%*	*92.41%*	*94.86%*	*78.23%*	*93.39%*
R&D	15.55	9.49	6.87	24.11	9.25
% Revenue	*58.15%*	*7.59%*	*5.14%*	*21.77%*	*6.61%*
Total	**26.74**	**124.96**	**133.67**	**110.77**	**139.92**

Impacts of COVID

COVID did not negatively impact the business operations of SIGA, because of the very insulated market it operates in. However, the pandemic did emphasize the need for the US National Strategic Stockpile to be ready for deadly pandemics and bioterrorism threats. This directly validated SIGA's business model, and increased sales 5-fold.

On the biotechnology and pharmaceutical industries, COVID created a sense of urgency to develop many vaccines and drugs to counter the never-ending threat of viruses worldwide. The virus also shed a light on how quickly regulatory agencies can approve/test novel drugs in the case of outbreaks and pandemics.

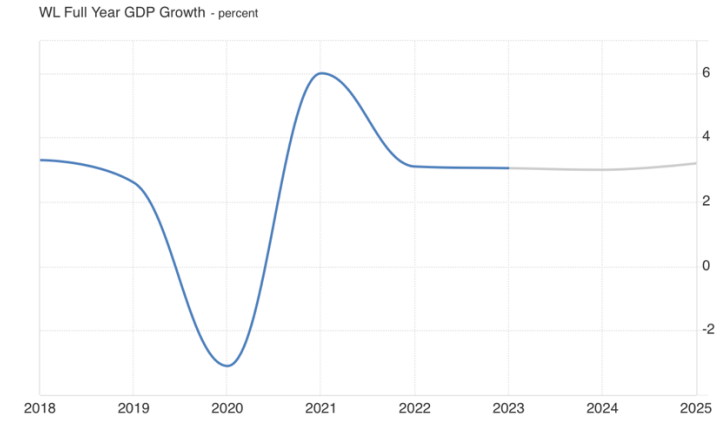
Cash Flow Assumption Implication: COVID won't have any impact on cash flow assumptions. Further details on slide 41.

Environment Analysis: Economics

CME FedWatch Tool, Interest Rates Predictions

	2024	2025							
Current = 450-475 bps	**18-Dec**	**29-Jan**	**19-Mar**	**07-May**	**18-Jun**	**30-Jul**	**17-Sep**	**29-Oct**	**10-Dec**
Implied Interest Rate (bps)	425-450	425-450	425-450	425-450	400-425	400-425	400-425	400-425	400-425
% probability	*51%*	*51%*	*44%*	*37%*	*36%*	*34%*	*32%*	*29%*	*29%*

- World GDP growth in 2025 is expected to be ~3.20%. Global inflation is forecasted at 4.5% in 2025 (source from IMF in bibliography).
- According to the CME Fedwatch Tool, US interest rates are supposed to incrementally decrease over the next year and reach a 4.00%-4.25% threshold.
- Although the S&P is at an all-time high (see next slide), the market seems to currently be favoring the Trump administration, regardless of tariffs. This should act as a positive catalyst for any sane US stock. However, biotech stocks are most often agnostic to market movements and move on company-specific and/or clinical trial catalysts, very rarely on macroeconomic news.
- Gold and Bitcoin are both at all-time highs. Moreover, the US dollar index is also rapidly climbing and reaching new heights.
- Cash Flow Implication: All these combined measures would normally signal frothing forecasts in the coming year or two. Since SIGA is immune to macro factors, I won't be taking any economic factor in consideration in the DCF.

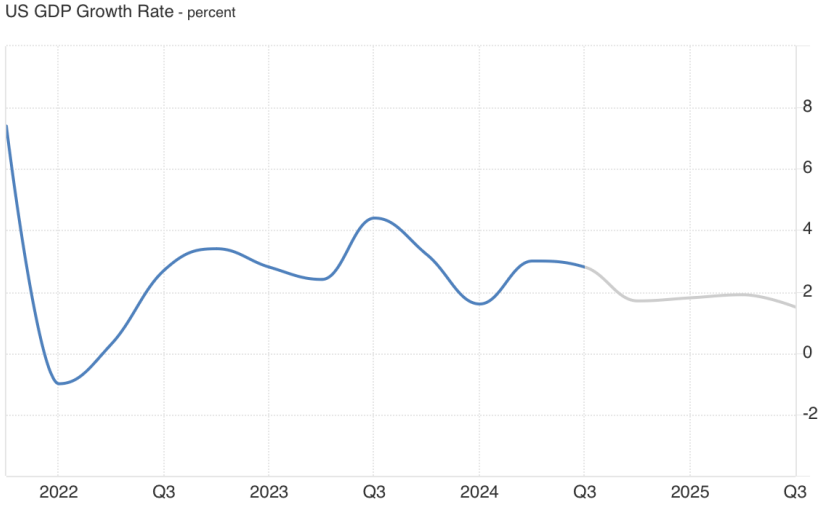


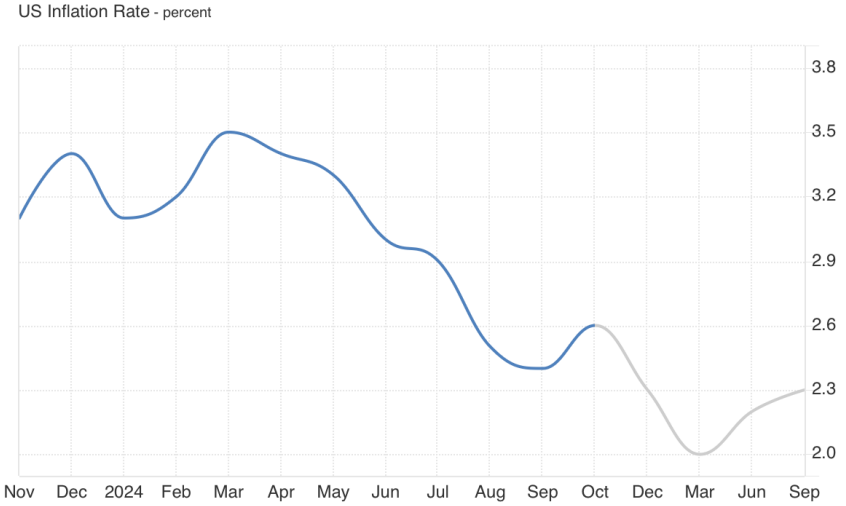
source: tradingeconomics.com

source: tradingeconomics.com

Environment Analysis: Economics

- North American economies strongly reflect that of the US. The US economy is currently strong, because of decreasing inflation and interest rates. The S&P is near all-time highs at a PE of 30.52. The US 10-year treasury is at 4.42% (21-Nov) and US GDP growth and inflation are forecasted at 2.1% and 2.5% respectively (source from Michigan University in bibliography).
- Cash Flow Assumption Implication: The economic outlook solidifies my cash flow assumptions, considering how reliant SIGA is to government contracting in the US and its favorable projected growth.





Source: tradingeconomics.com | U.S. Bureau of Economic Analysis

Source: tradingeconomics.com | U.S. Bureau of Labor Statistics

Most Recent Company Developments

- As of October 22nd, 2024, SIGA acquired a portfolio of preclinical and fully human monoclonal antibodies from Vanderbilt University. This portfolio, granted that studies and clinical trials are promising would enable SIGA to commercialize and manufacture the these mAbs while only having to pay royalties to Vanderbilt. These mAbs target mpox and other orthopoxviruses, and act as a diversification of methods to prevent or cure mpox if the TPOXX mpox indication fails to show efficacy. The price paid to acquire such a portfolio was $22,427 (CapEx, latest 10Q - Subtract Q3 CAPEX with Q2 CAPEX). Monoclonal Antibodies (mAbs) licensing agreement with Vanderbilt University.
- The slide after "management analysis" touches on the prior Chief Medical Officer (CMO) being fired in September, following corporate debauchery and fraudulent accusations against SIGA. The CMO role must soon be fulfilled and considering the immaculate track record of hiring spectacular scientists/doctors, I expect SIGA's next hire to be a positive catalyst for the stock. The company might reach out to Dr. Crowe of Vanderbilt University, who invented the mAbs acquired by SIGA.
- What's more, the company hinted at new BARDA and DOD contracts to be signed in 2025 (because the current BARDA contract options have almost all been exercised)
- Cash Flow Implications: These company developments will play a role in my DCF as I will base my terminal growth rate on the preclinical drugs Siga acquired. I also will base the majority of forecasted revenue on the next BARDA contract to be signed in 2025.

Recent Industry Developments

- The pharma/biotech/healthcare industry has seen a slight stagnation in terms of progress as of late, with the focus now on aesthetic drugs (obesity GLP 1s). This can be attributed to the massive developments of novel drugs in the 2010s. The main diseases/conditions left to be treated are Alzheimer's disease, Parkinson's disease and some cancer types (mainly solid tumors).
- The new Trump administration also hired Vivek Ramaswamy to co-lead the Department of Government Efficiency (DOGE) alongside Elon Musk. Vivek, being a very accomplished pharmaceutical entrepreneur, will surely bring novel ideas to the FDA and has alluded to revisiting the duration of patents for certain drugs to make it worthwhile for companies to pursue long clinical trials without having their patents expire before commercialization.
- In the more specific antiviral and monkeypox sub-industry, there haven't been immense developments apart from the
- Cash Flow Implication: These recent industry developments won't be taken into consideration in my forecast assumptions and DCF

Environment Analysis **PEST**

Political: The political aspect of SIGA is immense, because the entirety of its revenue stems from government agencies. Dealing with governments is also their expertise.

Economic: The company is very much insulated from economic factors such as inflationary and job market risks. Even recessions tend to leave performing drug manufacturers untouched due to their indispensable nature

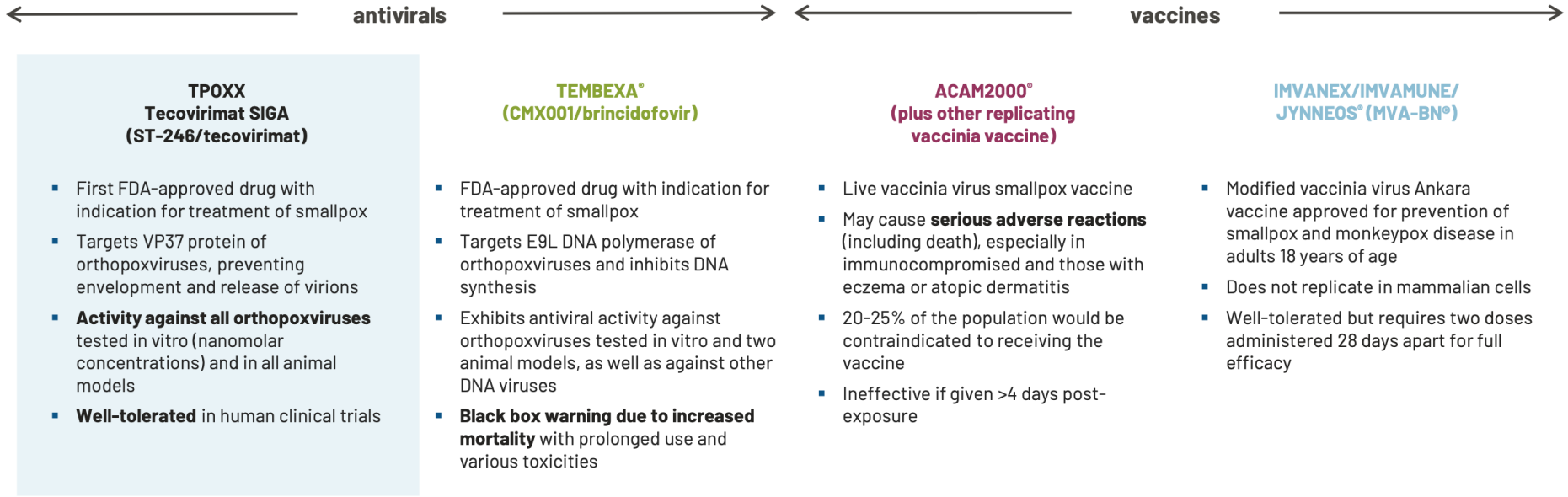
Social: The social aspect is also harmless for SIGA. In fact, it could prove beneficial if the population grows, thus increasing the risks of viruses. If job markets are strong or weak, their business is left unbothered still.

Technology: Technology wise, the company does benefit from the use cases of AI and machine learning in drug discovery software.

Cash Flow Assumption Implication: Overall, the PEST analysis strengthens my growth assumptions for ‘26-thereafter.

Environment Analysis (Porter's 5)

- **Supplier Power**: They're the sole suppliers and manufacturers of TPOXX, so they're quite safe from supplier threats.
- **Threat of New Entry**: Some patents regarding the recipe of TPOXX have expired in April of 2024. In theory, new rivals could enter the market, but none have so far.
- **Competitive Rivalry**: The company does have competitors in terms of firms manufacturing vaccines for smallpox and mpox. However, SIGA is more focused on easier medium of deliveries such as oral medication for longer storage capacity and easier administration compared to intravenous (vaccines).
- **Buyer Power**: SIGA has multiple government agencies as buyers of TPOXX, the most important one being the US Government. If the US Government agencies were to use aggressive dealing tactics, SIGA could suffer from lower revenues. So far, the company has dealt very good with optimizing their contracts.
- **Threat of Substitution**: If emerging biotechnological marvels such as CRSPR therapies were to come to fruition, the business model of SIGA would most likely fall apart. Luckily for SIGA, these chemical feats are still only in development
- **Current Industry Developments**: There are many new paradigms and developing narratives in pharmaceuticals. The most notable is the growing use of AI for drug discovery. Other industry developments include the manufacturing and preparedness of strategic cures against bioterrorism viruses.
- Cash Flow Assumption Implication: Porter's 5 also solidifies my growth assumptions for the company, given SIGA's limited threats.



- SIGA has competitors trying to cure and prevent orthopoxviruses. However, these firms have different delivery methods (mostly vaccines), they also have higher mortality rates. The other less fatal cures require more doses and are still intravenous. In sum, SIGA has a massive competitive advantage in terms of delivery method (oral), because it allows for easy drug delivery (chemically), but also literally. Indeed, delivering and shipping vaccines is quite difficult when accounting for temperature and humidity controls. The administration of vaccines also requires the help of health professionals, whereas orally administered medicine doesn't.

- Cash Flow Assumption Implication: The competition analysis strengthens my beliefs in growing revenue/cash flow, because it highlights the superiority of TPOXX.

Competition Analysis

Competition Analysis Broken Down

- As per the last slide, SIGA **DOES NOT** have direct competitors, in terms of smallpox and mpox antiviral manufacturers. However, there are several companies currently selling/developing vaccines to prevent smallpox and mpox. List of drugs against mpox - Perplexity AI
- Cash Flow Implication: These competitors don't pose a threat to future sales given the fundamentally different natures of these firms. If these companies were to venture into antivirals, more specifically orally administered antivirals, my assumptions would be negatively revised.

usd millions, 27-Nov-2024

Competition Breakdown

Competition	Ticker	Geography	Mkt Cap	TTM Revenue	Mkt Share	Brand	Indication	Admin	Intellectual Property
Bavarian Nordic	CPH: BAVA	Denamark	2,124	859	90%	JYNNEOS	Smallpox + Mpox	Intravenous	until 2032
Emergent BioSolutions	NYSE: EBS	US	517	1,094	8%	ACAM2000	Smallpox + Mpox	Intravenous	N/A
Chimerix	NASDAQ: CMRX	US	81	0.16	2%	Tembexa	Mpox	Intravenous	until 2034
Tonix Pharmceuticals	NASDAQ: TNXP	US	35	11	0%	TNX-801	Smallpox + Mpox	Intravenous	TBD

ESG Comments

MORNINGSTAR RATES SIGA QUITE POORLY ESG WISE, BUT THEY DON'T REALLY EXPLAIN WHY... (31.6 SCORE, AND "HIGH RISK" RATING).

E: ALTHOUGH SIGA'S ENVIRONMENTAL IMPACT IS VERY SMALL, THE COMPANY DOES TEST ITS DRUGS ON ANIMALS (MAINLY RATS). THIS IS STANDARD PROCEDURE IN THE US AND PHARMACEUTICAL COMPANIES ARE REQUIRED TO TEST ON ANIMALS BEFORE TESTING ON HUMANS.

S: THERE HAVEN'T BEEN ANY REPORTS ON POOR SOCIAL OR EMPLOYEE-RELATED MATTERS AT SIGA OVER THE PAST YEARS.

G: THEIR LOBBYING SPENDING ADDS UP TO A FEW MILLION US DOLLARS SINCE 2005, WHICH IS SMALLER THAN MOST PHARMACEUTICAL COMPANIES. THEIR EXECUTIVES ALL HAVE A COMPENSATION OF ~$1-2 MILLION USD.

CASH FLOW ASSUMPTION IMPLICATION: OVERALL, THE COMPANY HASN'T HAD ANY SCANDALS REGARDING ESG FACTORS SINCE INCEPTION. THERE HAVE ONLY BEEN RUMORS OF IMPROPER USE OF POLITICAL CONNECTIONS IN 2011, YET THESE CLAIMS WERE UNFOUNDED. ESG WON'T HAVE ANY BEARING ON MY ASSUMPTIONS.

Firm Analysis (SWOT)

- **Strengths**: The company has patent rights on the most effective orthopoxvirus drug (potentially Mpox as well). They also have a tremendous network and expertise in government contracting. Their monopoly on orthopoxvirus treatments is appealing to many developed and emerging countries, because some nations (mainly Russia and China) have alluded to their developments of bioterrorism weapons stemming from smallpox.
- **Weakness**: Some of the dozen patents comprising TPOXX have expired in April '24, which could open the door to increased competition. It's important to note that the most important patents showing the recipe of TPOXX are set to expire in 2032. No similar drugs have started trials, though. Thus far, the only approved drug SIGA has is TPOXX (I believe this will change). This can lead to weakening future revenues if the firm fails to get approval for other indication and drops the other preclinical mAbs trials it intended on pursuing.
- **Opportunities**: Given the druggability of TPOXX, the number of potential drug developments are quite innumerable in terms of new orthopoxvirus indications. The firm is also actively acquiring new preclinical drugs that target orthopoxviruses. The company has a lot of cash and effectively zero debt, which enables them to reinvest massively in R&D or continue to acquire drugs from universities or other companies.
- **Threat**: SIGA's only source of revenue is government contracting, which nurtures immense diversification risks long-term. As mentioned in the competition slide, the majority of SIGA's "competitors" manufacture vaccines against mpox and smallpox. However, if these companies were to start penetrating the antiviral market with their current expertise and knowledge of orthopoxviruses, the threat to SIGA's long term growth would be massive.
- Cash Flow Assumption Implication: Although the expired patents are concerning, no new patents on an alternative TPOXX have been issued. Overall, the SWOT analysis solidifies my assumptions regarding future growth. The current liquidity SIGA has on hand also reiterates my long-term growth vision for the company, given their investing in new drugs.

PEP Program
(post-exposure prophylaxis)

Addresses **time gap** between exposure and signs of clinical infection

Studies are supportive of the use of TPOXX in PEP to **reduce morbidity and mortality**

Targeting FDA **submission** in 2025

Mpox Program

Critical to provide in countries where not approved for this virus

Supporting 5 randomized controlled **trials** (RCT) and multiple observational studies

Working with government sponsors and FDA on **pathway to submission**

Pediatric Program

Important program to protect the **pediatric population**

Completed trial that demonstrates **equivalence of drug exposure** in volunteers (oral vs liquid formulation)

Designing **clinical program** to support regulatory filing

Selected a **manufacturer** to prepare clinical supplies

Current Firm Developments (Pipeline)

The current pipeline (product development plan) includes branches of new cures that all stem from their novel TPOXX drug. All PEP, Mpox and Pediatric programs are in clinical trial and waiting to be FDA approved. The TAM of these products was ~1,321,300 people in ’23.

Cash Flow Implication: Much of this TAM comes from mpox patients. If the mpox indication gets approved in ‘26 (my assumption), the firm’s development will positively impact future cash flows.

Other Current Firm Developments - Clinical Trials

Most Recent Mpox Clinical Trial (PALM007):

A clinical trial was conducted during Summer 2024 in the Democratic Republic of the Congo to assess the effectiveness of TPOXX against mpox. The primary endpoint (statistical goal needed to reached for the drug to prove effective) was time to lesion resolution within 28 days post-randomization for patients with monkeypox. The study was a double-blind, randomized trial, placebo-controlled trial with a total of 597 patients (n = 597).

The primary endpoint FAILED to be reached, (which is partly why I believe the stock to be so cheap), but results were slightly skewed when accounting for the shortened time patients were on the medication. SIGA's CEO shares my belief on this bizarre trial results:

Missing the primary endpoint is not entirely unexpected given that the study population was hospitalized during the duration of treatment receiving a high level of supportive care, and since many presented for treatment more than a week after their illness started *SIGA CEO Diem Nguyen on PALM007 mpox clinical trial results*

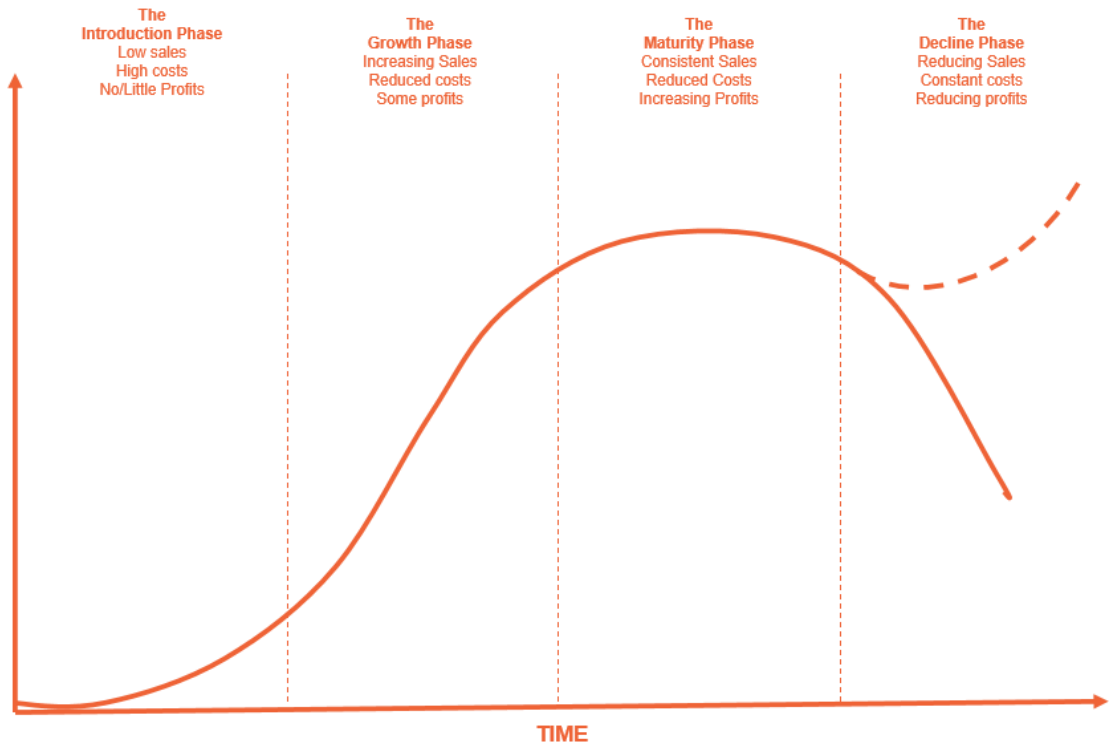
Ongoing Clinical Trials:

There are currently 4 other SIGA trials;

- STOMP: To test the efficacy of TPOXX for HMPXV treatment in a randomized, double-blind study. 530 patients will either receive placebo or tecovirimat, with open-label for severe cases. Mainly conducted in the US. STOMP - Clinicaltrials.gov
- UNITY: Randomized, placebo-controlled, double-blind phase III trial to evaluate Tecovirimat's efficacy against mpox in adults. Trial locations include Brazil, Switzerland and Argentina. SIGA's UNITY Clinical Trial Details - Perplexity AI
- Platinum-CAN: randomized, placebo-controlled, double-blind phase III trial to evaluate Tecovirimat's efficacy in treating mpox in 120 adult patients throughout Canada (Montréal, Toronto and Vancouver). SIGA's Platinum-CAN Clinical Trial Details - Perplexity AI
- EPOXI: Study design and population are still unknown, but we know that the trial aims to measure the effectiveness of Tecovirimat against mpox, in the EU. SIGA's Platinum-CAN Clinical Trial Details - Perplexity AI

Business Cycle: Industry & The Firm

- **Industry**: The pharma/biotech industry has a very systematic cycle that's applicable to every company. The cycle is in this specific order**: research and development**, **clinical trials and approval**, **patent protection**, **manufacturing and commercialization**, **patent expiration and generic competitors enter the market**. Overall, there are fewer drugs being approved, because there simply fewer diseases Eroom's Law - Perplexity AI
- **Firm**: The same industry-specific business cycle applies to the firm. The only major difference is the commercialization phase which is more government oriented since TPOXX is sold in prevention of a smallpox outbreak, instead of being sold to pharmacies, for instance. The firm has yet to sign its new BARDA and SNS contract (they'll do so in 2025), and in my view it'll represent considerable growth in revenue. They're also developing new drugs and acquiring portfolios of preclinicals as well, which is why **I would consider them at the end of their growth phase.**
- Cash Flow Assumption Implication: The industry and firm cycle won't affect my assumptions. This cycle is more descriptive than anything else. The fact they're still in their growth phase (although at the end of it) plays a role in the TV WACC, which I increased given the growth adjustment required to the TV when a company is still growing.



Management Analysis:

- Diem Nguyen has been CEO for 7 months (60% ROE)
- Average management tenure is 1 year (new management)
- Chief Scientific Officer has been with the firm since 1996
- Cash Flow Assumption: The management team has very pertinent prior work experience to navigate the pharmaceutical industry, which leads me to believe they won't detriment future growth.

Diem Nguyen, PhD, MBA
Chief Executive Officer

Visionary: Spearheaded $11 bn revenue global operating units that generated one third of Pfizer's annual profit

Dan Luckshire
Chief Financial Officer

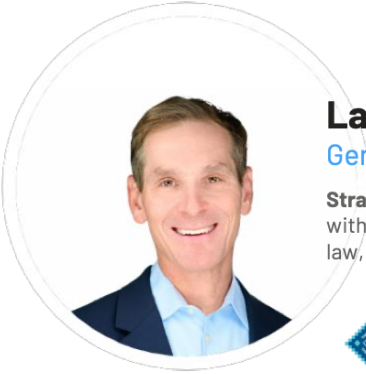
Operational Excellence and Financial Integrity Leader: Demonstrated leadership in finance, investment banking, and commercial operations

Jay Varma, MD
Chief Medical Officer

Public Health Guru: Led public health programs and outbreak responses in Asia, Africa, and US that saved hundreds of millions of lives

Dennis Hruby
Chief Scientific Officer

World Renowned Infectious Disease Researcher: Led the discovery, development, and approval of TPOXX



Larry Miller
General Counsel

Strategic Partner: Experienced lawyer with breadth of capabilities in corporate law, M&A, and public companies

Tove Bolken
SVP, Operations and Chief Supply Chain Officer

Flawless Operator: Managed manufacturing, process development and supply chain oversight

Management Breaking News

- As of September 23rd, leaked videos of the firm's Chief Medical Officer resurfaced. These videos filmed in July of 2024, show Dr. Varma talk about how SIGA uses contacts in the financial media to stir public opinion regarding clinical trials it conducts.

- The company officially terminated Dr. Varma's employment after the release of these treacherous videos

- Following these resurfacing videos, the stock price of SIGA declined a whopping 20% in two days!

- Cash Flow Assumption Implication: These videos, although concerning, don't interfere with future revenues and the information conveyed by Dr. Varma is standard practice in corporate America. If anything, it favors a potential investment in SIGA.

Management Analysis: Performance + Comp

- Compensation: The average executive compensation is ~$1.5million USD

- One key issue is the small equity stake the executives own, at around 0.5% of shares out. They should have more skin in the game to promote a bigger incentive to perform.

- There also have been no buy or sell insider transactions since 2019.
- Cash Flow Assumption Implication: Management's compensation doesn't interfere with my assumptions. In fact, I would love to see higher employee stock grants for an increased incentive to perform.

How the Firm Competes & Valuation Driver

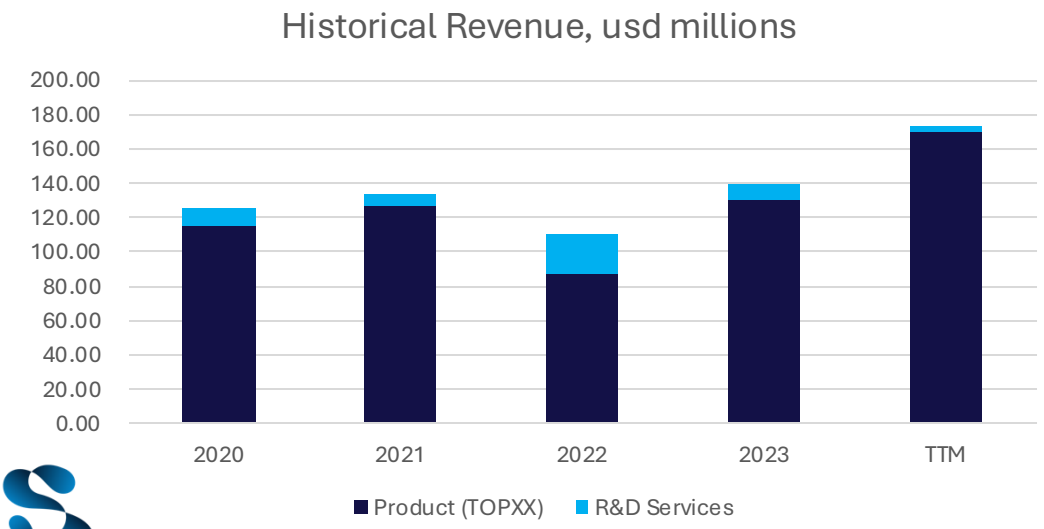
- The firm has limited competition when analyzing the biodefense sub-industry group in which it operates. However, their main competition factor lies in Monkeypox drug development. The firm very much competes to get US Gov contracts against other potential drug makers such as Bavarian Nordic, who manufacture Mpox vaccines and not antiviral drugs to treat an already contracted virus. Moreover, SIGA has partners throughout Asia and the rest of the world to help procure TPOXX to nations such as Japan. This level of international presence facilitates the signing of contracts worldwide and makes it easier for countries to conduct business with SIGA instead of developing their own drugs.
- In my view, the main valuation driver for SIGA will be the approval of other indications stemming from TPOXX. If they're able to get FDA approval for mpox, they should expect important growth in revenue. Otherwise, the smallpox TPOXX indication should continue generating ~$131.51m yearly, conservatively. In addition, their ability to maintain a very strong balance sheet positions them well for future investments which SHOULD unlock massive valuation growth if they're smart with their capital allocation. It's also important to note that although an official FDA approval decision for TPOXX on the mpox indication would be great for easier commercialization, the CDC has stated that TPOXX can be used in an expended access and compassionate use to treat mpox. CDC's statement regarding the use of TPOXX against mpox.
- Cash Flow Assumption Implication: This is the most important assumption in my growth analysis, because it directly and financially influences the revenue metrics at play to measure future growth. A sensitivity analysis will also show the many possible revenue growth outcomes.

Historical Revenue at a Glance

- Historical matrix shows linear growth in sales of TPOXX.

- **Guidance**: The only guidance the company has provided in their Q2 2024 was a conservative 3.2%/year revenue growth over the next 2 years. This has been revised in their latest 10Q and will be discussed on p.44.

- **Street Estimate**: There's only a single analyst covering the stock, and the most recent price target has been set at $11.0 (vs $8.41 currently, = +30.80% upside). This is discussed in more detail on p.45

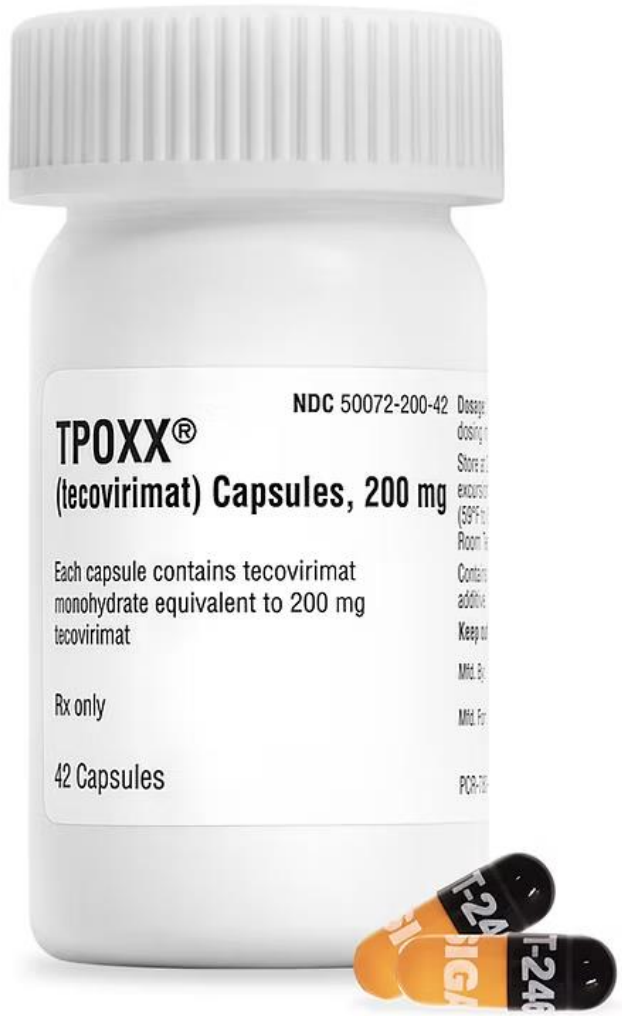


Historical Revenue with Segments (5 years)

LTM Revenues

usd millions	2020	2021	2022	2023	TTM
Product (TOPXX)	115.47	126.80	86.66	130.67	**169.25**
% Growth		*10%*	*-32%*	*51%*	***30%***
R&D Services	9.49	6.87	24.11	9.25	**4.49**
% Growth		*-28%*	*251%*	*-62%*	***-51%***
	2020	**2021**	**2022**	**2023**	**TTM**
Revenue	**124.96**	**133.67**	**110.77**	**139.92**	**173.74**
% Growth		*7%*	*-17%*	*26%*	***24%***
COGS	14.80	16.60	10.43	17.83	**31.96**
% of revenue	11.84%	12.42%	9.42%	12.74%	**18.40%**
Gross Profit	110.16	117.07	100.34	122.09	**141.78**
SG&A	14.00	18.03	35.12	22.04	**25.60**
R&D	11.66	10.65	22.53	16.43	**11.57**
Operating Expenses	25.66	28.68	57.65	38.47	**37.17**
Operating Profit	84.50	88.39	42.69	83.62	**104.61**
Interest Income (Exp)	(3.01)	0.10	1.03	4.16	**5.79**
Pretax Income	81.49	88.49	43.72	87.78	**110.40**
Taxes	(17.17)	(19.86)	(10.23)	(19.71)	**(24.65)**
Net Income	**64.32**	**68.63**	**33.49**	**68.07**	**85.75**
EPS	$ 0.81	$ 0.90	$ 0.46	$ 0.95	**$ 1.20**
Shares	79.44	76.40	73.55	71.68	**71.40**
Gross Margin %	88%	88%	91%	87%	**82%**
Operating Margin %	68%	66%	39%	60%	**60%**
Net Margin %	51%	51%	30%	49%	**49%**

DCF Analysis



Funded Debt

- According to the latest quarterly report (Q324, SEC 10Q), funded debt amounted to a mere $1.5 million usd, only comprised of non-current operating lease liabilities.
- The firm has stated multiple times on past earnings that they intend on maintaining as little debt as possible to ensure the healthiest balance sheet.
- The weighted average discount rate for these leases is 9.95%.

Funded Debt (latest 10Q), usd millions

Bank debt/commercial paper	0
Current long-term debt	0
Current operating lease liabilities	0
Long-term debt	0
Non-current operating lease liabilities	1.53
Funded Debt	**1.53**

WACC: Cost of Equity (Ke) - Bottoms-Up Beta

Bottoms-Up Beta (November 21st, 2024)

	usd milliions			*CAPIQ*	*CAPIQ*	*CAPIQ*	*CAPIQ*			
Companies	**Industry (disease focus)**	**Geography**	**Mkt Cap**	**LTM EBITDA Margin**	**Levered Beta (5Y)**	**D/E**	**Effective Tax Rate**	**Unlevered Beta**	**Weight**	**Weight Rationale**
BAVA.CO	Biotech (Mpox Vaccine)	Denamrk	2,126	29%	1.58	1.19%	0.36%	1.56	60%	It's the only other publicly traded company that has approved drug targeting Mpox which justifies major weight
JAZZ	Biotech (EDS)	Ireland	7,209	38%	0.57	148.75%	0%	0.23	10%	JAZZ had similar pipeline drugs to SIGA's a few years ago and became profitable thereafter
KRYS	Biotech (B-VEC)	U.S.	5,122	29%	0.82	0.84%	8.76%	0.81	10%	Very similar D/E and past monetization of their pipeline with Gov funding
HALO	Biotech (mAbs)	U.S.	5,822	58%	1.29	339.05%	18.25%	0.34	10%	Specialization in rare diseases and similar EBITDA margins + effective tax rate
EXEL	Biotech (oncology)	U.S.	9,895	31%	0.51	8.55%	22.17%	0.48	10%	Very similar effective tax rate and smaller pipeline of rare disease + Gov funding
SIGA	Biotech (orthopoxvirus)	U.S.	450	61%	0.89	0.89%	22.33%	0.88	1.12	
								Relevered Beta	**1.13**	

- The most similar company to $SIGA is Bavarian Nordic, which manufactures the JYNNEOS vaccine in prevention to mpox. Given this similarity and its profitability (unlike the other competitors mentioned previously), I gave a 60% weight to BAVA.CO.
- All the other companies have equal weights of 10%, because of their similar financial positions to SIGA's.
- After the bottom-up beta calculations, the relevered beta we're given is 1.13.
- Going forward with the WACC calculations, **I'll be using this 1.13 beta**.

WACC: Ke and Kd

Cost of Equity	Ke = Rf + B(ERP)	
Risk free rate	4.42%	US 10Y on November 21
Beta	1.13	Bottoms-Up Beta
Equity Risk Premium	4.04%	November '24 Damodaran
Cost of Equity (Ke)	**8.99%**	

Cost of Debt	Kd = Rf + Credit Spread	
Credit Rating	9.95%	operating lease discount rate (latest 10Q)
Credit Spread	0.92%	Damodaran Credit Spread
Risk free rate	4.42%	US 10Y 21-Nov
Cost of Debt (Kd)	5.34%	

- Risk-free rate (Rf): For the WACC calculation, I utilized the US 10-year bonds on November 21st, 2024 = 4.42%
- The 1.13 beta was derived from the bottoms-up calculation on the last slide.
- The equity risk premium (ERP) was taken from Damodaran's ERP website, for November 2024 and stands at 4.04%.
- **Consequently, the Ke stands at 8.99%**

- Risk-free rate taken from the US 10-year bill, on November 21st 2024 = 4.42%
- The cost of debt was calculated using SIGA's operating lease liability weighted average discount rate of 9.95% (SIGA Q324, p.15) and adjusted using Damodaran's Credit Spread Analysis of 0.92% (for firms with a market cap < $5 billion usd).
- **From these calculations, the cost of debt stands at 5.34%.**

Debt and Equity Weightings

Debt/Equity Weightings		
Funded Debt (usd millions)	1.53	10Q 5-Nov
Market Cap (usd millions)	448	21-Nov
Firm Value	449	= mkt cap + funded debt
Debt Weighting	0.34%	
Equity Weighting	99.66%	

- The market capitalization was calculated by multiplying the November 21st share price of $SIGA by its 70.40 million shares outstanding: $6.27*70.40 ~ $448 millions usd.
- The funded debt number of 1.53 million usd was shown three slides prior.
- The total value of the firm = funded debt + market cap

  = 1.53 + 448 ~ 449 millions usd
- **Debt weighting = Funded Debt/Firm Value = 0.34%**
- **Equity weighting = 1-debt weighting = 99.36%**

WACC Estimation

WACC Calculations FCFF	
Cost of Debt	5.34%
Weight of Debt	0.34%
Marginal Tax Rate	25.00%
Cost of Equity	8.99%
Weight of Equity	99.66%
WACC	8.97%

WACC = (Ke*Weight of Equity) + [(Kd*Weight of Debt)*(1-tax rate)]

- WACC = [(E/V * Ke) + ((D/V * Kd) * (1 – Tc))]
- WACC = [(99.66% * 8.99%) + ((0.34% * 5.34%) * (1 – 25%))] = 8.97%

TV WACC Ke	Ke = Rf + B(ERP)	
Risk free rate	4.96%	roughly highest US 10Y from past 15 yrs, ('23)
Beta	1.13	Bottoms-Up Beta
Equity Risk Premium	4.04%	November '24 Damodaran
Cost of Equity (Ke)	**9.52%**	

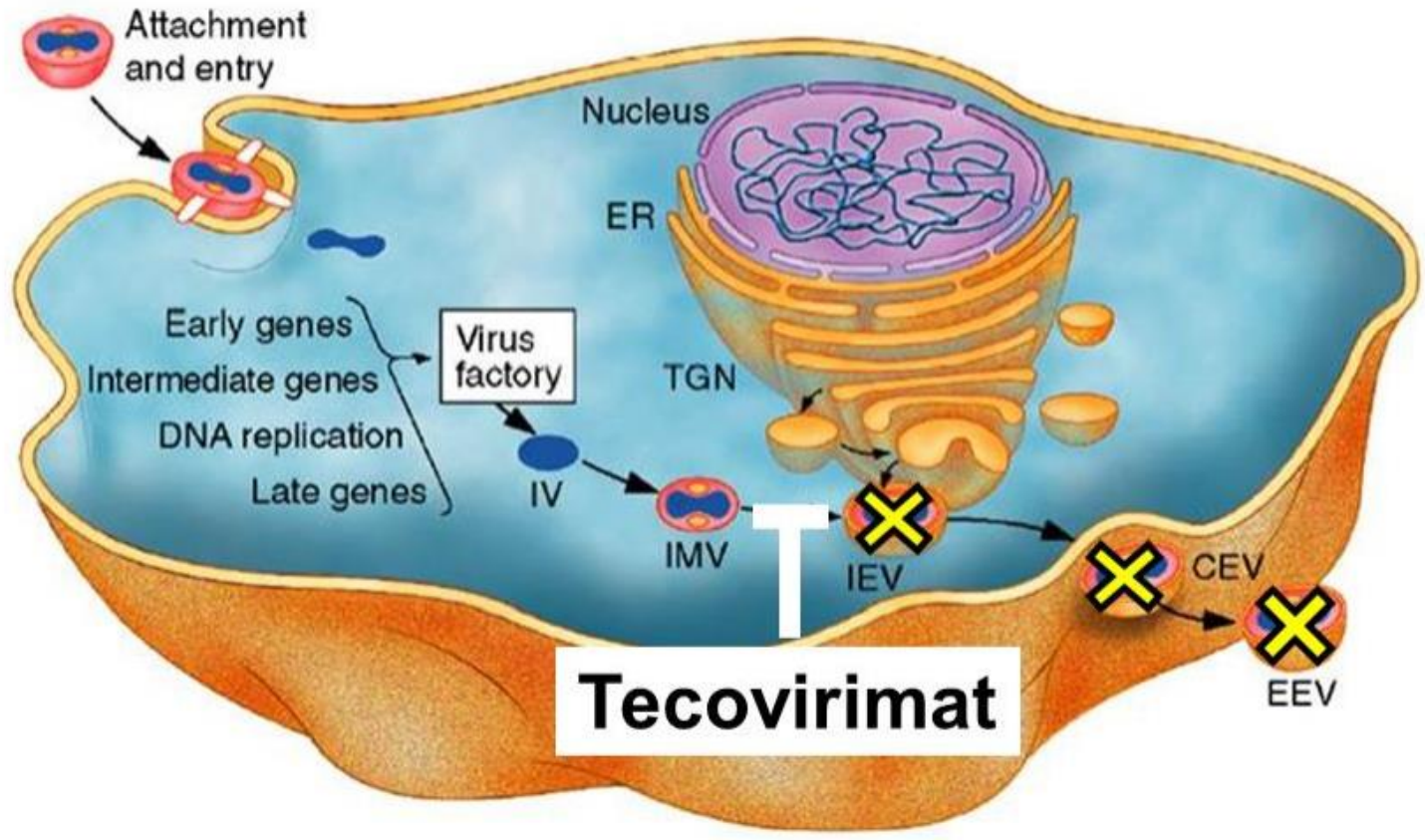
WACC TV Should be higher, considering company is still in the growth phase	
Cost of Debt	5.34%
Weight of Debt	0.34%
Marginal Tax Rate	25.00%
Cost of Equity	9.52%
Weight of Equity	99.66%
WACC	9.50%

WACC = (Ke*Weight of Equity) + [(Kd*Weight of Debt)*(1-tax rate)]

TV WACC Adjustment	9.50%

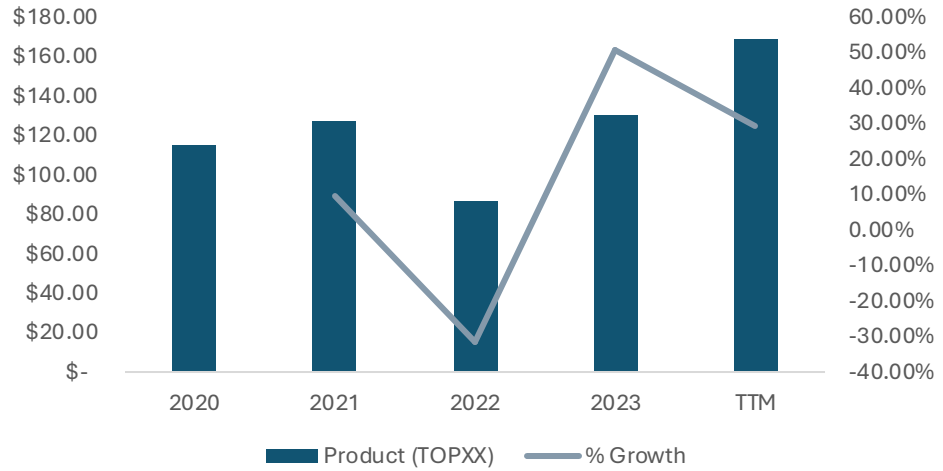
- Given the late-stage growth phase SIGA currently is in, the TV WACC should be bigger.
- The TV WACC's Ke comes in at 9.52%, because I chose the Rf of 4.955% (roughly the highest US 10-yr yield from the past 15 years.)
- I chose an increased Rf to make up for uncertain economic conditions beyond the DCF forecast periods. This results in a TV WACC Ke of 9.52% and a TV WACC of 9.50%, which satisfies the growth phase condition of SIGA's.

Historical Financial Analysis

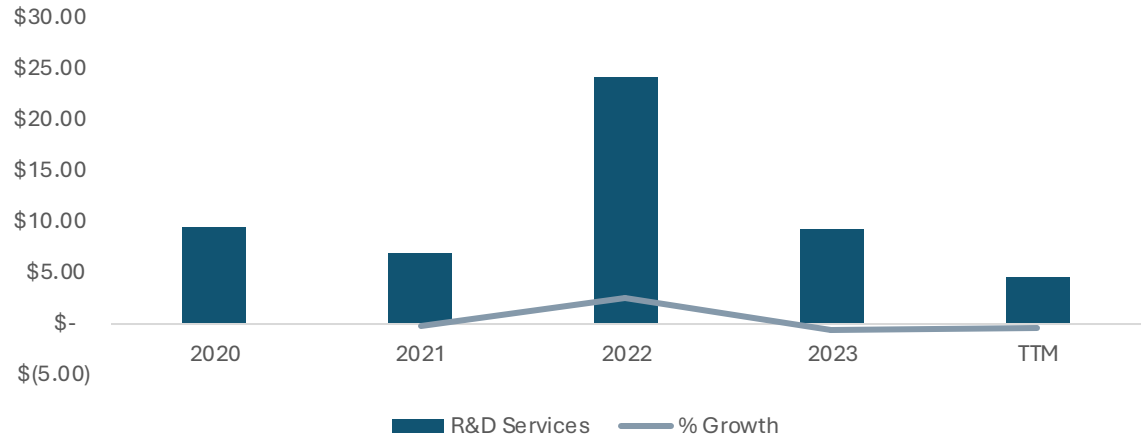


Historical Growth by Segment

TPOXX Historical Revenue, *usd millions*



R&D Historical Revenue, *usd millions*

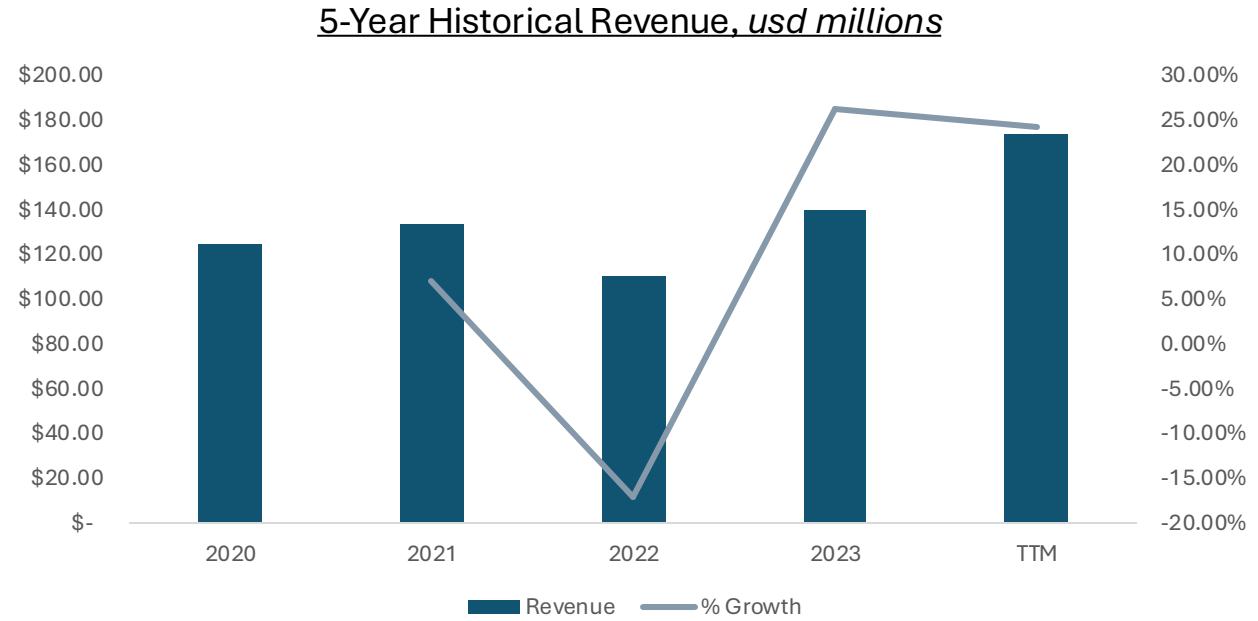


- The TPOXX historical revenues almost all stem from the BARDA contract exercised options.
- Around 78% of these historical revenues were from the US (~$550m) and the rest from Canada and Europe.
- Both Oral TPOXX and IV TPOXX are included in these historicals.

- The R&D revenues of SIGA come from US government grants to develop certain drugs in regards to potential bioterrorist threats.
- The creation of the IV form of TPOXX was from the US gov directly funding R&D.
- Data from SEC 10Qs and 10Ks

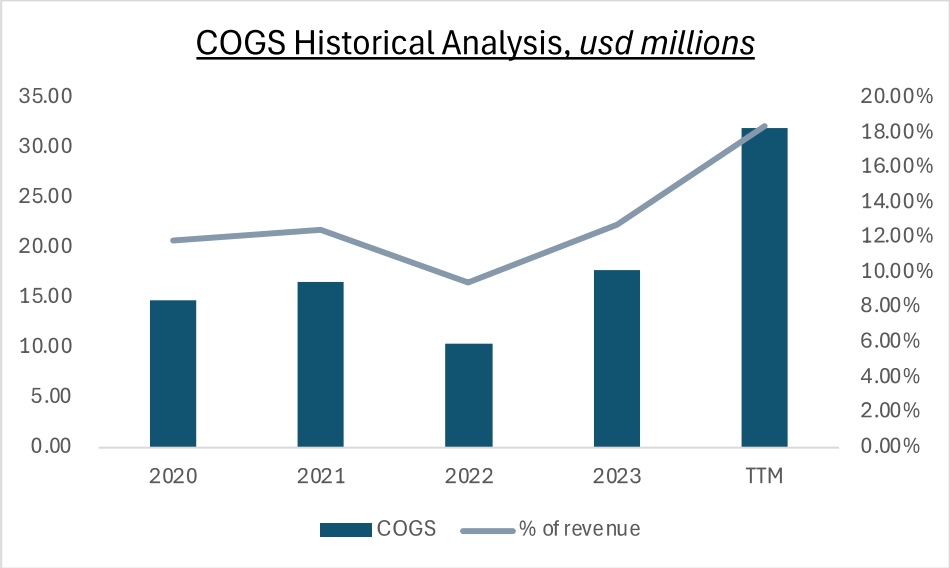
Cash Flow Implication: These historical segmented figures won't play a role in my forecasts, because I instead built my own models to predict both the next BARDA contract and the mpox valuation.

5-Year Historical Revenue Analysis



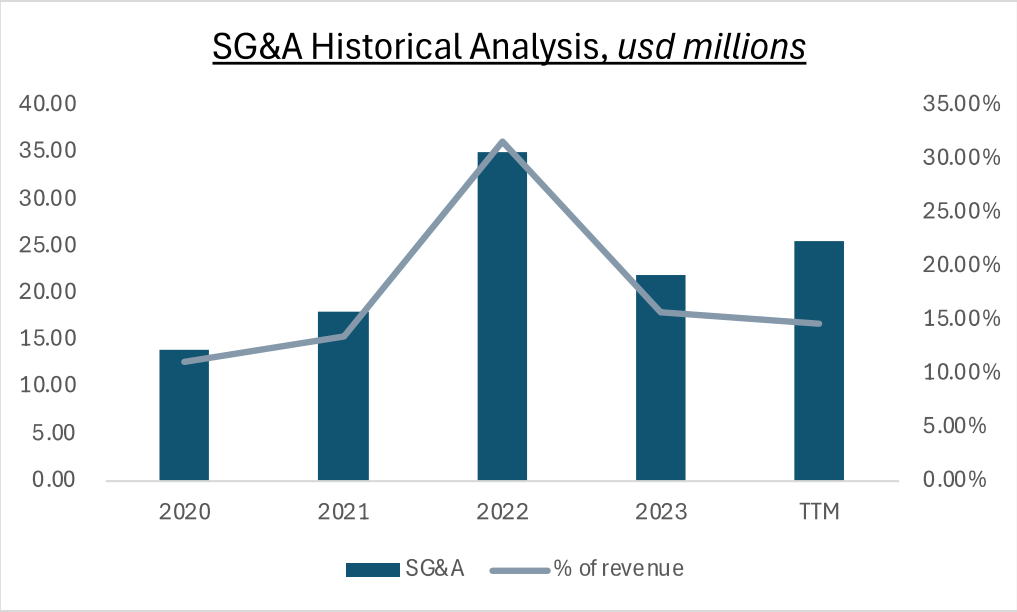
- For the past 5 years, revenue has been quite stable and has grown moderately. The company tried (and successfully) entered new geographical segments, which enabled them to diversify their revenue stream. Data from SEC 10Qs and 10Ks
- Cash Flow Implications: Since the historical revenues only take the TPOXX smallpox and R&D segment into account, I won't be utilizing them for my DCF (because I'll instead use Guidance to predict the next BARDA contract and my proprietary SUIR mpox valuation approach.)

Historical Analysis - COGS



- Relative to other industries, SIGA has very low COGS or very high gross margins ~87% average gross margins for the past 5 years. Data from SEC 10Qs and 10Ks
- These margins aren't surprising given the healthcare/biotech nature of SIGA. Indeed, most drug manufacturers have very high margins as actually manufacturing capsules or vaccines isn't expensive in terms of raw materials, but more so in drug discovery.
- Cash Flow Implications: I will be using these historical figures in my forecasts and DCF, as there aren't major changes to historical gross margins. Note that the TTM COGS are particularly high and this is due to Q2 2024 gross margins standing at 44% due to supply "chain bottlenecks" SIGA Q2 2024 transcript, p.6

Historical Analysis – SG&A



- These historical SG&A figures for the past 5 years are somewhat consistent with other biotech firms. Notice how the 2022 numbers are bigger, because of the mpox outbreak being considered an international public health concern by WHO. Data from SEC 10Qs and 10Ks
- There haven't been any spoken remarks in past transcripts regarding guidance or unusually high SG&A costs.
- Cash Flow Implications: With these figures being consistent in the past few years, I'll be basing my forecasts on the 5-year historical SG&A as a % of revenue numbers of ~17% and increasing it slightly to make up for the expended pipeline the company aims on pursuing (and selling to new government agencies worldwide). Further details will be provided in the forecasted financials section.

Lobbying spending in 2017, leading up to the signing of the 19C BARDA contract

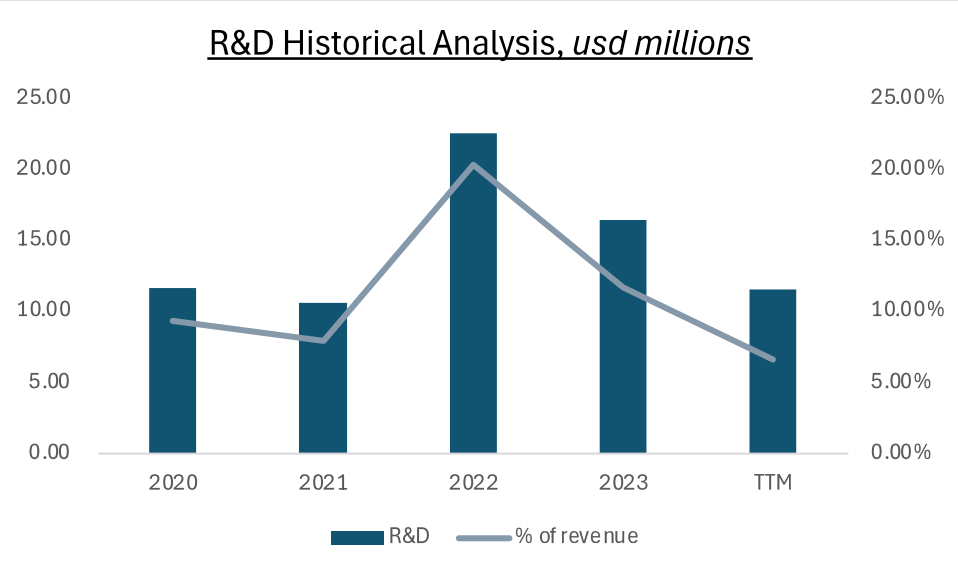
19C BARDA Contract Signed on Sept 10, 2018

000's USD		infl. Adj. (x1.25)		Date reported	Ammount
03-Jan-17	20	25		22-Jan-24	60
23-Jan-17	20	25		05-Feb-24	50
07-Apr-17	20	25		04-Apr-24	50
20-Apr-17	20	25		16-Apr-24	60
10-Jul-17	20	25		22-Jul-24	60
20-Jul-17	20	25		01-Aug-24	50
03-Oct-17	20	25		10-Oct-24	50
17-Oct-17	20	25		21-Oct-24	60
	160	$ 200	VS		$ 440

120%

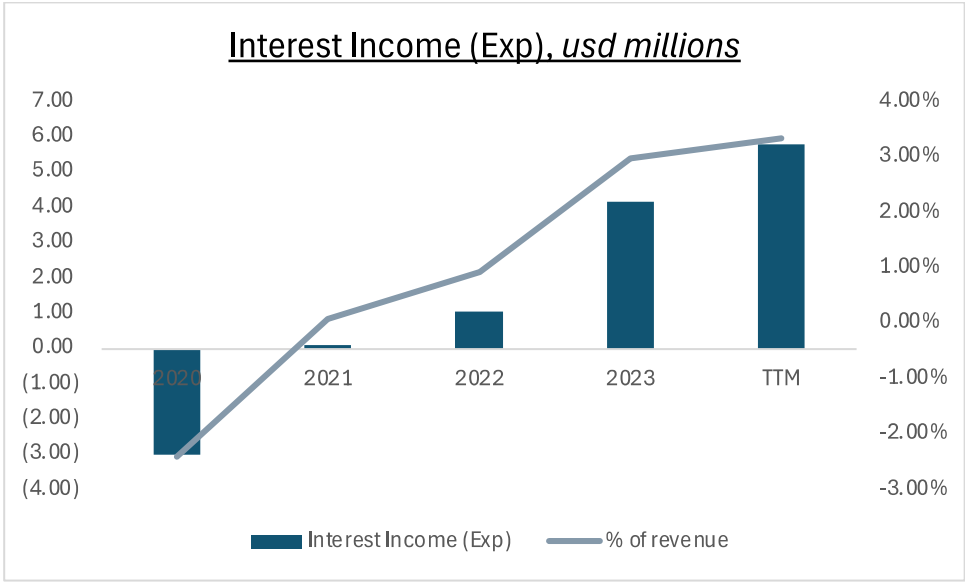
- In juxtaposition with historical SG&A spending, I broke down the inflation-adjusted lobbying spending in anticipation of the next BARDA contract. I've found that total lobbying spending is up 120% vs 1 year before signing the 2018 19C BARDA contract. Quiverquant Lobbying Spending for SIGA
- Given that BARDA is a Government organization, and that lobbying has direct implications on contracts and procuring for SIGA, I will be taking this into account when forecasting the next BARDA contract in the future revenues. This increased lobbying spending tells me that SIGA is betting big on resigning a bigger and bolder BARDA contract.

Historical Analysis – R&D



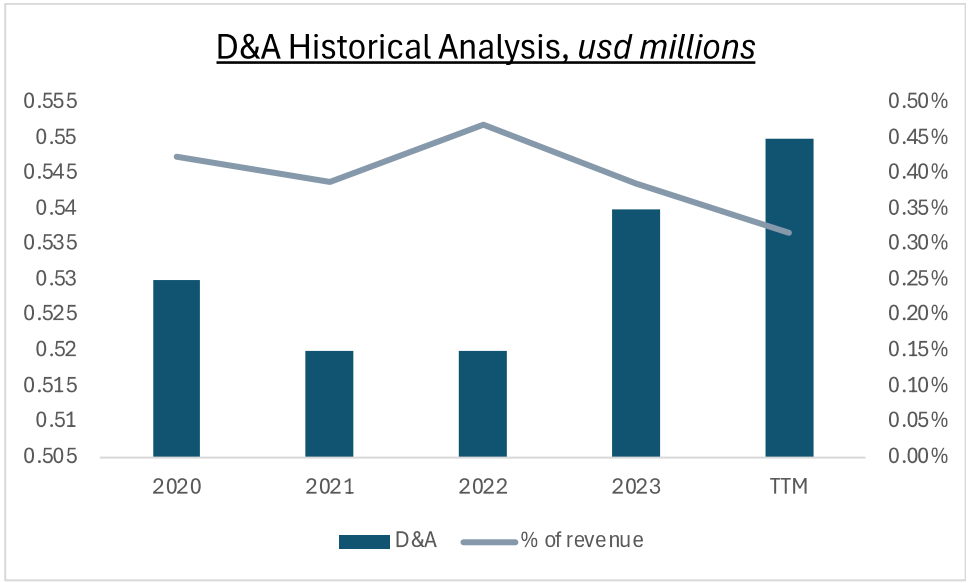
- The 2022 figures are (similarly to SG&A numbers) increased due to WHO calling mpox an international threat to public safety. Data from SEC 10Qs and 10Ks
- These R&D expenses have on average been around 11% of revenues.
- These numbers are generally low compared to the industry average of 27% (Perplexity AI).
- Cash Flow Implications: These specific historical margins (average of ~11%) will be used as a base in my forecasted R&D spending (more details in the forecasted financials section).

Historical Analysis – Interest Income (Exp)



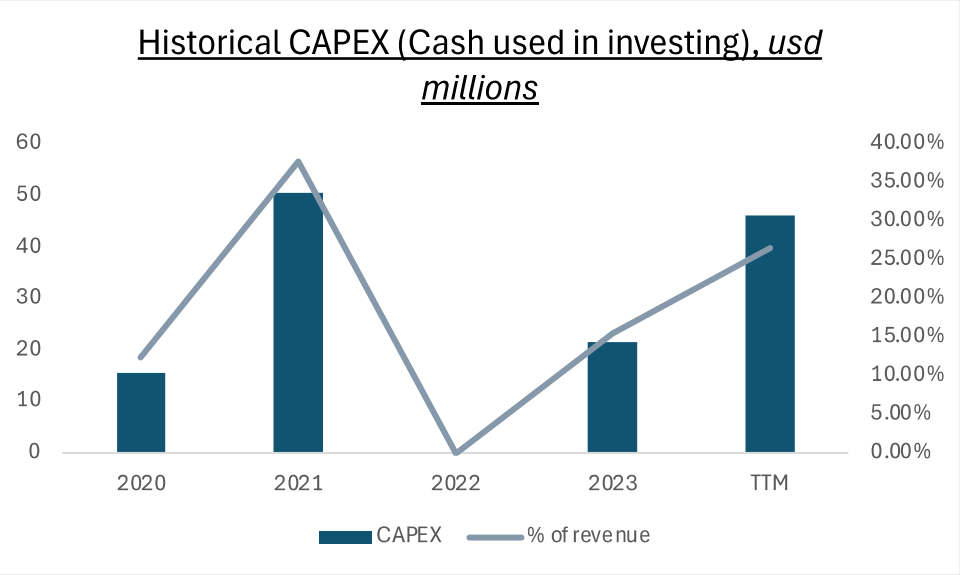
- The company' interest income (expenses) reflect the interest they earn on their cash and equivalents' balances. Data from SEC 10Qs and 10Ks
- This income is strongly sensitive to changes in the US's interest rate set by the Fed. SIGA latest 10Q Q324, p.21
- Cash Flow Implications: I wont' be using these historical figures to forecast my cash flows, but I will outline that I expect interest income (as a % of revenue) to decrease over the next years as the US interest rates (according to my CME Fedwatch tool analysis on p.6) will also decrease.

Historical Analysis – D&A



- SIGA's D&A expenses as a % of revenue are very minimal.
- Considering the very low PP&E balances of pharmaceutical companies relative to their entire book values, it's no surprise that D&A is insignificant and quite easy to forecast going forward.
- Cash Flow Implications: These historical figures will be used as baseline to forecast D&A expenses in my DCF. The 5-year historical average of D&A expenses as a % of revenue stands at 0.40%.

Historical Analysis - CAPEX

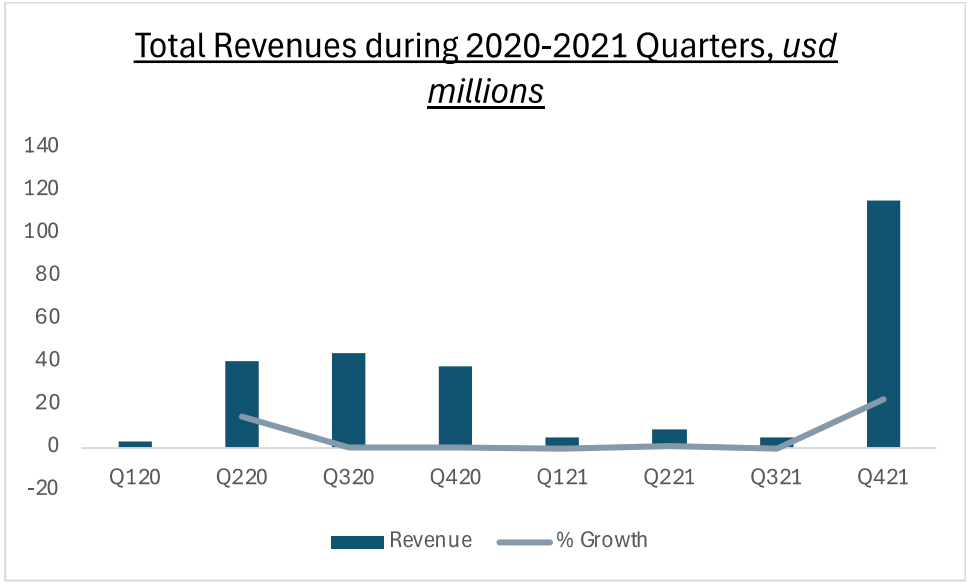


- The historical CAPEX figures for SIGA represent cash invested in the acquisition of intellectual property patents and rights to develop pre-clinical drugs.
- These figures represent a 5-year average of 18% (as a % of revenue) and by no means will I be using this average as a forecast of future CAPEX, considering the amount of money invested on the acquisition of new drugs in the past years. Data from SEC 10Qs and 10Ks
- Cash Flow Implications: I won't be using these historical CAPEX figures to forecast future CAPEX in my DCF.

Impact of COVID – Analysis/Comments

- **Although brief explanations we're given on COVID's impacts on the firm (slide 5), I'll comment and analyze these details furthermore:**
  - COVID did not directly affect ANY operations for SIGA, as their manufacturing facilities are small and quite immune large logistics fail (the way COVID hindered certain supply chains worldwide).
  - The overall impact COVID did have on SIGA, was to prove how public health preparedness does prove beneficial in the case of virulent outbreaks.
  - One main reason as to why I believe the 19C BARDA contract options were exercised so rapidly - keep in mind, the contract was signed in mid-2018, is meant to be exercised throughout a 10-year period, and is almost already fully exercised as of November 2024 – is because of COVID and its death toll.
- Cash Flow Implications: COVID won't have much impact on my forecasted financials for the DCF analysis, apart from confirming my conviction of the mpox indication for TPOXX to better prepare for the next epidemic.

Historical Analysis of COVID Quarters



- For 2020, we can almost exactly pinpoint where COVID had the strongest impact of mass psychology by analyzing the last three quarters of 2020, in terms of revenue. Data from SEC 10Qs and 10Ks
- Cash Flow Implications: This goes to show how even though COVID was never targeted by SIGA, the firm still benefited from the instantaneous Government response to fight off any biothreat. Keep in mind, at the time it wasn't so clear where the virus originated from, and many people speculated that it could've been an act of biowarfare. This narrative DIRECTLY touches on the specialty of SIGA – biodefense and counter bioterrorist threats.

Guidance

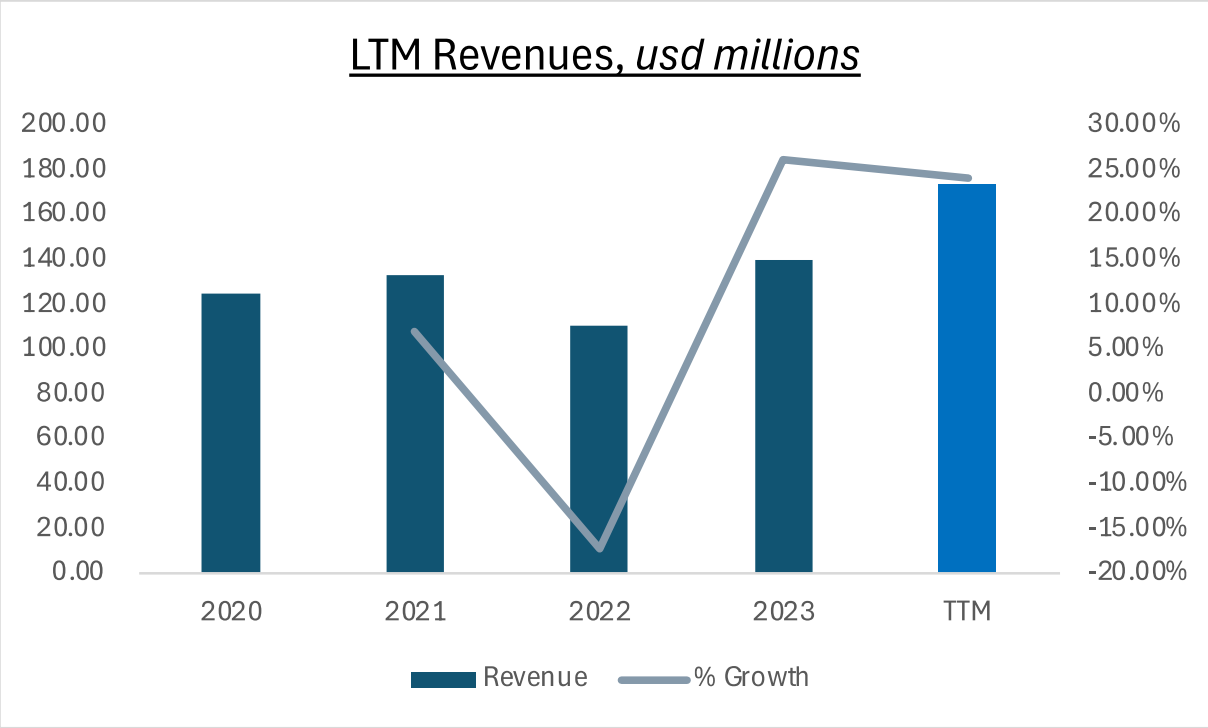
- The company hasn't explicitly issued guidance regarding any financial metrics or growth prospects. The only tangible guidance we can rely on is the 19C BARDA contract and its unexercised options:
  - $31.2 usd millions in unexercised options left in the 19C BARDA contract signed in 2018. Latest SEC 10Q for Q324, p.6
  - For Q4 2024, a whopping $146 millions usd in outstanding order balance is expected to be materialized (for TPOXX segment). $112.5 millions usd of which is from the 19C BARDA contract. $8 million usd in TPOXX was, however materialized in Q3 2024, so **this leaves a total of $138 in expected revenue for Q4 2024 for the TPOXX segment (only for the US)**. SIGA Q324 Transcript, p.4
  - The next BARDA contract (which I detailed and forecasted on p.45) will also be signed in 2025 and the company gave moderate guidance regarding this next milestone.
- Cash Flow Implications: These outstanding orders and unexercised options will be used in forecasted revenues.

Street Estimates

	Actual	Street Estimates	
usd millions	**FY2023**	**FY2024**	**FY2025**
Revenue	139.92	160.21	184.36
% growth		*15%*	*15%*
Net Income	68.07	73.22	88.00
Shares	71.68	70.4	70.4
EPS	$ 0.95	$ 1.04	$ 1.25
% growth		*9.52%*	*20.19%*

- There's only 1 analyst covering SIGA (according to Yahoo Finance), CIQ, FactSet, Factiva and SIGA's website have no mentions of analyst coverage.
- This analyst is expecting revenue to grow at 15%/year for the next two years.
- The earnings expectations also stand at $1.04 and $1.25 for FY2024 and FY2025 respectively. This represents a 9.52% and 20.19% growth Y/Y in EPS.
- Cash Flow Implications: These street estimates won't directly be used in my forecasts as the number of analysts providing these predictions is too low. Nonetheless, they do reaffirm my overall bullish beliefs for SIGA's future.

LTM Revenues (Base Revenue for DCF)



- Data from SEC 10Qs and 10Ks

LTM Revenues

usd millions	Q423	Q124	Q224	Q324	LTM
Product (TPOXX)	115.75	23.88	20.68	8.94	**169.25**
% growth		*-79%*	*-13%*	*-57%*	
R&D Services	0.73	1.55	1.14	1.07	**4.49**
% growth		*112%*	*-26%*	*-6%*	
Total Revenue	**116.48**	**25.43**	**21.82**	**10.01**	**173.74**
% growth		*-78%*	*-14%*	*-54%*	
COGS	14.81	3.22	12.31	1.62	**31.96**
Gross Profit	101.67	22.21	9.51	8.39	**141.78**
SG&A	7.37	7.88	5.53	4.82	**25.6**
R&D	2.61	3.05	2.89	3.02	**11.57**
Operating Expenses	9.98	10.93	8.42	7.84	**37.17**
Operating Profit	91.69	11.28	1.09	0.55	**104.61**
Interest Income (Exp)	1.2	1.94	1.32	1.33	**5.79**
Pretax Income	92.89	13.22	2.41	1.88	**110.4**
Taxes	-20.61	-2.94	-0.57	-0.53	**-24.65**
Net Income	72.28	10.28	1.84	1.35	**85.75**
Shares	71.68	71.56	71.75	71.77	**71.40**
EPS	$ 1.01	$ 0.14	$ 0.03	$ 0.02	**$ 1.20**
Gross Margin %	87%	87%	44%	84%	**82%**
Operating Margin %	79%	44%	5%	5%	**60%**
Net Margin %	62%	40%	8%	13%	**49%**

Forecast Assumptions for DCF

Forecasting the Next BARDA Contract – TPOXX Smallpox Segment

- **My Assumptions**: Management hinted at a new bigger and longer contract. page #3, second paragraph of Q2 transcript
- Given this new contract (which would exceed $546 million usd, equal to the last contract). In 2026, I strongly suspect the TPOXX mpox indication to be approved (if mpox doesn't spread faster and is considered an international threat AGAIN). Nevertheless, I still believe the next US contract to be ~$789 million, because of budget growth in the US (see calculations below). The average of the first and second matrix = $789 millions. Considering this $789 million is only 79% of their revenue (US segment), total revenue would amount to = $999 million USD for 6 years, which is a year over the shelf life of TPOXX (this would represent $166.45/year).

Government Agencies' Budgets Growth Since 2018

Base contract	SNS	CDP/military	BARDA	CDC	Average
$ 546	$ 891	$ 657	$ 1,265	$ 872	**$ 921**
growth %	*63.11%*	*20.29%*	*131.73%*	*59.72%*	

usd Ms	*growth accounted for since 2018*					
Base contract	US pop. Growth	Guidance	US Budget Increase	Cummul. Infl	GDP growth	**Average**
$ 546	$ 561.89	$ 563.47	$ 865.57	$ 684.14	$ 609.94	**$ 657**
growth %	*2.91%*	*3.20%*	*58.53%*	*25.30%*	*11.71%*	

MPOX TAM and Valuation

- Since I believe the mpox indication of TPOXX will be approved in 2026, I proceeded to value the drug and forecast future revenues using the following calculations.
- Using the confirmed cases and deaths of mpox from Our World in Data by continent, I was able to forecast the total number of deaths and cases (by 2026 which is my expected approval date for TPOXX mpox) using this SUIR formula:

$$N(t) = N(t-1) + \min[S(t-1), I(t-1) * R_0 * b] - V(t-1)$$

Where:

N(t) = Cumulative number of cases at time t

N(t-1) = Cumulative number of cases at time t-1

S(t-1) = Number of susceptible individuals at time t-1

I(t-1) = Number of infected individuals at time t-1

R_0 = Basic reproduction number (1.79 in the model)

b = Behavior change factor (0.85 in the model)

V(t-1) = Number of vaccinated individuals at time t-1

- All the Value of Statistical Life (VSL) are from the OECD.
- By multiplying the VSL values (by continent) with the expected number of deaths, I was able to get the mortality cost savings by continent (total = $19.65B) and discounted these numbers with a 40% discount (industry average representing the probability of approval for the drug) and calculated my PV per year.
- To be as conservative as possible, I also assumed a market penetration of 30% for TPOXX just in case any new competition creates a miracle drug in the meantime, which gave me a PV of $1.5B in TPOXX mpox revenue.
- **However, I believe the drug will be approved by 2026 and the US will sign a 6-year contract thereafter (6 years, based on prior BARDA contract) which represents $250.64 million/year for this segment.**

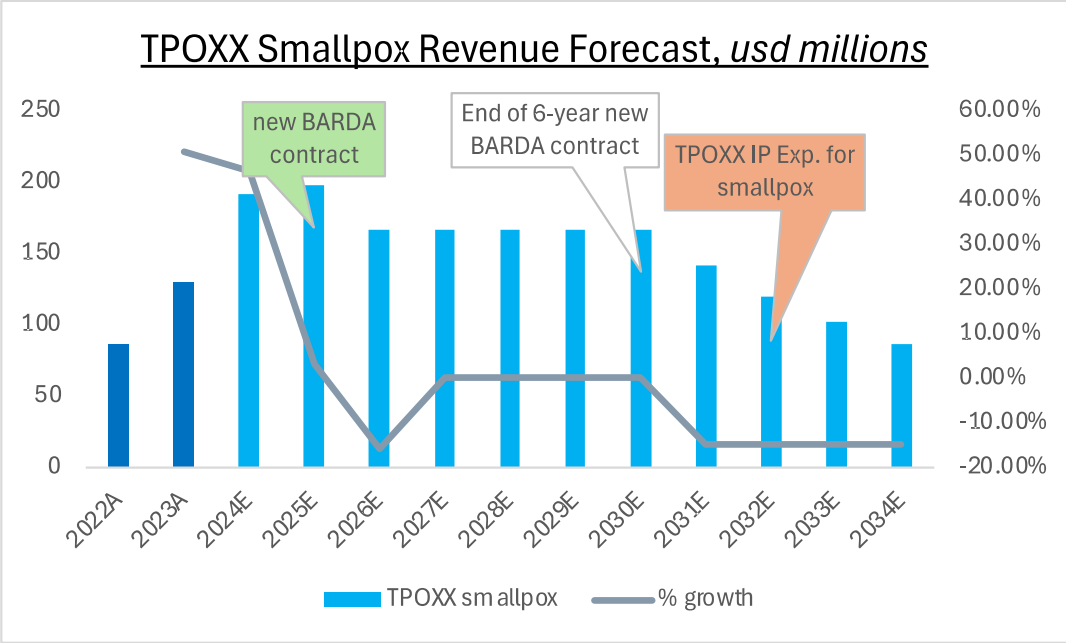
Mpox TAM + TPOXX Indication Valuation

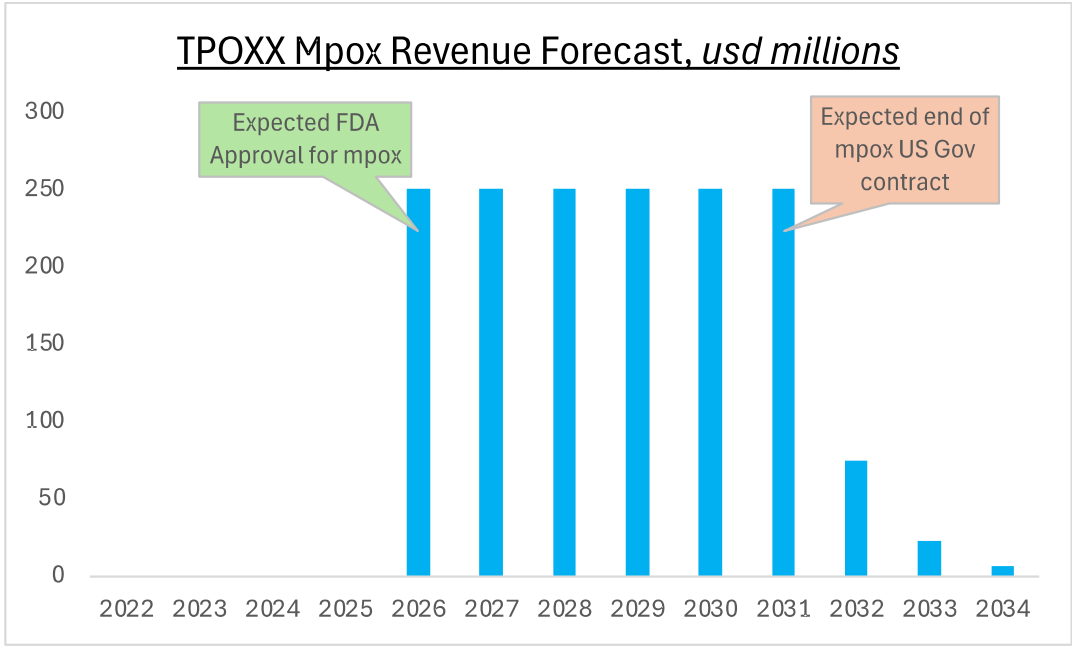
Cummulative Data (May 1 2022 - Sept 10 2024)

	North America	South America	Europe	Africa	Asia	Oceania	World
Confirmed Cases	40,804	24,079	27,628	8,302	5,450	714	**106,977**
proportion %	*38%*	*23%*	*26%*	*8%*	*5%*	*1%*	*100%*
Confirmed Deaths	101	47	9	55	22	0	**234**
proportion %	*43%*	*20%*	*4%*	*24%*	*9%*	*0%*	*100%*
Mortality %	0.25%	0.20%	0.03%	0.66%	0.40%	0.00%	0.22%
TAM							
Gay Male Population	12,262,395	17,424,470	14,895,137	15,151,350	99,007,261	921,774	**159,662,387**
Potential Deaths	30,352	34,011	4,852	100,376	399,662	2,016	571,271
SUIR '26 Target Cases	1,096,576	647,104	742,481	223,110	146,464	19,188	2,874,923
SUIR '26 Target Deaths	2,714	1,263	242	1,478	591	0	6,289
TPOXX mpox Valuation							
Projected '26 Cases	1,096,576	647,104	742,481	223,110	146,464	19,188	2,874,923
Projected '26 Deaths	2,714	1,263	242	1,478	591	0	6,289
VSL per region ('23)	$ 5,200,000	$ 1,900,000	$ 3,800,000	$ 900,000	$ 1,500,000	$ 4,300,000	
Mortality cost savings	$ 14,114,338,218	$ 2,399,867,485	$ 919,098,186	$ 1,330,273,690	$ 886,849,126	$ -	$ 19,650,426,705
PV (@ 40% discount)	$ 7,201,192,969	$ 1,224,422,186	$ 468,927,646	$ 678,711,066	$ 452,474,044	$ -	$ 10,025,727,911
PV	$ 5,012,863,955						
Mkt penetration	30%						
Revenue	**$ 1,503,859,187**						
Avg Net margin %	46%	plus mpox R&D	Projected Total NI	**Total NI**			
NI	**$ 691,775,226**	**$ 51,153,584**	**$ 1,434,704,036**	**$ 717,352,018**			

	2022	2023	LTM	Total
R&D expenses	$ 22,525,642	$ 16,427,942	$ 12,200,000	**$ 51,153,584**

Revenue Forecasts by Segment

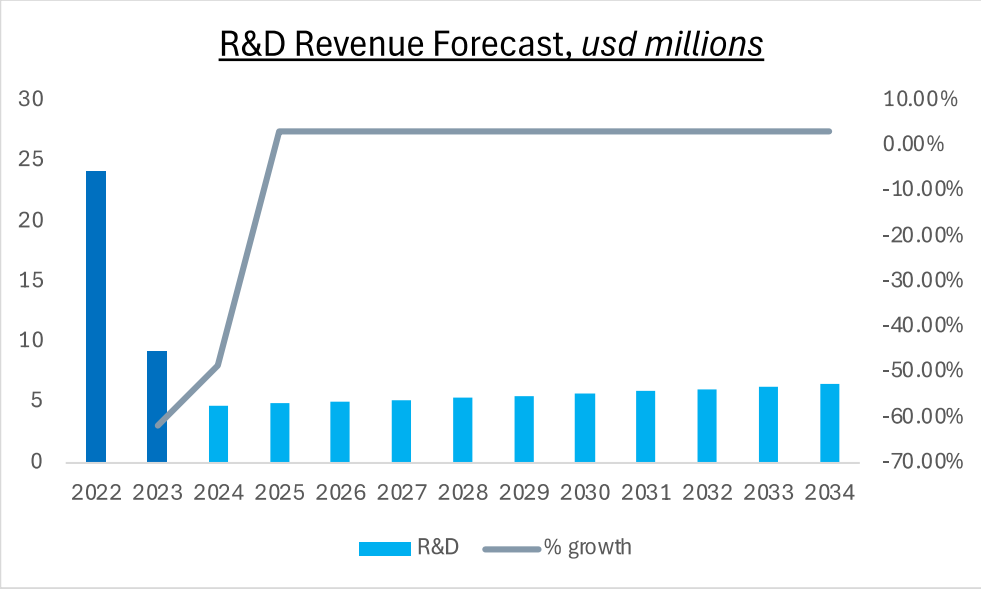




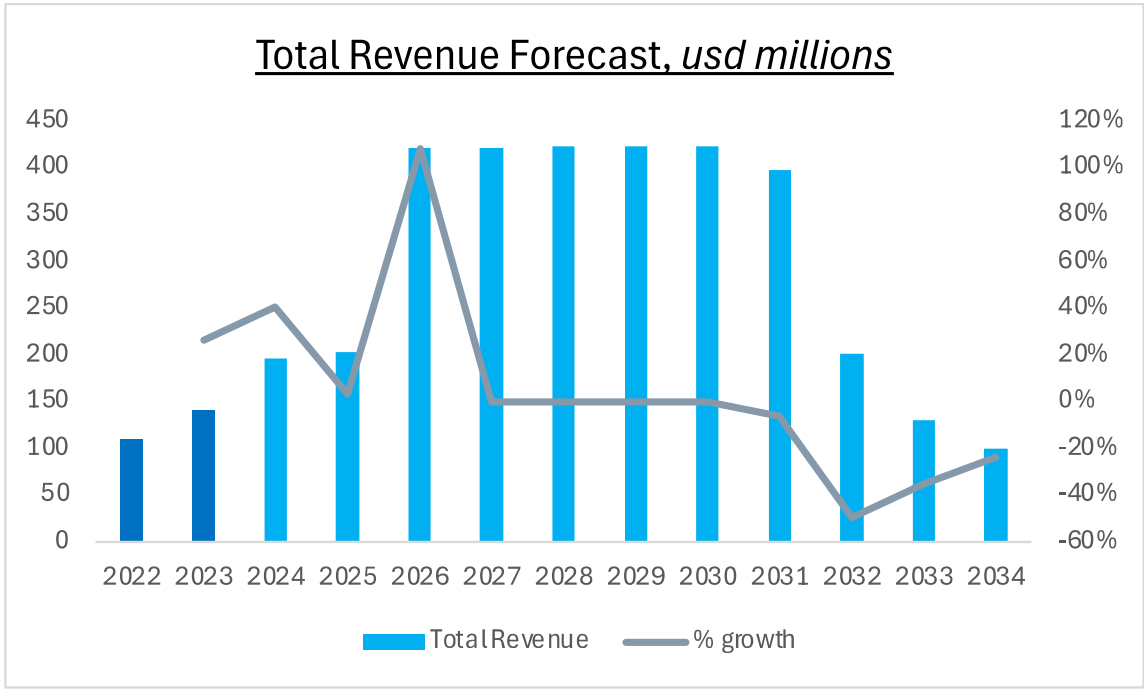
- Forecast Rationale:
  - As detailed on p.45, I expect the new BARDA contract to be signed in 2025 and to consist of roughly $789 million.
  - Considering the other world governments typically followed the option exercise dates of the US, I expect international revenue to grow in proportion to the US BARDA contract. This will lead to $166.45 million/year in revenue for the smallpox segment.
  - The intellectual property for the smallpox indication of smallpox will expire in 2032, which is why I gradually decreased revenue thereafter (-15%/year)

- Forecast Rationale:
  - In line with my mpox analysis on the last slide, I believe the mpox indication of TPOXX will get approved in 2026 and a new US Gov contract will immediately be signed.
  - I believe this 6-year contract will consist of $250.64 million/year.
  - After the contract ended (and hopefully mpox cured), I decreased revenue massively (-70%/year) to be as conservative as possible.
  - I believe there will be residual revenue after the contract ended to make up for future TPOXX reserves in case of another mpox outbreak.

Consolidated Revenue Forecast + R&D Segment

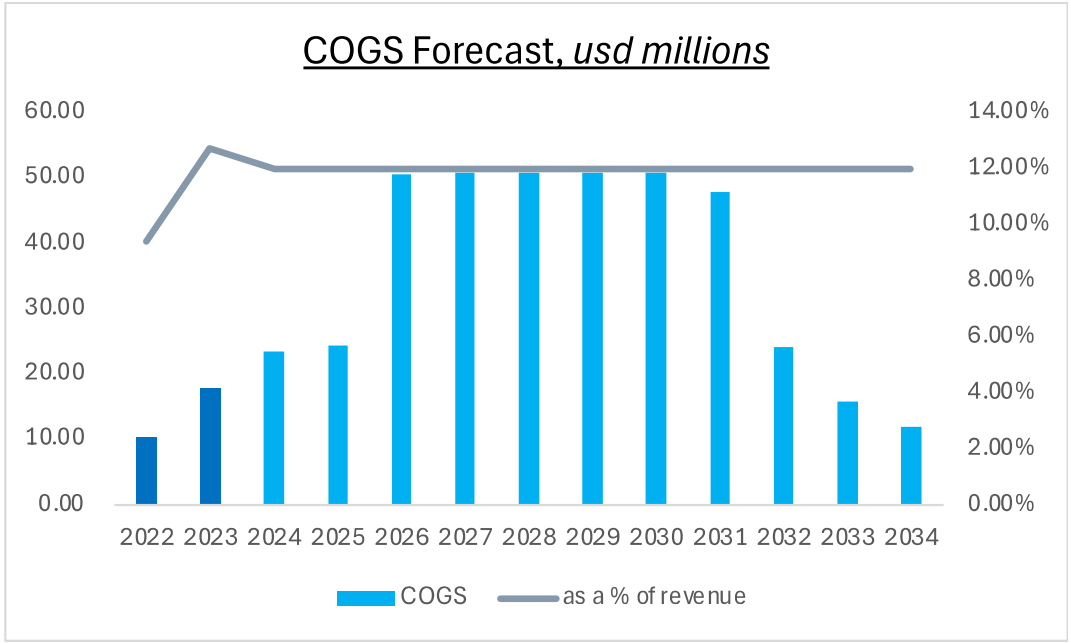


- Forecast Rationale:
  - Since the R&D revenue segment has been historically low and that it only ever grows if the US Gov sponsors SIGA to research/target a certain disease, I simply forecasted 3.2% growth going forward.
  - I don't believe this segment should prove to be more meaningful in aggregate terms, unless a new viral disease targets the western world.



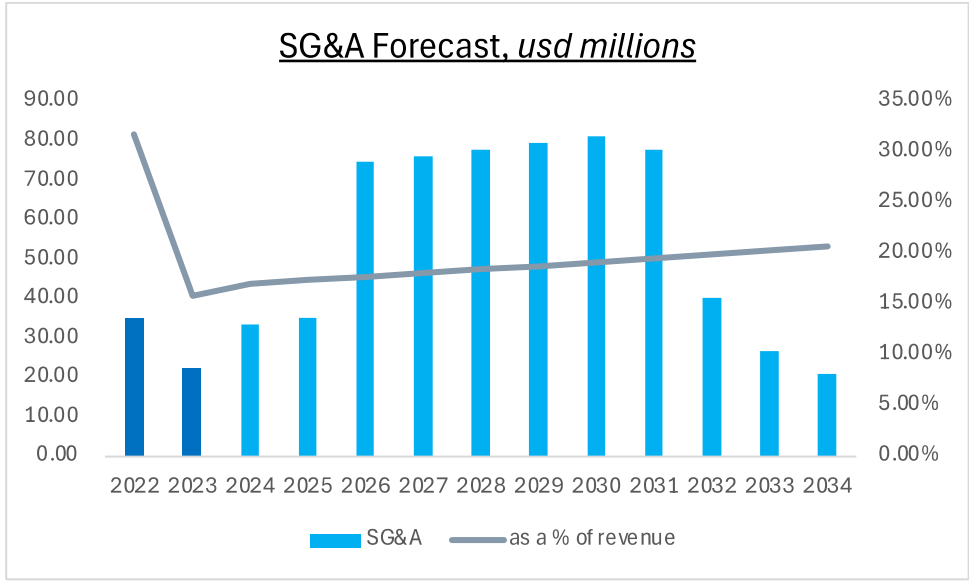
- Total Revenue Forecast Rationale:
  - As a result of the three segments shown before, total revenue should peak in 2030 and gradually decrease from there.
  - Note that the normalized growth should align with the risk-free rate of 4.42%, but since SIGA's revenue stems from contracts, the gradual decrease towards the Rf would simply prove false and artificial.
  - The TV growth shown later in the slides will take potential pipeline developments into account.

Consolidated COGS Forecast



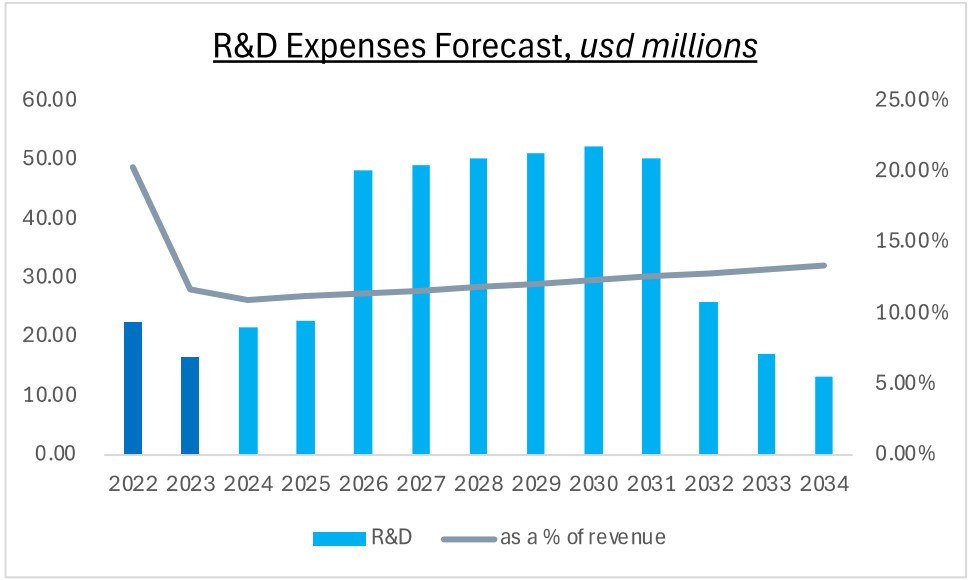
- Forecast Rationale:
  - The Costs of Goods Sold (COGS) for SIGA and other biotech/pharma stock consists of simple raw materials that aren't expensive relative to other industries' COGS.
  - I've forecasted a slight increase in COGS for FY2024 and FY2025 to reach 12% of total revenue, because it's a more conservative margin (vs historical COGS as a % of revenue).
  - The prices of the raw materials required to manufacture and package drugs are typically not volatile and predictable, which makes a constant 12% COGS as a % of revenue adequate to forecast.

Consolidated SG&A Forecast



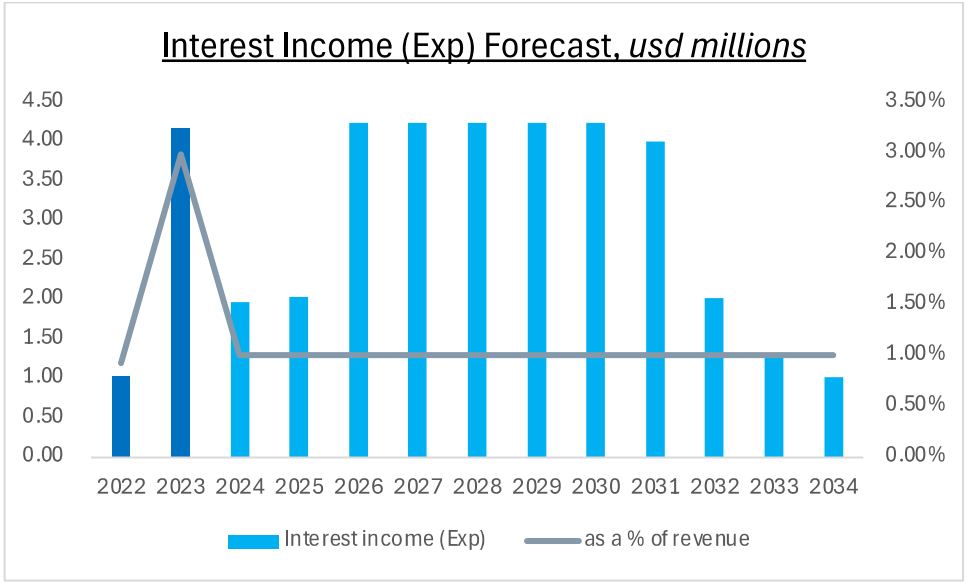
- Forecast Rationale:
  - I did forecast SG&A growing more than it historically has, again, to be as conservative as possible in my assumptions.
  - I believe SG&A costs as a % of revenue will gradually climb towards 20% as SIGA will aim to sell its products in new geographies worldwide and/or will increase its lobbying spending to get new drugs approved.

Consolidated R&D Expense Forecast



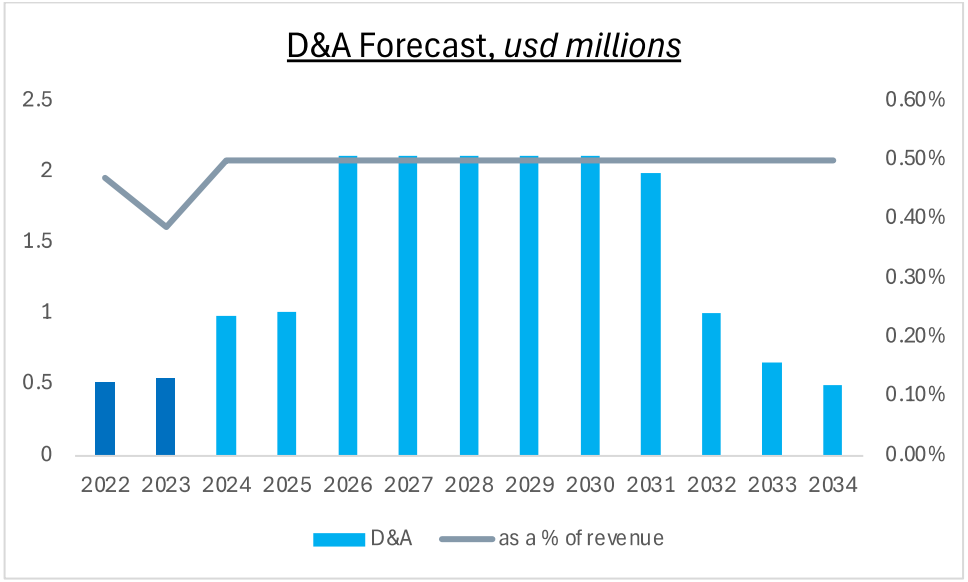
- Forecast Rationale:
  - In line with my conservative spending forecasts, I increased R&D expenses as a % of revenue to gradually reach a ~15% level.
  - I believe SIGA will increase its R&D expenses, because 1) new variants of mpox are currently being created faster than we believed possible 2) every biotech/pharma company who wants to stay afloat NEEDS to reinvest in R&D and/or acquire new drugs (CAPEX). I believe SIGA will continuously either target new indications or perfect its current pipeline via R&D.

Interest Income (Expense) Forecast



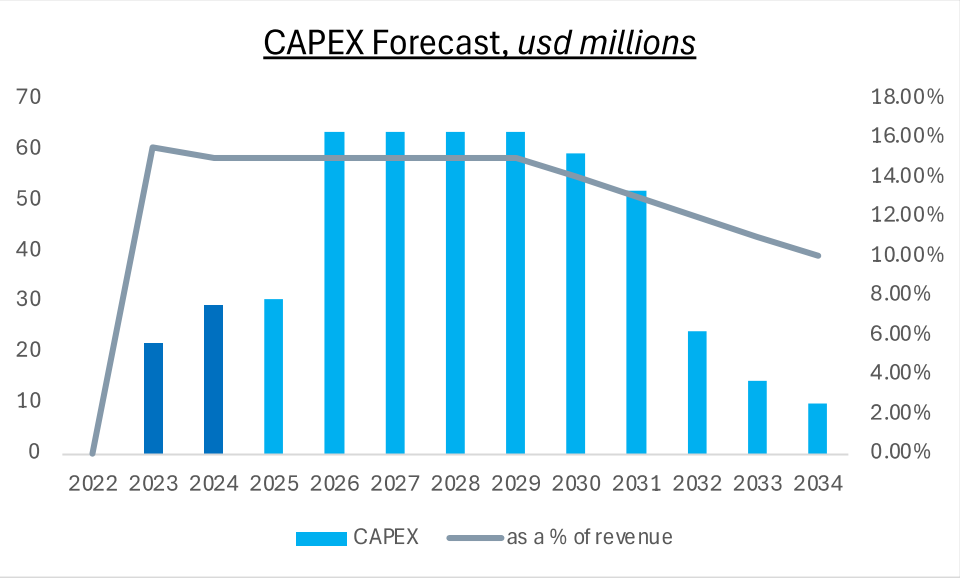
- Forecast Rationale:
  - Interest income for SIGA is a very minimal line item and has been (on average) equal to ~1% of total revenue.
  - Forecasting a 1% (as a % of revenue) interest income is adequate considering the conservative aspect of this assumption.
  - This forecast also stays pertinent in the context of decreasing rates in America.

D&A Forecast



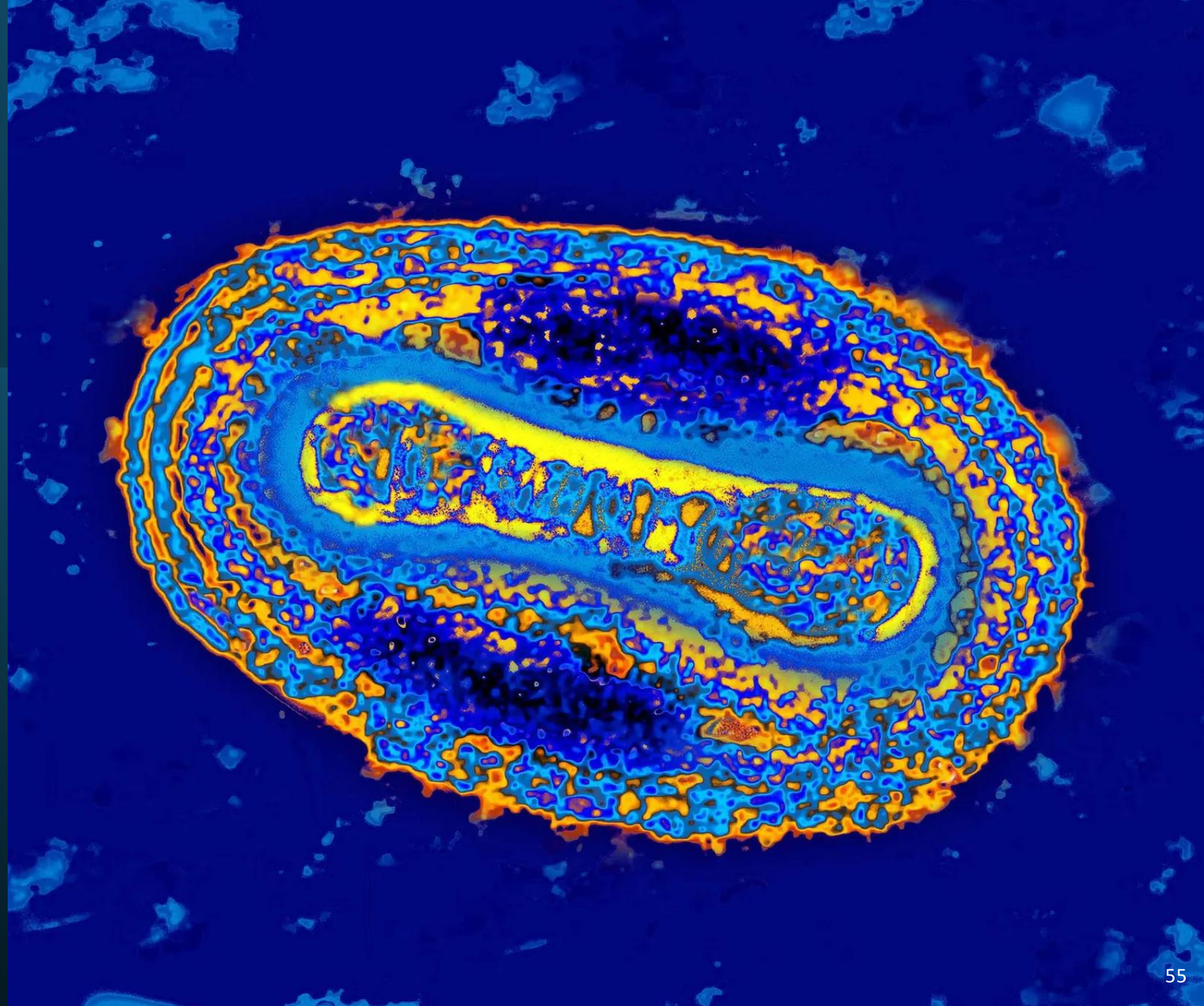
- Forecast Rationale:
  - For almost any biotech/pharma firm, D&A expenses are very low and constantly so.
  - In the case of SIGA, their low PP&E and historically stagnant D&A expenses make it easy for me to forecast at 0.50% of total revenue.
  - This 0.50% as a % of revenue level for SIGA is quite conservative, which follows my overall costs narrative.

CAPEX Forecast



- Forecast Rationale:
  - CAPEX forecasts are a bit more intricate in the case of SIGA, because the company is has recently started acquiring portfolios of preclinical drugs and management seems to like the idea of diversifying its pipeline.
  - As mentioned previously, mpox has mutated and created multiples variants more rapidly than expected. This context of multiple different branches of mpox make it easy to assume that SIGA would venture into potential acquisitions of drugs in the case that their novel TPOXX does not prove effective against the disease.
  - For this reason, I forecasted increased CAPEX for the next 6 years in the case that TPOXX doesn't work or that mpox mutates into more variants.

NCWC Analysis



NCWC Analysis and Matrix

usd millions	Historicals					Assumptions	Forecasts										
	2019	**2020**	**2021**	**2022**	**2023**		**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Revenues	26.74	124.96	133.67	110.77	139.92		196.26	202.56	422.16	422.32	422.49	422.66	422.84	398.06	201.58	131.10	100.18
% growth		*367%*	*7%*	*-17%*	*26%*		*40%*	*3%*	*108%*	*0%*	*0%*	*0%*	*0%*	*-6%*	*-49%*	*-35%*	*-24%*
Accounts Receivable	4.17	3.34	83.65	45.41	21.13												
% of revenue	*16%*	*3%*	*63%*	*41%*	*15%*												
Inventory	9.65	20.27	19.51	39.27	64.22												
% of revenue	*36%*	*16%*	*15%*	*35%*	*46%*												
Prepaids + Other CA	5.23	2.11	2.45	2.32	3.5												
% of revenue	*20%*	*2%*	*2%*	*2%*	*3%*												
Non-Cash Current Assets	19.05	25.72	105.61	87	88.85												
% of revenue	*71%*	*21%*	*79%*	*79%*	*64%*												
Accounts Payable	3.05	1.28	2.03	3.36	1.46												
% of revenue	*11%*	*1%*	*2%*	*3%*	*1%*												
Accrued Expenses + Other CL	8.64	8.29	9.25	6.3	10.18												
% of revenue	*32%*	*7%*	*7%*	*6%*	*7%*												
Current Liabilities	11.69	9.57	11.28	9.66	11.64												
% of revenue	*44%*	*8%*	*8%*	*9%*	*8%*												
Non-Cash Working Capital	7.36	16.15	94.33	77.34	77.21		98.13	101.28	211.08	211.16	211.24	211.33	211.42	199.03	100.79	65.55	50.09
% of revenue	*28%*	*13%*	*71%*	*70%*	*55%*	***50%***	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*
Change in NCWC		8.79	78.18	-16.99	-0.13		20.92	3.15	109.80	0.08	0.08	0.09	0.09	-12.39	-98.24	-35.24	-15.46

DCF Matrix

DCF Matrix

			1	2	3	4	5	6	7	8	9	10
usd millions	**Historical**		**Forecast**									
	TTM		**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Smallpox	169.25		191.5	197.65	166.45	166.45	166.45	166.45	166.45	141.48	120.26	102.22
% of revenue	*97%*		*98%*	*98%*	*39%*	*39%*	*39%*	*39%*	*39%*	*36%*	*60%*	*78%*
Mpox	0		0	0	250.64	250.64	250.64	250.64	250.64	250.64	75.19	22.56
% of revenue			*0%*	*0%*	*59%*	*59%*	*59%*	*59%*	*59%*	*63%*	*37%*	*17%*
R&D	4.49		4.76	4.91	5.07	5.23	5.40	5.57	5.75	5.93	6.12	6.32
% of revenue	*3%*		*2%*	*2%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*3%*	*5%*
Total Revenue	**173.74**		**196.26**	**202.56**	**422.16**	**422.32**	**422.49**	**422.66**	**422.84**	**398.06**	**201.58**	**131.10**
% growth			*13%*	*3%*	*108%*	*0%*	*0%*	*0%*	*0%*	*-6%*	*-49%*	*-35%*
COGS	31.96		23.55	24.31	50.66	50.68	50.70	50.72	50.74	47.77	24.19	15.73
% of revenue	*18%*		*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*
Gross Profit	141.78		172.71	178.25	371.50	371.64	371.79	371.94	372.10	350.29	177.39	115.37
% of revenue	*82%*		*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*
SG&A	25.6		33.36	35.12	74.67	76.19	77.74	79.33	80.95	77.73	40.15	26.63
% of revenue	*15%*		*17%*	*17%*	*18%*	*18%*	*18%*	*19%*	*19%*	*20%*	*20%*	*20%*
R&D	11.57		21.59	22.73	48.31	49.30	50.30	51.33	52.38	50.30	25.98	17.23
% of revenue	*7%*		*11%*	*11%*	*11%*	*12%*	*12%*	*12%*	*12%*	*13%*	*13%*	*13%*
EBIT	104.61		117.76	120.40	248.52	246.16	243.74	241.28	238.77	222.26	111.26	71.50
% of revenue	*60%*		*60%*	*59%*	*59%*	*58%*	*58%*	*57%*	*56%*	*56%*	*55%*	*55%*
Interest Income	5.79		1.96	2.03	4.22	4.22	4.22	4.23	4.23	3.98	2.02	1.31
% of revenue	*3%*		*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*
Tax Expense	(24.65)		(29.44)	(30.10)	(62.13)	(61.54)	(60.94)	(60.32)	(59.69)	(55.57)	(27.81)	(17.87)
% of EBIT	*-24%*		*-25%*	*-25%*	*-25%*	*-25%*	*-25%*	*-25%*	*-25%*	*-25%*	*-25%*	*-25%*
NOPAT	85.75		90.28	92.33	190.61	188.84	187.03	185.19	183.30	170.68	85.46	54.93
D&A			0.98	1.01	2.11	2.11	2.11	2.11	2.11	1.99	1.01	0.66
% of revenue			*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*
CAPEX			29.44	30.38	63.32	63.35	63.37	63.40	59.20	51.75	24.19	14.42
% of revenue			*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*14%*	*13%*	*12%*	*11%*
Change in NCWC			20.92	3.15	109.80	0.08	0.08	0.09	0.09	-12.39	-98.24	-35.24
FCFF			**40.90**	**59.81**	**19.60**	**127.52**	**125.69**	**123.81**	**126.13**	**133.31**	**160.52**	**76.41**
PV of FCFF = FCFF/((1+WACC)^t)			37.54	50.36	15.15	90.44	81.80	73.95	69.13	67.05	74.09	32.36

DCF Final Outputs

usd millions

WACC	8.97%
TV WACC	9.50%
TV Growth	2.00%

Sum of PV of FCFF		591.87	
Terminal Value		1039.15	TV = (FCFFlast*(1+TVg))/(TVWACC-
PV of TV		419.31	PV of TV = TV / ((1 + TV WACC)^10)
Enterprise Value		1011.18	EV = Sum of PV of FCFF + PV of TV
(+) Cash		99.27	Q3'24
(-) Funded Debt		1.53	Q3'24
Equity Value		1108.92	
Shares Outsanding		71.4	Q3'24
Price per Share	**$**	**15.53**	
VS Current Price	$	6.27	2024-11-21
Upside		**148%**	

Terminal Value Calculation

- I chose a **Terminal growth rate of 2%** given the firm's recent investments and acquisitions of preclinical drugs. I also firmly believe biowarfare will persist to be an active threat in international conflicts for the longer term and given the US Gov's reliance on SIGA for rapid antiviral development, pursuing a 2% growth after the DCF periods seems fitting.
- I also explained the TV WACC of 9.50% on the WACC Estimation slide. Yet to reiterate, given the late growth phase SIGA is in, I artificially increased the TV WACC to take SIGA's current business cycle position in consideration.

- TV = FCFF $_{\text{last year}}$ * (1 + TVG)/(WACC – TVG)
  TV = $76.41 * (1 + 2%)/(9.50% - 2%)
  TV = $1,039.15

- PV of TV = TV/((1 + TV WACC)^10)
  PV of TV = $1,039.15/((1 + 9.50%)^10)
  PV of TV = $419.31

Sensitivity Analysis

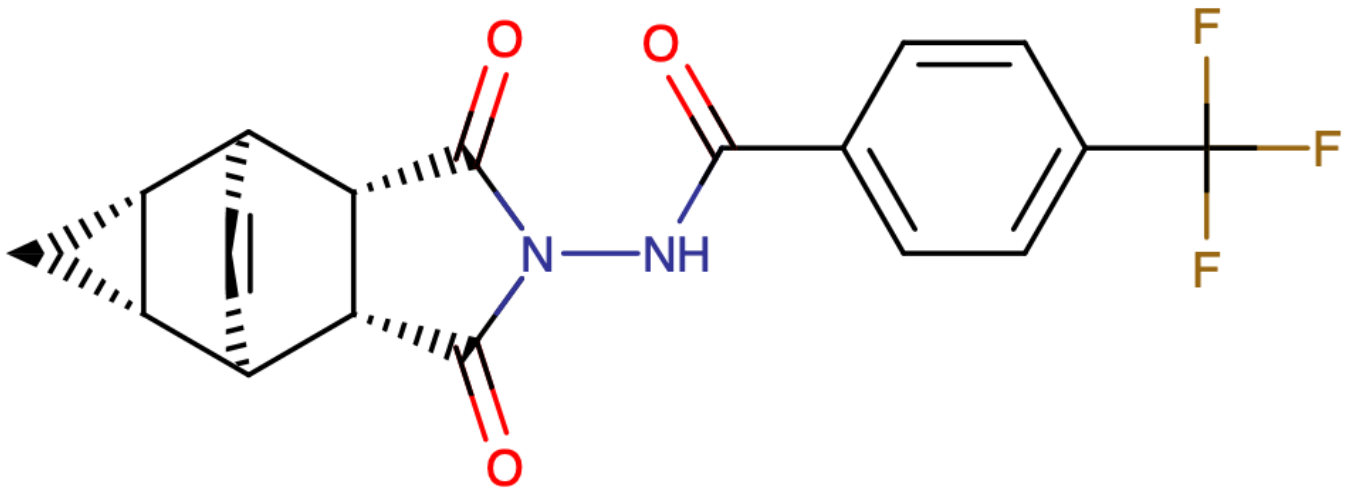
Mpox 6-year Contract (Rev/Year), usd millions

WACC	$ 100.00	$ 150.00	$ 200.00	$ 250.64	$ 300.00	$ 350.00	$ 400.00
6.00%	$ 13.90	$ 15.00	$ 16.10	$ 17.21	$ 18.29	$ 19.39	$ 20.49
7.00%	$ 13.52	$ 14.57	$ 15.62	$ 16.68	$ 17.71	$ 18.76	$ 19.81
8.00%	$ 13.17	$ 14.17	$ 15.17	$ 16.18	$ 17.17	$ 18.17	$ 19.17
8.97%	$ 12.85	$ 13.81	$ 14.76	$ 15.53	$ 16.68	$ 17.64	$ 18.60
10.00%	$ 12.53	$ 13.45	$ 14.37	$ 15.30	$ 16.20	$ 17.12	$ 18.03
11.00%	$ 12.25	$ 13.13	$ 14.01	$ 14.90	$ 15.76	$ 16.64	$ 17.52
12.00%	$ 11.99	$ 12.83	$ 13.67	$ 14.53	$ 15.36	$ 16.20	$ 17.04

Average	$	15.77
Average	$	15.74
Average	$	15.71
Actual Estimated Price	$	15.53

- I believe two of the most influential factors for SIGA's share price are/will be revenues after TPOXX mpox FDA approval and its WACC.
- My forecast for the 6-year contract revenues/year after the mpox indication approval stand at $250.64 millions, but I sensitized the DCF to take multiple scenarios into account.
- I also sensitized the WACC, because not only does it represent the cost of capital (and required return), but also a measure of risk (and probability) of future revenue. Measuring the probability of these future contracts makes sense given that they're SIGA' main source of revenue.
- The output of the analysis returned consistent average implied prices per share. This solidifies my beliefs of the actual share price I'm implying from the DCF.

Relative Valuation



Street Analyst RV Metrics

The main ratios used in the valuation of biotechnology and pharmaceutical companies are somewhat bizarre when compared to other industries. That's why I'll break down the more "traditional" ratios and the industry-specific ratios used by street analysts. [RV Multiples Street Analysts Use to Value Biotech Firms - Perplexity AI]

Traditional Ratios:

- The most widely used traditional financial ratios in biotech are the EV/Sales, P/E and P/Sales.
- These ratios are commonly used, because they take the high net margins and the often-strong balance sheets of the firms into account.
- The forward versions of these ratios can also be used (and in my opinion are more useful, because they consider future drug development revenue/earnings)

Industry-Specific Ratios:

- The ratios used to value biotech firms from a more specific approach are the EV/R&D (EV relative to the total R&D spending of the company), EV/Phase 3 (# of phase 3 drugs in pipeline) and the Return on Research Capital (RORC) ratio.
- Although these ratios would have proven somewhat useful in my RV, they fail to account for future growth in terms of profitability and revenue.

usd millions, except per share items, December 2nd

Price	$	6.84	TTM Revenue		173.74
Shares		70.4	TTM EPS	$	1.20
MC		**482**	TTM R&D		11.57
Cash		99			
Funded Debt		1.5			
EV		**384**			

December 2nd, SIGA Multiples

EV/Sales	2.21x
P/E	5.70x
P/Sales	2.77x
EV/R&D	33.19x

Multiples Chosen for RV Analysis

Forward P/E Ratio:

- This ratio is often used in biotech to value companies that have little to no earnings, but are expected to have an approved drug in the near future.
- What's so useful about the forward PE is that it'll bring a rapid relative price to EPS for SIGA.
- Biotech companies which have FDA approved drugs, tend to have very high net margins, so using this ratio to take future SIGA contracts into account gives this ratio a high weight.

Weight 40%

Forward EV/Sales:

- The EV/Sales ratio is often used in biotech valuations, because of the high net cash balances of the firms in the industry.
- Indeed, any biotech company which aspires to great pipeline development NEEDS a strong balance sheet to fund trials and drug acquisitions.
- Using this ratio to value the future contracts of SIGA in juxtaposition to its very strong balance sheet rewards it a high weight as well.

Weight 40%

Forward P/Sales:

- This ratio is like the EV/Sales ratio in terms of its practicality, but it doesn't take the net cash balances of the firms in consideration.
- I still find it useful in the case of SIGA, because when future contract values (or revenue from concentrated sources) are hard to estimate, this can lead to massive share price discrepancies that is easily measurable with this ratio.

Weight 20%

RV: Choice of Comparables + Weight

- **Bavarian Nordic (60%):** This firm is the only pertinent comparable in terms of the indication it's currently targeting (mpox). As outlined in the competition analysis, there are other firms targeting mpox (but in the form of a vaccine), but none are 1) currently profitable or 2) expect to be profitable in the future, apart from Bavarian Nordic. I believe this company deserves the highest weight of **60%**, because of the similarity of revenue source (Government contracts) and the profitability stemmed from said contracting.
- **Jazz Pharmaceutical (10%):** Although Jazz Pharma has different indications from SIGA, the overall net cash balance and profitability of the company makes it a pertinent comparable. Note that there are no sub $1 billion mkt cap profitable biotech stocks (like SIGA). To choose comparables, I chose the smallest profitable American biotech firms. The similar financial positions of Jazz and SIGA gives the comparable a **10% weight**.
- **Krystal Biotech (10%):** I chose Krystal Biotech for the same reason as Jazz. Low market cap with profitable pipeline development and same geography as SIGA. Since the drug development of Krystal is different from SIGA's, I gave it a **weight of 10%.**
- **Halozyme Therapeutics (10%):** I chose Halozyme for the same reason as Jazz and Krystal, all these companies are relatively low in terms of valuation, but are profitable and have a positive net cash balance sheet, thus justifying a **10% weight**.
- **Exelixis, Inc. (10%):** Similarly to the last three companies, Exelixis is one of the smallest cap biotech firm with profitable operations and a net cash balance. The company also operates in the same geography as SIGA, which is why I gave it a **10% weight**.

RV Analysis

Relative Valuation, Data from CIQ

	2024-11-21							NTM	NTM	2024-11-21			LTM	
USD m's	Weight	Price	Shares	Market Cap	Cash	Funded Debt	EV	Revenue	EPS	Forward P/E	Forward EV/Sales	Forward Price/Sales	FCF	Forward FCF Yield
SIGA		**$ 6.27**	**71.40**	**448**	**99**	**1.5**	**350**	**202.56**	**$ 1.31**	**4.79x**	**1.73x**	**2.21x**	**54**	**12%**
BAVA.CO	60%	$ 27.06	78.50	2,124	139	16	2,001	962	$ 3.23	8.38x	2.08x	2.21x	(5)	0%
JAZZ	10%	$ 119.24	60.50	7,214	2,218	6,204	11,200	4,201	$ 21.27	5.61x	2.67x	1.72x	1,270	18%
KRYS	10%	$ 178.10	28.80	5,129	374	8	4,763	392	$ 4.70	37.89x	12.16x	13.10x	42	1%
HALO	10%	$ 45.76	127.20	5,821	154	1,534	7,200	1,125	$ 4.63	9.88x	6.40x	5.17x	344	6%
EXEL	10%	$ 34.65	285.60	9,896	258	194	9,832	2,137	$ 1.84	18.83x	4.60x	4.63x	431	4%
Weighted Mean				**4,081**	**384**	**804**	**4,500**	**1,363**		**12.25x**	**3.83x**	**3.79x**	**206**	**6%**
Median (except SIGA)				5,821	258	194	7,200	1,125		9.88x	4.60x	4.63x	344	4%

RV Implied Share Price - Forward P/E

usd millions

Forward P/E			
Comparable ratio		12.25x	
2025 EPS	$	1.31	my forecast
Estimated Share Price	**$**	**16.04**	

RV Implied Share Price – Forward EV/Sales

usd millions

Forward EV/Sales			
2025 Revenue (Sales)		202.56	my forecast
WACC		8.97%	
PV of 2025 Revenue		$185.89	=FV/((1+WACC)^t)
Comparable ratio		3.83x	
Enterprise Value		$712.13	
(-) Funded Debt		1.5	latest 10Q
(+) Cash & Equivalents		99	latest 10Q
Implied Equity Value		$809.60	
Shares Outstanding		71.40	latest 10Q
Estimated Share Price	**$**	**11.34**	

RV Implied Share Price – Forward P/Sales

usd millions

Forward P/Sales			
2025 Revenu (Sales)		202.56	my forecast
WACC		8.97%	
PV of 2025 Revenue	$	185.89	=FV/((1+WACC)^t)
Comparable ratio		3.79x	
Equity Value	$	703.88	
Shares Outstanding		71.40	latest 10Q
Estimated Share Price	**$**	**9.86**	

RV Price Reconciliation

Weighted Average Implied RV Price per Share

Multiple	Implied Price	Weight	Weighted Implied Price	Weight Rationale
Forward P/E	$ 16.04	40%		More focus is placed on future earnings, which matters most
Forward EV/Sales	$ 11.34	40%	**$12.93**	It takes the significant cash position of the company into account, thus the true price paid for sales growth
Forward P/Sales	$ 9.86	20%		Easy snapshot of future sales growth, but fails to account for net margin and net cash

- As mentioned in my ratios selection, the forward P/E and Forward EV/Sales both get a 40% weight, because of their more precise functionalities (they take earnings and net cash into account).
- I still consider Forward P/Sales useful given its measurement of SIGA's future revenue streams.
- **All in all, the weighted average implied price from my RV analysis comes in at $12.93, which represents an upside of 89.05%.**

DCF & RV Reconciliation

- **The implied price per share from my DCF is $15.53**
- **The implied price per share from my RV is $12.93**

- To reconcile both valuations, I'll give each method its own weight:
  - The DCF takes the fundamentals of the underlying into account and my sensitivity analysis strengthens my assumptions
  - Given the very little amount of guidance and street estimates regarding SIGA, a lot of predictions and forecasts had to be made on my end, which realistically speaking do open the door to uncertainty.
  - For these reasons**, I gave a 60% weight to the DCF**, because I think the intrinsic value of future contracts is more poignant in this analysis.

  - The RV's comparables fail to be reach similarity in terms of indication which is why I gave the bigger weight to the DCF.
  - Otherwise, I think the implied price from the RV is pertinent given the SIGA's current low multiples vs its comparables.
  - The forward multiples from SIGA's comps are also quite consistent, which solidifies my beliefs in the weighted average implied price of the RV
  - **For these reasons, I gave the RV method a weight of 40%.**

Reconciled Price			
Valuation		Price	Weight
DCF	$	15.53	60%
RV	$	12.93	40%
Reconciled Price per Share		**$14.49**	
Current Price (December 2nd, '24)		$6.84	
Implied Upside		111.84%	
Recommendation:		**BUY**	

Reconciled Price = (DCF Price * 60%) + (RV Price * 40%)

Recommendation:

- Given the upside of 111.84% from the reconciled price of $14.49 (vs current price of $6.84), I recommend to **BUY** SIGA.

Extra: Scientific Analysis

When analyzing any commercial-stage biotechnological firm with pre-clinical or in-trial pipeline drugs, it is of good practice to fundamentally assess the probability of success the drug has against its target. I summarized my analysis on these 4 studies:

1) The sequence consistency of F13 between monkeypox and variola viruses ranges from 97.58% to 99.73%. AlphaFold2 created a reliable 3D model with a confidence score of 92.062. Tecovirimat libdock binding scores were 71.90 for monkeypox and 78.03 for variola, with binding energies of −10.65 and −38.68 kcal/mol, respectively. The active site was defined within a specific spherical region centered at coordinates X: −6.27702, Y: −2.48567, Z: −8.66086, with a radius of 8.9 Å. The molecular docking results indicate that tecovirimat is effective against both monkeypox and variola viruses, providing insights into its binding mechanisms that could aid in treating monkeypox. F13 Gene Predicted Full-Length Structure and Tecovirimat Binding Sites

2) The study involved 549 monkeypox patients treated with tecovirimat. 99.8% received it orally, avoiding hospitalization. Among 369 patients (with available data), only 3.5% reported adverse events, mostly nonserious. Median time to symptom improvement was 3 days, regardless of HIV status, supporting ongoing use of tecovirimat for monkeypox treatment.
A case report detailed a 37-year-old immunosuppressed male with confirmed monkeypox. He received 600 mg of tecovirimat twice daily for two weeks, leading to rapid disappearance of skin lesions without significant negative effects. Tested Efficacy of TPOXX Against Mpox

3) The study evaluated tecovirimat (TCV) in nine adults (n = 9) with severe mpox in Montréal. Five patients experienced severe head and neck symptoms, while four had genitourinary or anorectal issues. Two-thirds received treatment for suspected bacterial superinfection. All patients, including five living with HIV, **recovered within a median of nine days without adverse events or relapses**. TCV was administered a median of nine days after symptom onset, and no patients discontinued treatment early. Health Canada Study for TPOXX Against Mpox, Montréaal, March 2023

4) This study assessed the compassionate use of tecovirimat in 25 (n = 25) male patients with monkeypox at UC Davis from June 3 to August 13, 2022. Participants had a median age of 40.7 years and received oral tecovirimat for 14 days. By day 7, 40% reported complete lesion resolution, and by day 21, 92% achieved resolution of lesions and pain. Adverse events included fatigue (28%), headache (20%), and nausea (16%), but all patients tolerated treatment well. UC Davis, Summer '22 Study of TPOXX Against Mpox

Summary - Why TPOXX Will Get Approved

- **In summary, I believe TPOXX will get approved for the mpox indication for the following reasons:**
  - TPOXX is already approved for smallpox, mpox and cowpox in the EU (EMA) + UK (MHRA)
  - The PALM007 trial conducted in the Democratic Republic of the Congo failed to reach its primary endpoint, but I think the study design was fundamentally wrong, because most patients reported for treatment more than a week after their illness started (thus directly skewing primary endpoint of "Time until lesion resolution").
  - The similar nature of mpox and smallpox (both orthopoxviruses with the F13 gene) makes it probable that TPOXX is pertinent for mpox.
  - The three studies conducted in the US and Canada (last slide) show TPOXX efficacy in treating mpox patients. Note that these aren't clinical trials, but studies and papers. Real trials with adequate trial designs, double-blinded and placebo-controlled are currently being conducted worldwide to measure Tecovirimat's efficacy in treating mpox.
  - **Most importantly, TPOXX is already approved for the mpox indication under the CDC's Compassionate Use and Expanded Access in life-threatening situations.**

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- US GDP Growth and Inflation Forecast for 2025, University of Michigan
- Our World in Data, MPOX Confirmed Cases and Deaths