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Risk, return, and regulation: how venture capitalists navigate the life sciences sector

Accounting and Finance
Bachelor's thesis

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Abstract

The life sciences sector combines scientific research and technological innovation with the goal of improving human health. While the industry offers high growth potential, it also poses major challenges for investors due to strict regulation, long development cycles, and high capital intensity. Venture capital (VC) has become a critical source of funding for early-stage companies seeking to commercialize scientific innovation in areas such as drug development, medical devices, and digital health.

This thesis explores how venture capital investors operate in the complex life sciences sector and identifies the key factors that drive their success. The research aims to identify the factors that distinguish life sciences investing from traditional VC industries and to examine the key challenges and success factors shaping investor performance. The study focuses on differences between life sciences-focused VC funds and generalist VC funds, investigating both the regulatory and market-related dynamics that influence investment decisions.

Methodologically, the thesis combines a literature review with an expert interview to integrate theoretical insights with practical perspectives. The literature review draws primarily on U.S. sources, reflecting the leading global market for venture capital and startup activity, while the interview provides first-hand knowledge from an experienced life sciences executive and investor, primarily focusing on the Northern European market.

The findings show that successful venture capital investing in the life sciences sector depends on strong professional networks and deep scientific understanding. Investors must be able to accurately evaluate the scientific as well as commercial potential and manage high levels of uncertainty. Precision, scientific thoroughness, and strategic collaboration are fundamental. Investors often adopt a partnership-oriented approach, leveraging shared expertise and networks to identify opportunities and achieve successful exits. Overall, the study emphasizes that networks, scientific understanding, and close collaboration with co-investors are essential for managing the risks of life sciences investing and achieving sustainable returns.

Keywords: venture capital, life sciences, biotechnology, drug development, startup, medical devices

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Tiivistelmä

Life science -ala yhdistää tieteellisen tutkimuksen ja teknologisen innovaation ihmisten terveyden edistämiseksi. Ala tarjoaa suurta kasvupotentiaalia, mutta sijoittajille se on haastava tiukan sääntelyn, pitkien kehityssyklien ja korkean pääomaintensiteetin vuoksi. Venture capital (VC) -sijoittaminen on keskeinen rahoitusmuoto varhaisen vaiheen yrityksille, jotka pyrkivät kaupallistamaan tieteellisiä innovaatioita esimerkiksi lääkekehityksen, lääkinnällisten laitteiden ja digitaalisen terveyden aloilla.

Tämä tutkielma tarkastelee, miten venture capital -sijoittajat toimivat monimutkaisella life science -sektorilla ja tunnistaa keskeiset ajurit, jotka edistävät heidän menestystään. Tutkimuksen tavoitteena on tunnistaa tekijät, jotka erottavat life science -alan sijoittamisen yleisestä VC-sijoittamisesta, sekä selvittää alan keskeiset haasteet ja menestystekijät, jotka vaikuttavat sijoittajien suoriutumiseen. Tutkimus keskittyy life science -alan VC-rahastojen ja yleisten VC-rahastojen eroihin sekä siihen, miten alan sääntely- ja markkinadynamiikat vaikuttavat sijoituspäätöksiin.

Tutkimusmenetelmänä on kirjallisuuskatsaus ja asiantuntijahaastattelu. Tutkielmassa teoreettiset näkemykset yhdistyvät käytännön kokemuksiin sijoittamisesta life science -sektorilla. Kirjallisuuskatsaus pohjautuu pääosin aineistoihin Yhdysvaltojen markkinoilta, jotka edustavat johtavaa globaalia VC-sijoittamisen ja startup-toiminnan kenttää, kun taas haastattelu tarjoaa Pohjois-Euroopan markkinoille painottuvaa ensikäden tietoa kokeneelta life science -alan johtajalta ja sijoittajalta.

Tulokset osoittavat, että menestyksekäs venture capital -sijoittaminen life science -alalla perustuu vahvoihin verkostoihin ja syvälliseen tieteelliseen ymmärrykseen. Sijoittajien on pystyttävä arvioimaan tieteellistä ja kaupallista potentiaalia tarkasti sekä hallitsemaan suurta epävarmuutta. Huolellisuus, tieteellinen perusteellisuus ja strateginen yhteistyö ovat alalla keskeisiä. Sijoittajat omaksuvat usein kumppanuuslähtöisen lähestymistavan, jossa jaettua asiantuntemusta ja verkostoja hyödynnetään sijoitusmahdollisuuksien tunnistamisessa sekä onnistuneiden exitien varmistamisessa. Kokonaisuudessaan tutkimus korostaa, että vahvat verkostot, tieteellinen ymmärrys ja tiivis yhteistyö ovat ratkaisevia life science -sijoittamisen riskien hallinnassa ja kestävien tuottojen saavuttamisessa.

Avainsanat: riskipääoma, lääkekehitys, lääkinnälliset laitteet, startup-yritys, bioteknologia, venture capital

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1 Introduction

1.1 Introduction to the topic

Venture capital (VC) firms are investment companies that provide financing to privately owned early-stage companies with high risk and return potential. Venture capital is structured as equity financing, where the fund acquires a minority ownership share in the target company. Apart from funding, venture capitalists contribute to the development of portfolio companies by offering strategic advice and facilitating connections within their networks. VCs play a crucial role in enabling the development and commercialization of high-potential innovations, and many of today's most influential products and services originate from venture capital-backed companies. Venture capitalists do not only provide funding, but also evaluate which business ideas are technically possible, commercially viable, and likely to succeed. Through these decisions, they determine which innovations reach the market, influencing the development of different industries. The societal impact of VC backed companies is substantial. They have a key role in job creation, stimulating economic growth and enhancing well-being (Brown et al. 2022, 1, 6–7; Copenhagen Economics 2019, 11–12). Venture capitalists fulfil the societal role of finance by allocating surplus sector's capital to high-potential startup companies.

The life sciences sector comprises firms that combine scientific research and technological innovation with the objective of creating products and services designed to enhance human health (Bell 2017, 3). According to Burns (2005, 3), the highest innovation potential in the industry can be found in the following sectors: pharmaceutical sector, biotechnology sector, genomics and proteomics sector, medical device sector and information technology sector. The boundaries of the life sciences sector are not always clear, and some definitions exclude technology-related areas altogether. This thesis adopts a venture capital perspective: life sciences and health funds typically invest in drug development, medical devices, and digital health, and accordingly, the study focuses on these areas. The sector offers early-stage companies high growth potential, but it is also associated with a high level of risk, as obtaining market approval alone requires successfully completing numerous regulatory tests. In the early stages of drug development, the chances of reaching the market are measured in fractions of a percent. The sector's growth is supported by demographic developments as well as breakthroughs in science and technology, which make innovation possible. Aging populations, high healthcare costs, prevalent health issues, and rising living standards in developing countries create need for better solutions in healthcare. The life sciences industry also has a critical role in responding to pandemics, as COVID-19 demonstrated.

The risk of a new pandemic has increased, due to environmental factors, climate change and demographic trends (Fanelli & Riccetti 2025, 1). The industry's growth is also driven by the growing demand for consumer-oriented health products beyond conventional healthcare. According to a McKinsey report (2024a, 2), younger generations are increasingly spending on their own health, longevity and well-being. In conclusion, health problems generate substantial costs both in terms of treatment and lost work years, and preventive measures and higher-quality care provide considerable value to both individuals and societies. Early-stage companies in the sector have the potential to disrupt the industry with their innovations, which attracts venture capital investments.

The life sciences industry offers high growth potential but is a challenging and risky environment for venture capitalists. This is due to its high capital requirements, extended product development timelines, and regulation. VC activity is still high in the sector, and investments are often made by sector-specific VC funds or firms. In the year 2024, the life sciences industry raised $37,4 billion of VC funding in the U.S, which made up 17,3 percent of total VC funding of that year (NVCA 2025a, 21). As illustrated in figure 1, even with a very high risk profile and capital intensity, the sector is still one of the most active in the VC and startup environment.

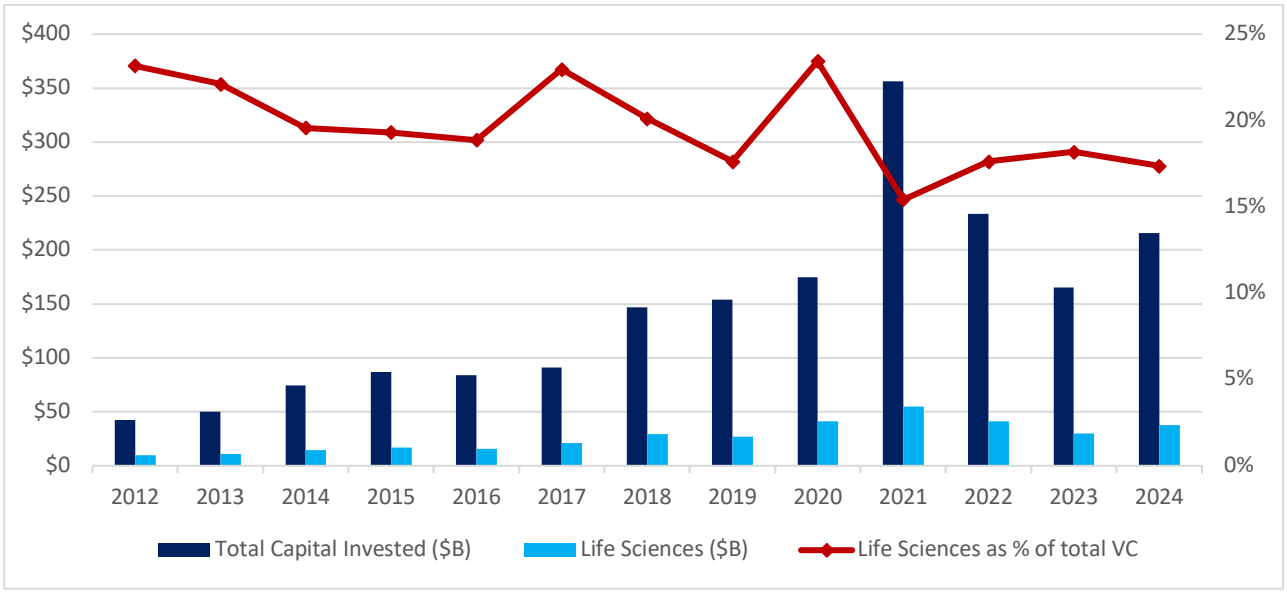

Figure 1: Life sciences and total venture capital deal flow in the United States
Source: NVCA (2025a, 12, 21).

The industry focuses on solving major problems, and the potential gains from successful ventures justify the considerable risks involved. For example, the economic burden of dementia in the United States is projected at $781 billion for the year 2025 (USC Schaeffer 2025). Overweight imposes total annual costs of $425 billion on OECD countries, with the prevalence of overweight continuing

to rise (OECD 2019, 41, 75). Innovations targeting issues of such magnitude hold considerable economic potential, making the scale of returns demanded by VC funds possible.

Although venture capital has received some academic attention, there is limited research specifically addressing its relationship with the life sciences sector. Compared to the United States, the Nordic VC markets are relatively young and have significant growth potential, which could stimulate economic growth and enable domestic ownership in later stages (Copenhagen Economics 2019, 22–24). The Finnish startup ecosystem is becoming increasingly important to the national economy, with venture capital playing a significant role. While the technology sector has excelled in producing successful startups, the potential of life sciences remains underutilized. More developed venture capital markets and a deeper understanding of the sector could help foster its growth. For these reasons, investigating this topic is particularly timely and relevant, as it not only fills gaps in the existing literature but also provides practical insights that can help venture capitalists enhance innovations in the sector.

1.2 Research objective and questions

This thesis focuses on the specific characteristics of the life sciences sector from a venture capital investor's perspective. The aim is to explore the differences between life sciences-focused VC funds and generalist VC funds, to identify the challenges present in the sector, and to determine key factors supporting fund performance. The research questions are:

What factors distinguish venture capital investing in the life sciences sector from traditional VC industries?

and

What challenges and success factors characterize venture capital in the life sciences sector?

By combining a literature review with an expert interview, this thesis aims to provide valuable insights into the business logic of the life sciences industry and the venture financing of companies operating within the sector. The interviewee brings experience both as a life sciences founder and as a VC investor, which offers a unique dual perspective and deepens the overall understanding of the sector and its challenges. Therefore, the study provides guidance for venture capitalists aiming to gain a deeper understanding of the industry and navigate its unique challenges. At the same time, it helps startup founders better understand the VC landscape as they seek funding to build and grow their life science ventures.

The literature review focuses on the United States, as it's the leading region for venture capital and startup activity, with much of the rest of the world trailing significantly behind in development. High-quality data is also most readily available from U.S. sources, such as National Venture Capital Association's (NVCA) reports. Moreover, the U.S. market is strategically crucial for life sciences startups, regardless of their location. The conclusions of this thesis are broadly applicable in the life sciences sector, as the business logic of venture capital funds is consistent across geographic markets and VC attractive business is inherently international.

1.3 Research structure

The thesis is organized as follows. Chapter 1 introduces the topic and highlights its relevance, emphasizing the important roles of both venture capital and the life sciences sector in promoting economic growth and enhancing societal well-being. Chapter 2 examines the business logic of venture capital, outlining the entire lifecycle of a VC fund. Chapter 3 provides an overview of the life sciences sector. It addresses significant sub-sectors, regulation, and covers the healthcare value chain briefly to facilitate an understanding of the sector's business logic. The scientific aspects of the sector are concisely addressed to understand the product development, but the focus remains on new innovations and the perspective of startup entrepreneurship. Chapter 4 integrates the content of Chapters 2 and 3 by contextualizing the business logic of venture capital within the life sciences sector and examining the specific challenges associated with investing in this field. The chapter also provides the necessary background to support the interview. Chapter 5 presents the empirical findings from the expert interview and reflects them to literature, offering a real-world context for the observations made in the preceding chapters. Chapter 6 concludes the thesis by synthesizing the findings, highlighting their contribution to filling gaps in the academic literature, outlining their practical implications for actors in the venture capital market, and offering perspectives for future research. Chapter 7 summarizes the key findings of the thesis, presenting the main insights on challenges, success factors, and strategic considerations for venture capitalists in life sciences.

2 Venture capital

2.1 Business logic

VC firms manage funds, which are typically financed by institutional investors. A venture capital fund is structured as an investment agreement between general partners (GPs) and limited partners (LPs), whereby the limited partners commit capital to the fund, and the general partners invest these funds into chosen portfolio companies (Haislip 2010, 17). A VC fund typically has a lifespan of 10 to 12 years and invests in 10 to 30 companies, depending on target sector as well as other factors (Ramsinghani 2014, 28). During the early years, the fund searches for promising companies and invests the capital it has raised. It then monitors and supports its portfolio companies to grow and ultimately liquidates its investments to return capital to the limited partners. The structure of a venture capital fund is further illustrated in figure 2. VC funds target a 20 percent annualized rate of return, with the top quartile of funds reaching even higher returns (Ramsinghani 2014, 25, 28).

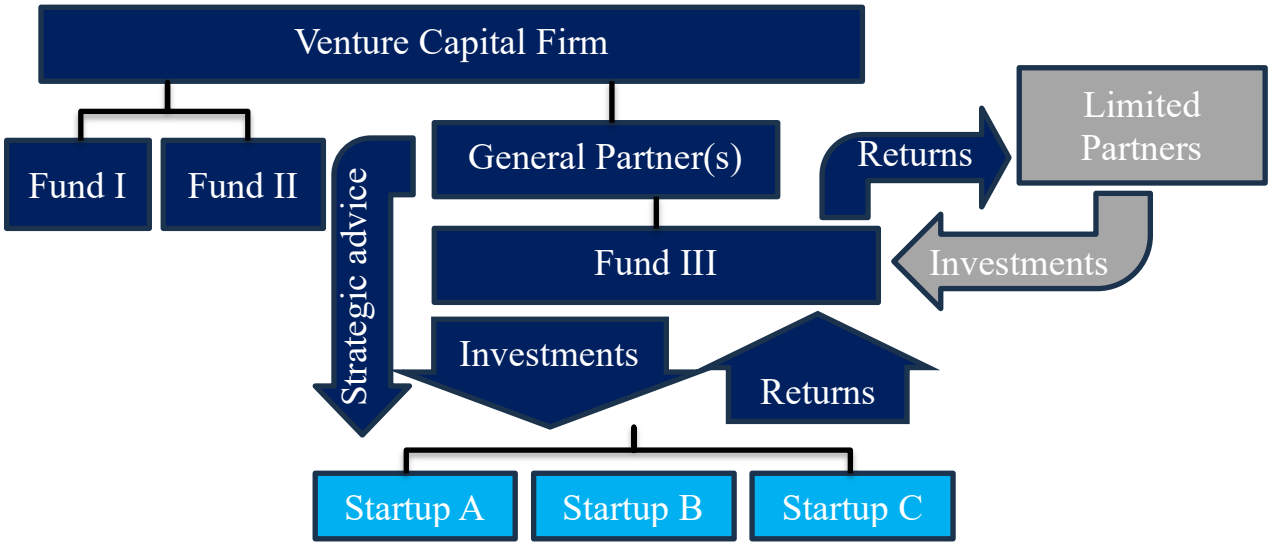

Figure 2: The structure of a VC fund
Adapted from Ramsinghani (2014).

Venture investments are characterized by high risk, illiquidity, and the potential for substantial returns. Often most portfolio companies result in unprofitable investments, however, a single successful company can generate such substantial returns that it outweighs the losses of the entire remaining portfolio. Mallaby (2022, 13) states that investors focusing on traditional investment products can generally expect the changes in valuations to approximately follow a normal

distribution, whereas VC investing relies on the exponential returns of a few winners. This phenomenon is referred to as the power law in the VC environment. Venture capital financing offers startups not only capital, but also additional support and resources. GPs are usually individuals with successful business backgrounds, including former entrepreneurs and corporate executives. They give strategic advice to their portfolio companies and often have board positions within them. VC backing can also enhance the startup's credibility and increase its chances of securing additional financing. The general partners in VC generally have three functions: fundraising, investing in startups, and collecting the rewards (Haislip 2010, 17).

2.2 Fundraising

When establishing a new fund, the general partners of a VC firm define an investment strategy, according to which the fund will operate. The investment strategy of a fund typically outlines the market opportunity and key drivers of growth, the fund's competitive advantage, the background and expertise of the managers, capital efficiency and expected returns, as well as the main risks and plans for mitigating them. (Ramsinghani 2014, 97.) The GPs will then begin to screen for suitable limited partners, to whom they will pitch their strategy, with the aim of attracting investment. Screening for target LPs is essential, as funds can differ significantly in terms of the types of LPs they are likely to attract. The suitability of an LP is influenced by factors such as the fund's size, sector focus, the VC firm's track record and number of prior funds (Ramsinghani 2014, 166). Fundraising is a tough business, and funds need to establish a positive differentiation from competitors to raise their target capital. The LPs are professional asset managers, such as pension funds, insurance companies, family offices, trusts or wealthy individuals, consequently every investment decision is made through careful consideration and due diligence. Based on Q2 2025 measurements, the median fundraising period in the United States has reached a record-long 15,3 months, and at the same time, both the number of funds and the capital raised have declined by more than 50 percent from the record levels of 2022 (NVCA 2025b, 36). In markets outside the United States, the numbers tend to be weaker, as there is less investable capital in circulation.

A limited partner's investment is formally made once the limited partnership agreement (LPA) is signed. The LPA includes fund key terms, such as management fees, industry focus, term, investment stage and the GPs carry (Ramsinghani 2014, 178). Carry or carried interest refers to the fund managers' share of the profits. Typical carry of a fund is 20 percent, and management fees begin at 2-2,5 percent per annum of capital invested and decrease as the fund's investment phase comes to an end (Ramsinghani 2014, 179). GPs usually invest their personal assets into the fund as

a demonstration of commitment. LPs typically demand this and can expect GPs to account up to 7 percent of the total fund (Haislip 2010, 55). Following the signing of an LPA, cash is only drawn when the fund proceeds with an investment decision and makes a capital call (Haislip 2010, 53). VC firms do not act as cash management companies, instead they focus on their core business activities.

2.3 Investing

After a VC has raised a fund, their investing phase begins. Venture capital firms may evaluate up to a thousand companies when assembling the portfolio for their fund. VCs source potential investments from various channels, including accelerators, VC e-marketplaces, angel investors, consultants, peer VCs, serial entrepreneurs and universities (Ramsinghani 2014, 206). Therefore, VCs with the best reputation and networks usually have best access to quality deal flow. The term deal flow is used to refer to the VCs access to investment opportunities. Startups typically raise funding in three stages: pre-seed, seed, and series rounds. The pre-seed round is used to raise funding to start the business, with the investors typically being friends and family (Cremades 2016, 89). The purpose of the seed round is likewise to further develop the company's operations; however, these rounds are generally larger, with capital most often provided by angel investors (Cremades 2016, 91). VCs can participate in pre-seed, seed and series rounds. Stage specific fund specialization is not uncommon, and established firms might have funds for different investment stages, with venture growth funds generally investing in Series E or later (NVCA 2025a, 77). Funding rounds are typically designated by letters; Series A, Series B, and so forth, because at the time of the first round, it is uncertain how many rounds the company will raise. VC funds can focus on various investment stages, with earlier-stage investments typically involving greater risk and higher potential returns due to lower company valuations at those stages.

2.3.1 Determinants of VC-interest in early-stage companies

The distribution of VC fund returns implies that every company within the portfolio should be capable of achieving significant market success. After identifying potential investment opportunities, the VC firm undertakes an extensive due diligence (DD) process. Venture capital due diligence focuses on three key aspects: management, markets, and technology (Ramsinghani 2014, 228). A company should possess a business model with the potential to achieve market leadership, a clearly defined strategy, and the managerial as well as technological capabilities required for execution. Venture capital firms seek companies with the potential to become global leaders within their sectors. Industry success stories are often called unicorns and decacorns, referring to

companies that have achieved valuations of one billion and ten billion dollars. Most companies within a fund's portfolio result in losses or merely return the invested capital, meaning that the successful investments must generate substantial profits to enable the fund to achieve the returns demanded by the limited partners (Haislip 2010, 22). Therefore, an exit with a 5x multiple from a single company can still result in a poor outcome for the VC fund, as most portfolio companies are probably loss-making. Every portfolio company should have the potential to return the invested capital at least with an 8–10x multiple (Ramsinghani 2014, 28). To deliver on its return commitments, a fund typically needs at least one mega successful investment.

2.3.2 Valuation and investment terms

Establishing a valuation for a startup is a negotiation between the venture capitalists and the founders of the prospect company (Haislip 2010, 88). A high valuation allows the founders to raise more money for less equity. A low valuation gives the VC fund a bigger share of the company for a smaller investment. Many commonly used and academically respected valuation techniques are often irrelevant when valuing early-stage companies (Ramsinghani 2014, 279). Startups rarely have the relevant financial information needed for techniques such as the discounted cash flow (DCF) model. Valuation is usually based on many qualitative factors, including the team, market size, exit potential, geographic location, competitive position and growth potential of the company (Ramsinghani 2014, 275). Comparable VC deals can also be utilized in estimating the target company value.

According to Damodaran (2009, 20–24), cash-flow based modeling can be utilized in startup valuation in two main approaches: top-down and bottom-up. The top-down model begins with market size, market share, and margins, while the bottom-up model builds up from production capacity to revenues and costs. Both methods also account for taxation and reinvestment capacity for sustainable growth. Still, cash-flow based modeling is challenging as the factors are estimates based on estimates. Various valuation techniques can still offer VCs useful estimates of the company's value in different scenarios. VCs utilize many advanced methods to model valuation, but in the end, it can also be based on a back-of-the-envelope calculation (Ramsinghani 2014, 275).

VC funds do not invest all their raised capital into their chosen portfolio companies in the first rounds of investments, instead they save it for later funding rounds to defend their investment against dilution. Typically, the entry investment is one third of the money reserved for the portfolio company (Ramsinghani 2014, 120). The rest is invested when successful portfolio companies seek for more funding. The structuring of investments is illustrated in figure 3.

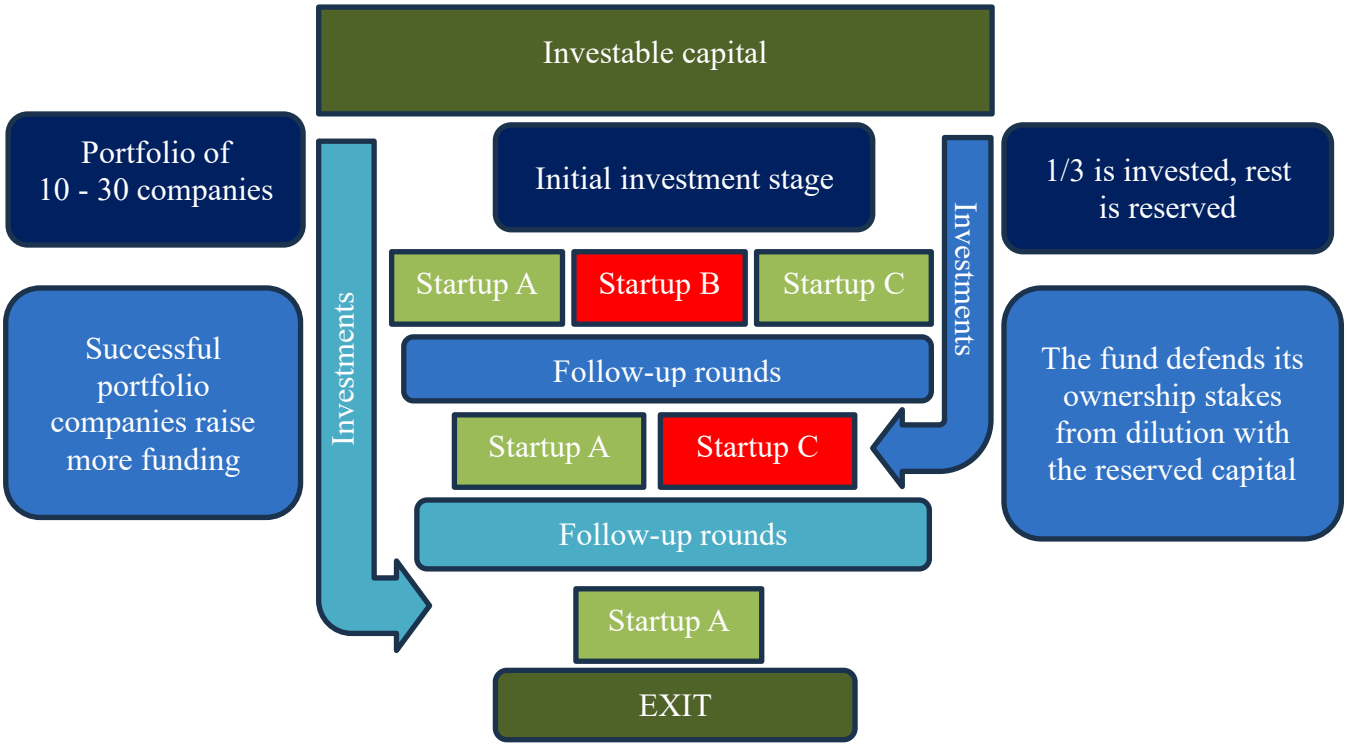

Figure 3: Investment allocation
Adapted from Ramsinghani (2014).

VCs ultimately allocate their investable funds towards the most promising ventures within their portfolio. Defending ownership is crucial, and VCs use multiple different ways to improve their position among other owners. For instance, VCs usually invest through preferred stock with antidilution protection and liquidation preference terms (Ramsinghani 2014, 273).

2.4 Collecting the rewards

The two main ways for a VC to liquidate its portfolio companies are acquisitions or initial public offerings (IPOs). A startup can be acquired by a corporation operating in the same sector, aiming to enter new markets or strengthen its competitive position. The acquisitor may also be a different kind of investor, such as a buyout fund. Both main exit methods have their pros and cons. IPO processes are long and expensive but can offer larger valuations especially in strong market conditions (Ramsinghani 2014, 344). Selling shares in the public market is also more flexible, and post-IPO performance can increase the final exit valuation. For the founders, an additional advantage is the possibility to retain part of the ownership. An acquisition is faster, more liquid and does not bring stock exchange regulation into play.

According to Bienz & Leite (2008, 4) IPOs do offer higher returns to VCs, calculated by both mean and median internal rate of return (IRR). Between 1995 and 2008, of the firms that exited either through an IPO or an acquisition, only 13,9 percent did so via an IPO (Tian, Udell & Yu 2016, 531). During the years 2004–2024, the annual fluctuations in M&A exits have been much smaller than those in IPO exits (NVCA 2025a, 24–27). The willingness of VC funds to take their portfolio companies public depends largely on the state of the economy, as the overall economic condition significantly affects post-IPO performance. Gompers & Lerner (2004, 375) reach the same conclusion: VCs tend to take their companies public at market peaks, while private markets are preferred at other times. Their research also shows that experienced VCs are more proficient at timing IPOs, which increases their returns.

3 The life sciences industry

This chapter explores the subsectors, business logic, innovations and trends within the life sciences industry. Given the strong connection to healthcare, the value chain of healthcare is also considered, focusing on the role and economic value of innovations. All the topics are examined from the perspective of early-stage companies. The life sciences sector's products directly affect human health; therefore it's strictly regulated. Regulation makes the introduction of new products expensive, time-consuming and risky, as unfavorable test results might lead to the abandonment of the entire product candidate. Given that startups, especially in life sciences, are often built around one primary product candidate, its discontinuation can result in the collapse of the entire business. As manufacturing processes in the life sciences industry are relatively straightforward compared to the complex product development, value creation is concentrated in innovations during research and development (R&D). Therefore, the protection of intellectual property (IP) rights is particularly critical, and patents hold substantial value in both, safeguarding innovation and influencing venture capital investment decisions.

3.1 How does innovation in healthcare create value

Recognizing the considerable return potential of the life sciences sector requires an understanding of the healthcare value chain, as the end users of the sector's products operate mainly in healthcare. The way in which a society organizes its healthcare has a strong influence on the balance between public and private roles in financing and providing healthcare services. Regardless of the model, overall spending is substantial, and the trend of global health expenditure share of gross domestic product (GDP) has been rising in the 2000s (World Bank Group 2023). The burden of health problems and related expenses have pushed healthcare spending to unsustainable levels in many countries. Costs incur in both direct and indirect ways, as the treatment itself is expensive, but the loss of work years and associated social costs are also significant for economies. While global lifetime expectancy has increased in the 2000s, the increase in healthy life expectancy (HALE) has not kept the same pace (World Health Organization 2025). A healthy life year is much more valuable to individuals and economies, than one constrained by health problems, therefore a complete recovery is a different matter than keeping a person alive. Prevention and earlier treatment reduce costs and increase the likelihood of positive outcomes, making innovations in, for example diagnostics, significant.

Better and more efficient treatment methods are important for individuals, healthcare businesses and national economies. Considering the scale and significance of the entire healthcare sector, it is understandable that market participants are willing to invest substantial amounts in better outcomes. Therefore, the return potential of innovation is high, which ultimately drives it within the risky and capital-intensive sector.

The market is relevant to analyze from the perspective of the United States. In 2023, OECD countries spent on average 8,88 percent of their GDP on healthcare, with the U.S spending the most at 16,7 percent (OECD 2024). The prices across all drugs were 178 percent higher in the U.S compared to the average price across all OECD countries in 2022 (Lovejoy, Mulcahy and Schwam 2024, 5). The U.S. share of the global pharmaceutical markets in 2024 was 53,2 percent, which makes up $797,8 billion in sales (IQVIA 2024). Regulation also drives the focus towards the United States, as attracting venture capital requires potential for global success. This in practice means the products need to be in the U.S markets, which requires an approval from the U.S Food and Drug Administration (FDA). In addition to the importance of the market and regulation, the United States is a key focus in terms of time. According to Charles River Associates (2025, 10), the FDA is on average 252 days quicker in approving new pharmaceuticals compared to the European Medicines Agency (EMA). The United States also has the most developed VC markets in the world. For all these reasons, the U.S. market is a key initial target for life sciences companies from around the world.

3.2 Pharmaceutical development

Drug discovery is the leading life sciences sub-sector by VC activity (NVCA 2025a, 20). The pharmaceutical sector, which mainly commercializes innovations from drug discovery and biotechnology startups, is valued at $1210 billion in revenue (Statista 2025). Northrup (2005, 27) defines a pharmaceutical as follows: "*a pharmaceutical is a drug for human consumption, specifically developed to impact a disease, which goes through the regulatory process designed to approve prescription medications for marketing to physicians*". This definition does not take generic drugs and over the counter medications into account, which directs the focus towards higher-innovation medicines. In other words, those very projects that hold potential from the standpoint of venture capital. Pharmaceuticals are commonly classified into two main categories: new chemical entities (NCEs) and biologicals (Northrup 2005, 28–29). NCEs are developed by drug development companies, and biotechs develop biologicals. Big pharmaceutical corporations have their own development for both types. In this thesis, the term biotechnology company (or

biotech) is used to describe businesses mainly developing biologicals, and the term biopharmaceutical is used when referring to a fully integrated biopharmaceutical company with its own R&D, manufacturing and commercial operations. The development of a medical product is addressed on a general level, as for an investor, the process is approximately the same for drugs, vaccines and other similar products. Pharmaceutical development is a lengthy and costly process, involving numerous tests, each of which carries substantial risk of failure. The total probability for a drug candidate to make it to the market is 2 percent (Northrup 2005, 35). Despite the sector involving high risks, the combination of researchers' and founders' ambition combined with high profit margins drive innovation in life sciences.

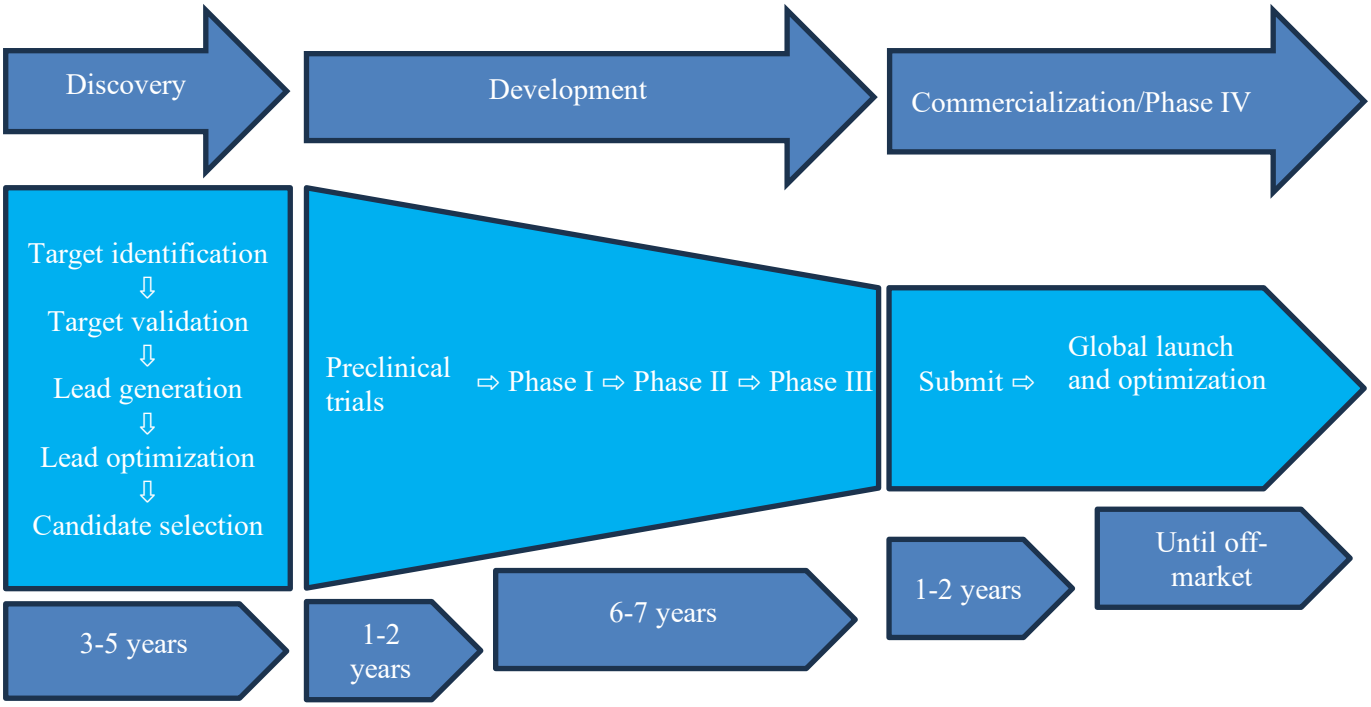

Figure 4: Drug development stages and timeline

Adapted from Northrup (2005, 54) and Matthews, Hanison & Nirmalan (2016, 3)

The journey of a drug from laboratory to market (illustrated in figure 4) is divided into three stages: discovery, development, and commercialization (Northrup 2005, 54). The thesis reviews the different stages, as understanding the risks, probabilities, and costs associated with each stage is important from a financing perspective. The scientific details of development are covered only to the extent necessary to understand the main risks and bottlenecks in the development cycle. Regulation is reviewed through the mechanisms of the FDA, as it is the most relevant authority when targeting international markets.

3.2.1 Discovery

The discovery stage starts with deciding a target and should end with a candidate with enough proof-of-concept to continue into the development stage, as can be seen on figure 4. Target identification is probably the most important decision in drug discovery, as it may trigger a process of 15 years. (Vallance 2009, 7).

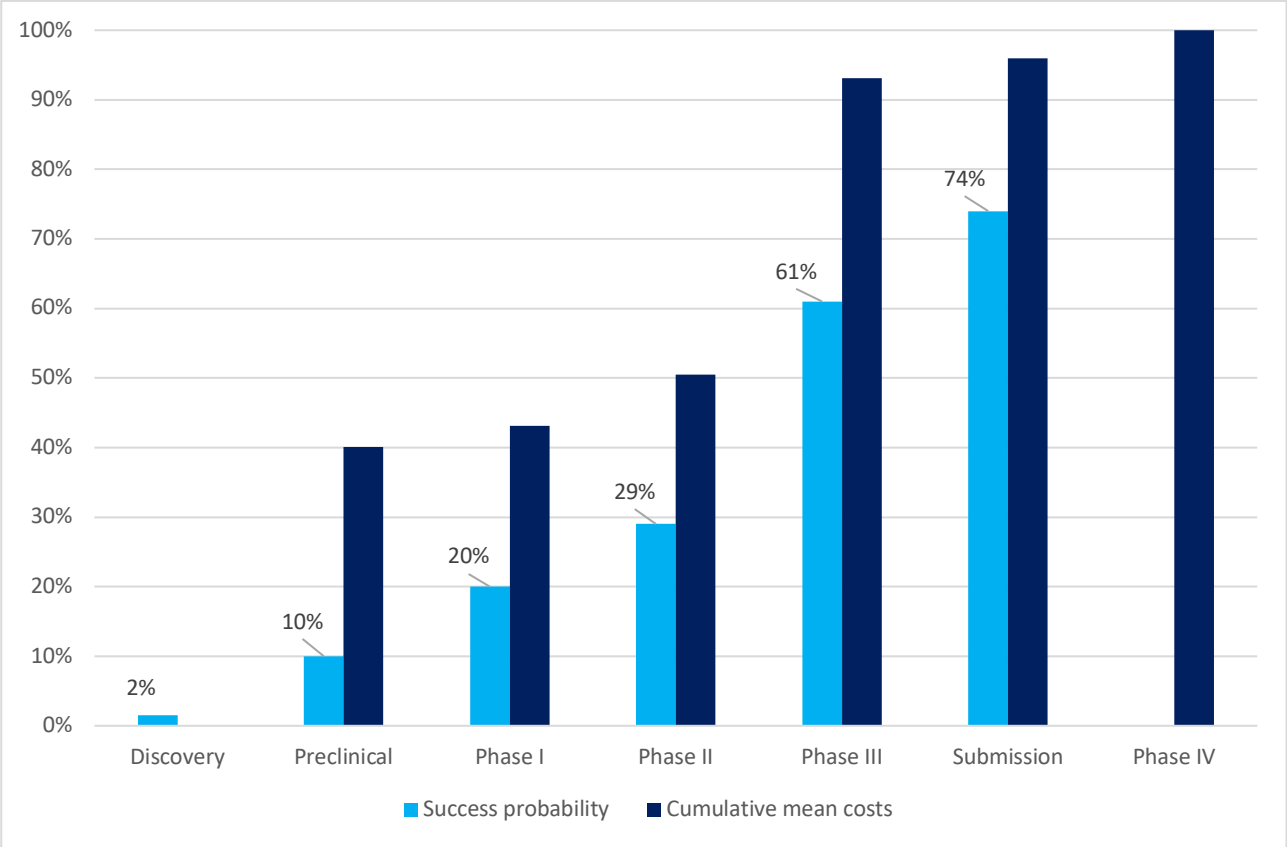

Figure 5: Success probability and mean costs of development stages
Adapted from Northrup (2005, 61), Sertkaya et al. (2024, 9) and GreenField Chemical (2023).

Deloitte's research indicates that for a major corporation, the average R&D costs to bring a pharmaceutical product to market are $2,3 billion (Deloitte 2024a, 1). However, Sertkaya et al. (2024, 1, 6–7) demonstrate that there are significant differences in costs between drugs from different therapeutic areas, and that the costs included in calculations greatly influence the results. For instance, when all failed projects are included in the calculation, the average cost of a successful project rises sharply. When considering the cost structure of drug development presented in figure 5, it is important that the early research is done extremely well before the more expensive stages begin.

3.2.2 Development

The development stage begins with preclinical testing, where the compound goes through toxicological and animal testing. The results are submitted to regulatory authorities, and the clinical trials can only begin after the authorities approve them. (Northrup 2005, 59.) The clinical trials are addressed in table 1. In the clinical stage, the process becomes more time consuming as the authorities need considerable time to assess the results. The phase 1 tests small amounts in healthy humans to investigate how the drug functions in the human body (Northrup 2005, 60). As can be seen on figure 5, only 10 percent of molecules entering preclinical research go to the market. The phase II is an important part of the value chain, as completing it will improve the probabilities by a large margin. (Northrup 2005, 61–62.)

Table 1: The clinical trials phases
Source FDA (2018a).

Phase	**I**	**II**	**III**	**IV**
Purpose	Safety and dosage	Efficacy and side effects	Efficacy and monitoring of adverse reactions	Safety and efficacy
Participants	20–100 healthy volunteers	Several hundred individuals with the target disease	300-3000 volunteers with the target disease	Several thousand volunteers with the target disease
Length	Several months	Up to 2 years	1 to 4 years	Continuous monitoring
Passing probability	70 %	33 %	25-30 %	-

Phase III is the most expensive and time taking. It shifts the focus to commercialization and is important for marketing purposes as the drug can be compared directly to competitor's drugs with a high degree of statistical confidence. (Northrup 2005, 65.) After phase III, the developer can file a New Drug Application (NDA) to the FDA, which must include all the drug candidate's data. If the FDA decides that the drug is safe and effective, it will be approved to be marketed. (FDA 2018a.) The phase IV studies are clinical trials after the drug has been approved to the market, with the scope of analyzing and comparing efficacy (Northrup 2005, 66).

3.2.3 Commercialization

The manufacturing, selling and distributing pharmaceuticals is a completely different game than development of pharmaceuticals. Big pharmaceutical corporations have the capability to execute the whole life cycle of a drug, which early-stage development companies do not. The complexity and capital intensiveness of drug development makes partnering an attractive choice for development companies. Strategic alliances (SAs) are formed to share the risks and profits of a molecule, and to utilize the resources of a big pharmaceutical company (Northrup 2005, 93–94). The SA deals might be the first time a development company can generate positive cash flow, as a deal can have signing bonuses and milestone payments up to hundreds of millions, and include royalty share for sales. A SA can be formed at any stage of the development cycle, but the most suitable time can be after the phase II lowers the risks substantially. (Northrup 2005, 94.)

Mergers and acquisitions (M&A) are common in the pharmaceutical industry. The mergers side is not highly relevant for this thesis, as both parties are usually big corporations. The acquisitions side relates to the startup ecosystem, as they are often the targets. Big pharmaceutical corporations acquire small development companies for their technology, patents and compounds, as it can be cheaper way to bring new drugs into market compared to their own R&D. An acquisition is often the most efficient way to commercialize, as the resources of a large corporation make further development more cost-effective. Strong licensing agreements can also lead to acquisitions if royalty payments grow high enough to justify purchasing the entire company. Acquisitions may occur at any stage of the development cycle when promising results emerge, and corporate venture capital activity frequently supports such transactions by giving the acquirer an existing ownership stake.

Only three out of the 25 companies on the S&P500 Pharma, Biotech and Life Sciences index have been founded in the 2000s (Bloomberg Terminal 2025a). Those companies are AbbVie, Viatris and Moderna. AbbVie is a spin-out from Abbott and Viatris was formed through a merger of Mylan and Upjohn, making Moderna the only recently founded company in the index (AbbVie 2025; Viatris 2025). Moderna has been working with industry giants, such as AstraZeneca and Merck since its early years (Moderna 2025). Entering the pharmaceutical market has its barriers, and the usual way is through a SA or a M&A deal.

3.3 Biotechnology

The biotechnology sector was born in the 1970s, when investors and entrepreneurs began to utilize scientific discoveries in genetic engineering to create business opportunities (Pfeffer 2005, 103). Therefore, it is a relatively new area of business. Currently, the biotech sector's products include drugs, diagnostics, vaccines and agricultural products, and the range has expanded from its early days, when the main element was utilization of rDNA technology (Pfeffer 2005, 109). In 2023, nine out of the 20 top selling drugs were biologicals, and together created over 100 billion USD in revenue (GaBI 2024). Alongside product development, the business perspective of the sector has undergone significant evolution. The Nasdaq Biotech Index has grown at a compound annual growth rate (CAGR) of 11,6 percent between 1995 and 2025 (Bloomberg Terminal 2025). Startup activity is one of the main drivers of innovation in the sector. Between 2018 and 2023, around 40 percent of new products in the pharmaceutical industry were launched by companies with little or no commercialization experience (McKinsey 2024b, 2). First-time launchers are projected to outperform established companies in blockbuster drugs by nearly two-to-one ratio based on pipeline data (McKinsey 2023, 2).

A biotechnology startup can be founded around single research finding, with the aim of further development. They may originate from various sources, such as university laboratories or corporate spinouts. The first milestones of an early-stage biotech are usually financed by venture capitalists, and if the project is successful, a SA will be formed with a pharmaceutical company (Northrup 2005, 37). A biotech can also raise more funding by going public via an IPO. Traditionally, companies are expected to present strong data on their candidate in preparation for an IPO. For example, in 2023, all ten biotechs that went public in the United States were in the clinical stage, and one-third were in Phase III (Wellington Management 2024). The founders might aim for the startup to eventually become a fully integrated (bio)pharmaceutical company (FIPCO), that has its own R&D, manufacturing and sales operations. The company may also be acquired or end up as a royalty income pharmaceutical company (RIPCO). RIPCOs license their product to a large pharmaceutical and finance their growth by royalty payments from sales. (Pfeffer 2005, 128.) A biotech startup that has brought a product on the market can be considered a success from a probability perspective. The early-stage investors have likely also realized returns through an IPO or an acquisition. 10 to 20 percent of biotechs launching their first product are acquired post-launch (McKinsey 2024, 3).

The evolution from an early-stage biotech to a FIPCO is a long and expensive process. In addition to sales or royalty income, the company can raise more funding from VC growth funds or arrange public offerings, if its listed. According to a McKinsey report (2023, 3–5) a successful evolution depends on the clarity of vision, key commercial talent attraction and investment capability. Product portfolio needs expanding, if it's still single product. To succeed, many pieces need to fall in the right place. The company needs to simultaneously have more molecules in the pipeline, build manufacturing capabilities and develop an effective sales organization. The access to capital is therefore crucial. With a skilled management, strong vision and required funding, some biotechs still succeed in this evolution process.

3.4 Medical devices and digital health

Following the companies developing drugs, diagnostic equipment and medical devices are the next most active life sciences subsectors in terms of VC deals (NVCA 2025a, 21). Every hospital in the world is full of equipment and devices used in treatment of patients, and there will always be demand for better alternatives. McKinsey (2024a, 2–5) lists health-at-home and biomonitoring as future's top two trends in the consumer health and wellness. Health is becoming more personalized. An increasing number of people want to view their real-time health data on their phones, not just see it when they visit a doctor. The anti-aging and longevity market is expected to grow at a CAGR of 21,5 percent to year 2030 (Deloitte 2024b, 7). These trends predict favorable market conditions for innovation in the fields of medical devices, diagnostic tools and digital health systems.

Medical devices are a crucial part of the healthcare value chain. The sector has traditionally been a pure hardware business, conducting R&D, manufacturing and business-to-business (B2B) sales. According to KPMG (2018, 4) companies in the sector are going through a shift from a conventional manufacturing only model to integrating more intelligence and services to their products. At the same time, the growing business to consumer (B2C) market is also creating new opportunities. The hardware sector of the life sciences industry encompasses a very wide range of products, and the definition is not entirely unambiguous. For example, the FDA, EMA and WHO all have slightly different definitions (EMA 2017; FDA 2024; WHO 2020). Any device designed to diagnose, treat, prevent or monitor a disease, without the primary effect from a drug can be classified as a medical device. The field is regulated, but not all products fall under it. The FDA classifies regulated devices into three regulatory classes (Class I, II and III) based on their intended use and associated risks. Usually, only class III devices require clinical research, and depending on

the classification, the regulation processes take from a couple months to 2–3 years. (FDA 2024.) Therefore, the devices sector has shorter development cycles than drug development.

For startups, the sector is challenging due to regulation, resource- and network-intensive commercialization, and the risk of failure (Lee, Park & Lee 2019, 13–14). The sector battles with the same issues as drug development, but the business is broader many ways. Companies must integrate multiple scientific disciplines, such as medicine, biotechnology, software engineering, and materials science in their products, and the sector is becoming more digital, with the focus shifting from pure hardware to a comprehensive service ecosystem. Drugs can also be compared in a statistically significant manner, which helps in marketing. It is not as straightforward to establish a ranking for devices. Healthcare procurement has shifted towards the use of group purchasing organizations (GPOs), who value large suppliers, lower prices and long-term contracts (Miller et al. 2019, 51, 53–54). While the development cycle of a medical device may be shorter than that of a pharmaceutical product, establishing it on the market usually takes more time.

One major trend in healthcare is the shift from treatment-based care to prevention, which will drive growth in the diagnostics market (Deloitte 2023, 2). Diagnostic testing holds considerable business potential, driven by the development of technology and advances in science. AI integration enhances diagnostic accuracy and precision treatment, while making health systems more efficient (Jain 2024, 6–8). Disease prevention and early detection reduce costs for hospital care, as well as healthcare costs in societies in general. According to Deloitte's research (2023, 2, 7), leaders of MedTech startups, diagnostics industry executives and sector-focusing venture capitalists see remote measurement technologies, at-home testing and wearable biomonitoring devices as some of the most promising areas in the market. The COVID-19 pandemic opened the world for at-home testing, and similar products could be used for more infectious diseases. In the U.S, VC funding flowing to the diagnostics sector grew from 675 million USD in 2012 to 3410 million USD in 2021, after which it has declined, following the overall trend in VC investment (NVCA 2025a, 12, 20). Although drug development has historically been the largest business area in the life sciences industry, advances in technology and AI are increasing the potential of digital health and MedTech, as science sets the boundaries for drug development, while the tech side allows for more creativity.

4 The life sciences venture capital landscape

The life sciences sector differs significantly from other VC-active sectors. One of the factors causing differences is regulation. It extends product development cycles and increases capital requirements. Regulation is clearly necessary to the sector. Still, it makes life sciences a challenging industry for venture capitalists. For drugs, the development process is generally longer than a VC funds lifetime. Clinical trials demand considerable financial resources from investors, and the risk of failure is considerable even in VC context.

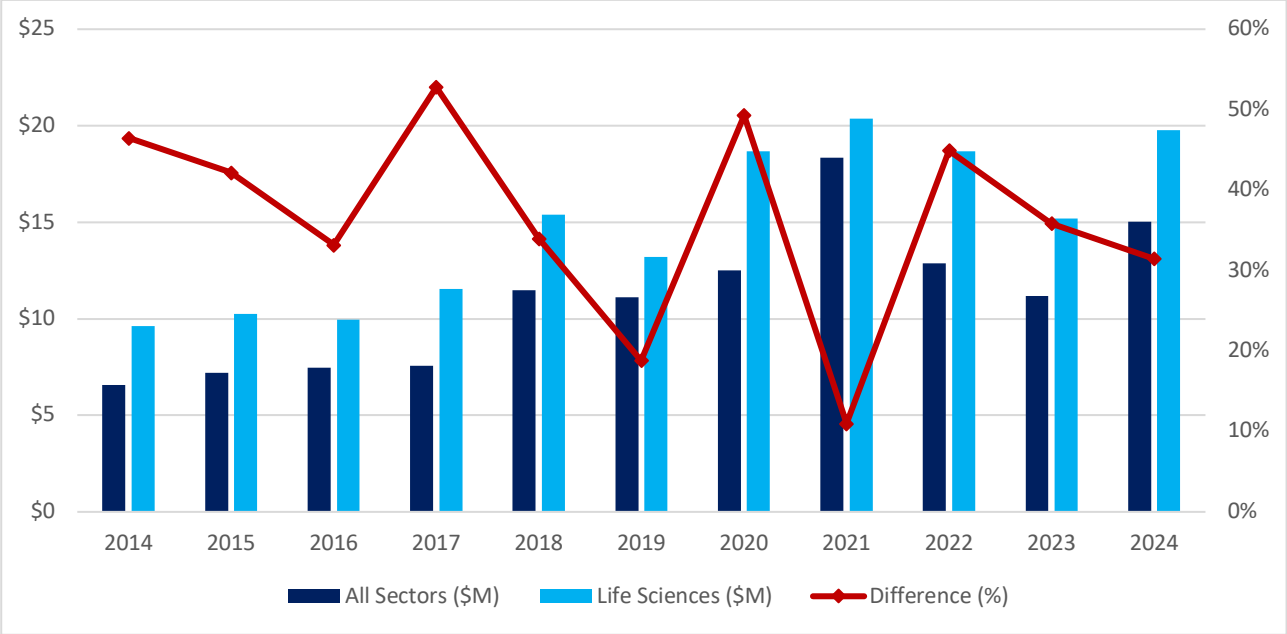

Figure 6: Average VC deal size in the United States
Source: NVCA (2025a, 21, 12).

On average, VC deals are bigger in life sciences when compared to all-sector wide data, as can be seen on figure 6. The size premium can be partly explained by the sector's capital-intensive nature. This means that single VCs need to make bigger investments, or the funding rounds need to involve more investors to cover the financing needs of the target company. VCs may also form syndicates to invest in companies to access more capital and strategic resources. Venture capital syndication is more likely in complex industries, where intangible assets are important and R&D costs are high (Bayar, Chemmanur & Tian 2020, 1898). Corporate venture capital (CVC) is also common in life sciences, as close collaboration with large pharmaceutical companies is important for startups, and the corporate investors simultaneously improve their chances for acquiring the firm in the future.

4.1 Corporate venture capital

Corporate involvement is essential in the life sciences sector. In addition to M&A transactions and strategic deals, this also occurs through corporate venture capital. Research and data indicate that CVC involvement has generally positive outcomes. In 2022, biopharma venture capital deals involving a CVC fund were significantly larger on average than deals without a corporate investor (Silicon Valley Bank 2023). Dubocage and Shuwaikh (2022, 11–12) demonstrate in their study that in the biotechnology sector, CVC involvement leads to more innovative companies. This is reflected, among other indicators, in the number of patents. Silicon Valley Bank's (2023) data also suggests that CVC-backing leads to a higher possibility of M&A exit across all life sciences subsectors. Nevertheless, the reality is not always so straightforward, as CVC funds may have incentives to advance the interests of their parent companies rather than those of the entrepreneurs and other investors. For independent VC funds, it is essential to understand how to cooperate with CVCs, as they can bring valuable resources to the table.

According to Deloitte's research (2023), on average, the return on investment (ROI) in R&D of large pharmaceuticals is only 4,1 percent and the development costs for a new drug average at 2,3 billion USD. When comparing the ROI to the fact that successful VC firms can generate an annual IRR of over 20 percent for their funds, it is understandable that R&D investments are also made in the form of CVC. Given the importance of strategic alliances in the sector, holding equity in newcomers is also beneficial. CVC provides the opportunity for strategic guidance, for example through board representation, and improves positioning for potentially acquiring the company.

Frequent biotech asset acquiring can reduce the acquirer's development timelines by at least 30 percent (McKinsey 2024c, 4). Henderson (2007, 37) however demonstrates that historically only 20–30 percent of the portfolio companies of the five largest pharmaceutical CVCs are acquired. Depending on the pharmaceutical behind the portfolio, some prefer to keep the private and others have higher IPO percentages. However, it's noteworthy that 48,5 percent of their portfolio companies were either acquired or had an IPO. The data does not distinguish between acquisitions carried out by the pharmaceutical itself and those executed by external parties, however, the statistics indicate that CVC involvement is successful for life science startups.

4.2 Life sciences VC: fundraising and investing

Venture capital is a business of three general functions: fundraising, investing and exiting. Operating in the life sciences industry has its effect on the details of each function. The business

logic is still the same; GPs make money by raising funds from limited partners and later returning the investments with profits. This section explores the life sciences sector's specific characteristics at different stages of a VC fund and examines the challenges venture capitalists might face.

Possible life sciences involvement needs to be decided in the investment strategy for a new fund, as it's the base for fundraising. Limited partners invest according to their own preferences, and some might be attracted to life sciences, while others avoid it altogether. Sector specification is among the most important differentiation strategies for successful fundraising, and in 2024, life sciences focus emerged as particularly attractive (NVCA 2025a, 9). The fund must be able to convince the investors that it has competence to operate in life sciences. For example, the team may include successful entrepreneurs or executives from the sector. Screening for possible LPs is an important part of fundraising, and the target investors should ideally have prior investment history in life science funds. Pitching a fund focusing on companies with a low possibility of even getting a product on the market to someone without any knowledge of the industry is not an effective fundraising strategy. Because life science VC deals are larger on average, both the funds and their target LPs tend to be relatively large as well.

4.2.1 Company selection and portfolio construction

As mentioned in section 2.1, a venture capital fund generally builds a portfolio of 10 to 30 companies. This depends a lot on the sector focus. A tech-focused fund can make more investments, as the initial development is often cheaper than R&D in life sciences. Life science funds tend to have less portfolio companies, but the investments are bigger. A pre-seed or seed focused fund might make more initial investments, as the capital needs of companies in those stages is lower and then invest more of the remaining capital in the following funding rounds. The subsectors also impact the construction of a portfolio. Biotech and drug development are the most capital intensive and time-taking, as medical devices or consumer health products are less complex, and the development fits the general timeframe of a fund better. Nevertheless, pharma and biotech are the most active in terms of deal flow.

The trend in healthcare startup funding has been shifting towards earlier stages in the U.S. In 2024, seed share of all deals was around 40 percent. Subsectors do differ, as biopharma's ratio of seed and Series A has been 1 to 1, while health tech has seen twice as many Series A rounds compared to seed stage. (Silicon Valley Bank 2025.) Henderson (2007, 35) shows that CVC funds have historically invested in all stages between seed and later series rounds. Early rounds are generally

valued lower and carry more risk, but as figure 5 shows, the preclinical trials do accumulate significant costs.

The access to deal flow is a major success-factor in the world venture capital. Networks are essential for VCs, and Nguyen and Nguyen (2025, 19) show that central VC-firm backing leads to more likely subsequent financing and achieving an exit. Therefore, funding from a major VC can act as a driver of success for a startup. Consequently, founders should prefer financing from leading industry players, who possess the best networks and strategic expertise. Top VCs have the best deal flow, which enables them to select the most promising companies. A life sciences fund should have strong networks within the sector's startup ecosystem, such as connections to research institutions, universities and accelerators. In addition to industry knowledge, the presence of former life sciences entrepreneurs and executives within a VC fund is important, as they can enhance the access to deal flow.

4.2.2 Valuation and due diligence

Many of the most common valuation techniques are based on cash flows, discount rates and growth estimates. As section 2.2 mentions, these widely used techniques, such as the DCF, are not particularly suitable for startup valuation. Valuing early-stage businesses is difficult by itself, and operating in life sciences further complicates it. According to Woo et al. (2019, 1, 4) the risk-adjusted net present value (rNPV) method is frequently used in drug development. The formula adjusts the NPV to the risk of failure and cost of development at the different phases of development. Valuation methods such as the rNPV can be used to estimate the value of a drug, and since life science startups are usually focused on one primary candidate, it can steer the company valuation for investors. Still, the challenges in valuation are emphasized in life sciences, due to the complex and risky nature of the industry.

The timelines and costs of product development are completely different than in other active VC sectors. A tech company can launch a minimum viable product (MVP) without substantial resources and see if it has any market potential. In life sciences, the success or failure becomes evident later, having accumulated higher costs. Therefore, the due diligence process is extremely crucial in life sciences. The business side of DD remains consistent across all sectors, but life sciences companies require deep analysis on the science behind the product. In addition to standard DD, the sector requires focus on regulatory risks, trial results and IP protection and commercialization strategy. Common pitfalls include unclear regulatory approval strategies, weak IP protection, unproven science, overly optimistic trial timelines and inexperienced leadership. (Excedr 2025.)

4.3 Exit strategies

In section 3.2.3, the challenges regarding the commercialization of life sciences products are addressed. Sector transactions are made mostly B2B or business to government (B2G), despite the growing B2C market. The B2B market has traditionally been dominated by long contracts, close relationships and high-volume contracts. For a startup, it is difficult to gain initial legitimacy, but one flagship deal can solve the matter. (Batra et al. 2022, 2434, 2438.) While strategic alliances help startups commercialize, acquisitions are the key value drivers in the industry. Bain's research (2025, 58–59) shows that by total shareholder returns (TSRs), frequently acquiring companies (12,2 % growth in TSR) have beaten passive acquirers (0,3 % growth in TSR) between 2012 and 2022, and the difference in life sciences is larger than in any other industry.

As noted in section 2.4, generally IPO profits have beaten M&A deals, but the market conditions impact IPO performances significantly, and VCs aim for IPO exits during favorable times. The business of life sciences companies can be difficult to understand for the broader audiences investing in the public markets, which makes IPO exits particularly challenging for the sector. Biotech IPOs usually happen in the clinical trials stage, which indicates that it may still take years for the company's product to be approved. Therefore, cash flows are not expected in the near future, and the quarterly reports might seem unattractive to some investors. Complex business models can lead to increased volatility, which can be harmful to the owning VCs. Silicon Valley Bank (2023) expects M&A to be a top exit strategy, with the IPO window remaining largely shut in the current market.

McKinsey's (2024c, 4–5) research suggest that the life sciences M&A trend has been shifting towards smaller companies, at least in the biotech subsector. Lower valuations indicate earlier acquisitions, which has both advantages and disadvantages for VCs. The ultimate objective for a VC is an exit, but earlier-stage exits can lead to lower valuations as companies are in the earlier stages of development. The median M&A exit times between 2018 and 2022 have been 3,9 years for biopharma and 7 years for MedTech, and over 40 percent of biopharma deals have been in preclinical stage (Silicon Valley Bank 2023). Consequently, the sub-sectors have key differences in exit timelines.

5 Empirical insights from a life sciences VC

5.1 Introduction to empirics

This chapter presents the findings from the expert interview and relates them to the existing literature and previous research. The findings were largely in line with prior studies; however, the interviewee offered some distinct perspectives and alternative interpretations regarding certain sector dynamics. The interview was semi-structured and lasted approximately one hour. It was conducted in person on October 2, 2025, and the recording was transcribed for analysis. The interview questions, presented in Appendix 2, were derived from the key factors emphasized in the literature review. The practical relevance of these aspects was largely supported in the interview. However, some features that appeared significant from a theoretical perspective were not regarded as equally important based on the interviewee's experience. The focus remained on the same key themes: the specific characteristics of the life sciences sector, the challenges faced by venture capital investors, and the ways in which these challenges are addressed. The interview results are presented in section 5.2, and their relation to literature and prior research is discussed in section 5.3. During the interview, strong professional networks and deep scientific understanding emerged as key success factors for life sciences venture capital investors.

The interviewee currently serves as a partner at Finland's only health-focused venture capital fund. They have an extensive and successful background in startups and growth companies within the life sciences sector, which provided a strong foundation for their later transition into venture investing to support innovation in the industry. Their career began as one of the first employees at a now-unicorn health tech company, and since then, they have founded and held executive roles in successful firms within pharmaceutical development. This interview draws on experiences from both perspectives: raising venture funding as a life sciences founder and investing in early-stage companies as a venture capitalist. Additionally, they have served as CEO through both M&A and IPO processes, providing particularly valuable insights into exit strategies. As such, the interviewee's dual experience on both sides of the investment table offers highly relevant and insightful perspectives for the objectives of this thesis.

5.2 Navigating the complex sector as a venture capitalist

The interview emphasized that the fundamental pillars of investing do differ between general VC funds and those operating in the life sciences sector. The business logic is the same, but differences are evident across multiple levels, from individual investment decisions to exit strategies and

cooperation between VC funds. The interviewee noted that successful actors are typically those who can leverage both their network and expertise to find and develop portfolio companies. Overall, it became clear that while tech startups often rely on first-mover advantage, and the ability to move quickly with an idea is essential, in life sciences it is crucial to do things correctly, as the field operates on a much longer timeline.

> "To me, it's obvious that the classic rulebook for tech investors says: invest in the team, the team, and the team. A strong team can fix a weak idea or pivot to a new one and achieve success. But with a weak team, even the best idea won't work. In life sciences, we believe the key factor is the strength of the underlying science. Translating research into clinical practice relies heavily on the quality of the science itself. Biological risks are always significant, but if the science isn't solid and carefully conducted, it's easy to be fooled by something that looks good on paper but is fundamentally flawed."

They also emphasized that to succeed, there must be real clinical demand for the product, as in healthcare, there is always a high threshold for changing existing practices. This is evident in drug development, but is especially prominent in medical devices, where capturing market share is challenging.

5.2.1 The importance of networks

The importance of networks was emphasized throughout the interview. Networks play a crucial role in nearly all aspects of the fund's operations: fundraising, sourcing deal flow, evaluating startups, syndicating investments, supporting portfolio companies, and facilitating exits. The interviewee noted the effort required to establish the team's reputation. When they began raising their first fund, they were largely unknown despite strong individual networks. Today, the fund has a solid reputation among co-investors and Big Pharma. Developing and maintaining these connections through industry events is still crucial.

Connections in the field enable quality deal flow and help support portfolio companies in hiring talent and raising subsequent funding rounds. A strong network is highly important in investment decision-making, as it provides access to expert opinions on the target's science and Big Pharma's acquisition intentions. The interviewee noted that they can engage directly with Big Pharma's Business Development and Licensing (BD&L) before making an investment decision to get their scientific perspective and to assess potential M&A interest.

The fund in which the interviewee works aims to syndicate all their investments with other international funds. Syndication improves networks, lowers the risks and creates better conditions for raising subsequent funding rounds.

> "Yeah, we see that tech funds like to invest alone, kind of thinking, 'I'm gonna be the first one to find the next Google.' We're totally fine being one of the five who find the next Moderna."

While VCs in other industries tend to compete more heavily, in life sciences the focus is more on cooperation. However, the interviewee expressed a rather cautious attitude towards co-investing with corporate venture capital funds.

> "[CVC] is always a bit of a double-edged sword. Certain CVCs are very strategic, others are strictly arms-length financial investors, and it's important to know what type you are taking on board. The wider investment community might look at it and think, "With that Big Pharma CVC involved, we can't get in." You want to ensure there are no strings attached, no special side letters for strategic investors, or anything that would grant preferential rights in a M&A deal.

For them, the key point of collaboration with Big Pharma lies in BD&L, not so much in corporate venture capital. The possible challenges partly stem from a potential misalignment of objectives between the CVC and other co-investors. In an acquisition by the parent company, a CVC may aim to secure the best terms for the parent, while VCs and founders seek the best deal for themselves.

5.2.2 Combining scientific understanding and business expertise

Scientific understanding emerged as a key factor throughout the interview. The team managing the fund has very strong expertise, including two PhDs. They also frequently consult key opinion leaders in the field when making investment decisions.

> "It is absolutely crucial to have a deep understanding of what the science has clarified, and what it has not. It's easy to cure mice in a simple cancer model, but truly understanding why the results turned out the way they did is what matters. Is the model relevant? How do competing molecules behave in the same model? What actually happens at the molecular level? Could those molecular interactions lead to side effects when transitioning to humans? Or could, for instance, a tumour mutate and develop resistance to what worked in a simple mouse model? Ultimately, when negotiating an M&A deal with Big Pharma, one must understand the molecular mechanisms well enough for them to trust that this is something worth acquiring."

Although science lies at the core of life science companies, without business expertise, discoveries will never translate into viable businesses.

In the context of the Finnish life sciences sector and its untapped potential, the conversation highlighted business-related challenges. They emphasized that scientific knowledge in Finland is strong, but there is practically no experience in drug development and commercialization. Limited funding has also been a challenge, but VC funds do often operate internationally. Although science is at the core of the sector, it is essential to understand how to commercialize it. The interviewee

also highlighted the important role of universities, noting that about one-third of their deal flow originates from university spinouts. Today, Finnish universities have quite competent tech transfer offices, and the younger generation of researchers recognize that, although it may seem illogical, patenting a discovery and turning it into a product actually increases its impact. One challenge with university spinouts is that, in the absence of successful business examples, it has been difficult to recognize that a discovery has value beyond academic publications.

5.2.3 Success drivers in life sciences VC

Although the life science sector may seem challenging for a generalist VC, experienced industry players understand its characteristics well. Deep industry knowledge makes the sector approachable, just as in other fields, where successful VCs often have a background as entrepreneurs or business leaders.

The interviewee noted that keeping track of trends in healthcare and Big Pharma's focus is crucial, because demand dynamics determine the companies most likely to succeed at different times. They also highlighted changes in regulation; at present, the FDA's stance is somewhat uncertain due to the political landscape in the United States, and the European medical device regulation has incurred challenges there. Political decisions also impact the pricing of drugs.

> "Even though regulations are challenging and always changing, we know that soft tissue sarcomas are a big unmet clinical need. And regardless of what Trump does, patients are still dying from them, so there will be demand for drugs, there will be someone to buy them. Of course, depending on pricing at market entry, the price might be half of what we imagine, or twice as high. But either way, it's big enough."

Despite some shifts in trends, the fundamentals of the business remain the same. The interviewee noted that many successful companies exhibit similar traits. While robust scientific foundations and a strong team are essential, more detailed patterns have also been observed to significantly contribute to success.

> "In drug development, perhaps the most significant [success] factor has been the relevance of preclinical data to the clinical disease. In brain disorders, for example, Alzheimer's or other neuropsychiatric disease, models in animals are poor, everyone knows that. It's difficult to predict what will happen in humans based on those models. On the other hand, in oncology, using humanized models or targeting a clinically validated target but designing a better drug for it clearly increases the likelihood of success. Those are the kinds of factors we consider. In digital health, many investors focus first on seeing proper product-market fit. They want the product on the market, with some preliminary commercial demand, initial satisfied customers, and proof that the solution works."

The interviewee explained that in their fund, the investment process is designed so that scientific due diligence rarely causes a case to fail, since the science has been carefully scrutinized at earlier stages. In due diligence, issues tend to arise more often from business-related reasons, including market size, competitive edge, or the company's strategic uncertainties.

> "Another aspect is really understanding the development plan. We actually just had a concrete example: a drug being developed for a disease with significant unmet clinical need. At first glance, everything looked good: strong biology and a compelling target. But we realized the Phase 2 trials would have to be much larger and longer than expected, because the primary endpoints accepted by regulators are so rare in the patient population. That increases the cost substantially and creates a significant funding risk. We decided to take a pause, and the team agreed, as they saw it as a risk themselves. Now they're considering whether this is the right indication or if another might be more feasible. It [investment decision] is really a matter of feasibility and fundability, especially given today's tight funding conditions."

According to the interviewee, VCs have recently faced fundraising challenges worldwide, which is clearly visible in life science funds in the Nordics. They noted that they gained an advantage in fundraising by being the only fund in Finland with a pure health focus, having a credible team, and benefited from a favorable timing. They are about to begin raising their second fund, and regarding its outlook, they noted that the anchor investors have been very satisfied with the first one.

5.2.4 Addressing risks and overcoming challenges

Venture investing in life science startups is risky, but the risks can be managed by understanding the development trajectory, product, market, regulation, and exit potential. By simply comprehending the science and avoiding investments in projects with no real chance of success, the biggest risks can already be avoided. The interviewee's fund uses standard risk management measures in venture capital. They allocate 30 percent of investable capital into initial investments and reserve the rest for successful portfolio companies' further funding rounds. The portfolio is diversified across company stages and therapeutic areas, and drug development is balanced with medical devices and digital health in their portfolio. According to the interviewee, the risk profiles of drug development and medical devices differ both in timing and in nature.

> "In drug development, it is well established that large pharmaceutical companies acquire smaller biotech firms during the clinical phase, or even in preclinical stages, and then continue development internally… In MedTech, however, the challenge is that acquisitions rarely occur at such an early stage. Many, including Finnish MedTech companies, have fallen into the trap of raising funds for their own projects to conduct research and obtain FDA approval or CE marking, expecting an acquisition to happen. But it does not happen. Then you need to invest $50 million in market launch, U.S.

> sales infrastructure, and generating additional evidence, since doctors are very slow to adopt new technologies."

The interviewee stated that this all may seem counterintuitive and needs to be clarified to their LPs who believe that drug development costs 1,5 billion euros and takes fifteen years. While that is true in general, an early-stage VC is not responsible for covering that cost. He further explained that they invest only in drugs with strong early indicators, expecting that if everything goes well, they will be sold after Phase 1 or Phase 2. Then a pharmaceutical company pays the billion and carries the project forward.

Syndication also plays a major role in risk management. It brings together strong expertise and resources to support the companies and simultaneously enables smaller investments from individual funds.

> "A really important part of our risk management is syndication. One generation ago, in Finland too, biotech investors were often quite possessive. They wanted to invest alone because they thought, 'this is going to be the biggest thing in the world, and we want to own a huge stake.' We see things differently. Sure, any one of these could become something really big, but they're all very risky. So we'd rather make five investments with five very professional co-investors than one big solo bet."

Valuating early-stage companies is challenging in the sector. The fund applies rNPV for valuation purposes. Prior to investment decisions, the team assesses Big Pharma's willingness to acquire, and knowing that they use the same model, it becomes logical to understand the range for M&A negotiations.

> "If we invest in a company at the hit-to-lead stage, the odds are obviously very low, maybe one in a thousand makes it to market. But if the science is strong and you know Big Pharma is interested in that specific target, especially if they've failed with it themselves, then you know there's real interest. In that case, it can make sense to calculate the rNPV already. You'd want your rNPV to show a valuation of, say, 80 million, while the company's current valuation is 5 million. That way you can offset the high risk with a big potential upside."

The fund also applies rNPV to track the development of portfolio companies on an annual basis for further investment decisions. The ability to quantify the developments in their portfolio enhances the efficiency of capital allocation for follow-on investments.

Significant risks related to IPOs also emerged, and the interviewee had a clear view regarding exit strategies.

> "An IPO is not an exit. No, we are very clear that an IPO is a last resort. If nothing else works, only then can an IPO be considered… I don't believe that [IPO returns being

> higher than M&A] applies to us as early-stage investors in drug development. The problem with an IPO is that after going public, you are in lock-up for 12 months and cannot exit, and even after that, it may be difficult to sell without signaling to the market that something is wrong. If an IPO is pursued, it needs to be a major U.S. Nasdaq IPO or equivalent. Ideally, it would also be structured so that we could sell part of our stake at the IPO, making it a viable exit for us."

The interviewee stated several issues with IPOs. They suggested that an IPO may sometimes happen simply because no professional investor is willing to participate, as the underlying science is too weak. Biotech valuation in the public markets is also challenging for venture-owners.

> "A good example of this is Sunstone. In their last fund, they had two major U.S. Nasdaq IPOs, Galecto and IO Biotech, both very successful IPOs. They raised roughly $100 million each, with post-money valuations probably around half a billion. Then the economic conditions changed, and the stock prices of both companies crashed for no significant reason. After that, Sunstone faced the problem that they couldn't actually exit and the paper valuations had dropped dramatically, and this has significantly affected their fundraising."

IPOs carry risks whose consequences can have long-lasting effects for the VC firm. Once a company goes public, the VC loses control over it but cannot immediately liquidate its ownership. Nevertheless, the interviewee did not take an absolute stance: if the investment syndicate opts for an IPO, they will be involved, if the expected profit is significantly larger than M&A deal would offer.

5.3 Discussing the results with literature

The interview highlighted networks and scientific understanding as the most important success drivers for a life sciences VC. Regarding networks, the literature holds similar views. Ramsinghani (2014, 206–210) highlights the role of networks in attracting LP investments and sourcing quality deal flow. Nguyen & Nguyen (2025) emphasize networks in securing subsequent funding and exits, and Lee, Park & Lee (2019) in commercializing innovation in healthcare. There are gaps in venture capital research pertaining to the life sciences sector, as most studies address VC at a general level or focus on technology. The interviewee emphasizes that network effects are particularly strong in the life sciences.

The importance of networks is further highlighted in syndication, which Bayar, Chemmanur & Tian (2020) support in industries where intangible assets play a significant role and R&D is expensive. Nevertheless, the limited sector-specific research has led to the role of scientific expertise in the success of life science venture capital being underemphasized. According to Ramsinghani (2014), industry experience is important for all venture capitalists, yet the role is more pronounced in life science focused funds.

The interviewee introduced an entirely new perspective regarding regulation. Due to the regulated nature of the market, it is known what competitors are developing and at which stage. While patents protect the science, the competitive landscape is more transparent compared to other industries where nothing needs to be disclosed to the public. Scientific literature and industry studies have not highlighted this effect of regulation. According to the interviewee, regulation does not generally pose major challenges for actors in the field, as they understand it. However, they can arise in certain situations. For example, if a large sample size is required for a rare disease, the development process may be prolonged.

The risk profiles of drug development and medical devices appeared differently in the interview compared to what the timelines suggest. The regulatory processes for devices take a maximum of three years (FDA 2024), whereas drugs can take 10 to 15 years to reach the market (Northrup 2005). Still, for an investor, the time-related risk function of these sectors varies. The interviewee explained that from a VCs point of view, the cycle is actually slower in devices, and investments are risky as even with a good product, as exit can take considerable time. In section 4.3, Silicon Valley Bank's data (2023) reported that the median M&A exit times were 3,9 years for biopharma, and 7 years for medical technology. The interviewee highlighted the impact the time differences have on early-stage VCs. Although the short-term risk in drug development is higher, VCs only carry it for a limited period, as a successful project often quickly leads to M&A. In MedTech, however, the risk must be carried for much longer, and it is not purely scientific but more business oriented. Miller et al. (2019, 51–55) and Lee, Park & Lee (2019, 13–14) highlight similar challenges in commercializing medical technology.

As noted in section 4.1, literature and market research suggest that corporate venture capital is generally positive for both, co-investors and founders. According to Dubocage and Shuwaikh (2022), CVC leads to more innovation and patents, and Silicon Valley Bank's research (2023) indicate higher M&A probabilities. However, the interviewee held differing views on the effects of CVC from a co-investor's perspective. This is understandable, given that the operational logic of a CVC differs from that of a private VC. CVCs have much greater access to capital for follow-on investments, so there is little incentive to bring other funds in. While risk-sharing is still important to CVCs, their goal is not to return money to LPs but to advance the interests of their parent company. The increased M&A activity could be explained by acquisitions of CVC-funded companies by their parent corporations, yet such transactions may not be the best deals for the founders. Still, the interviewee emphasized the significance of co-investing, although it is typically carried out by syndicating with other VCs.

Regarding exit strategies, the interviewee expressed somewhat different views from those presented in the literature. Bienz and Leite (2008, 4) suggest that IPOs have historically provided venture capital investors with higher returns than M&A transactions, and Gompers and Lerner (2004, 375) note that VCs tend to prefer IPOs over M&A exits during market peaks. Divergences in perspective may stem from factors such as sector focus, geographical context, and the stage of the fund.

It should be noted that some comparisons with literature are difficult, as research on venture investing in the life sciences sector is very limited. Most studies focus on general VC funds, making the insights from the interview particularly valuable. The interviewee expressed views largely consistent with the literature review in Chapter 4, which integrates the venture capital business logic to the life sciences sector. However, obvious differences emerged in terms of CVC impact and exit strategy preferences. The transparency that regulation brings into the competitive landscape has not been observed in literature either.

6 Conclusions

Venture capital and startup entrepreneurship have been studied to some extent, but significant gaps remain in the literature concerning the life sciences sector. Most existing VC research provides only a partial understanding of venture capital activities within life sciences. The objective of this thesis was to address these gaps by exploring the distinctive characteristics of the life sciences VC landscape, understanding what makes it particularly challenging for investors, and identifying the factors that commonly contribute to successful fund performance. The research questions were: 1. *What factors distinguish venture capital investing in the life sciences sector from traditional VC industries?* and 2. *What challenges and success factors characterize venture capital in the life sciences sector?* These questions were addressed through a literature review and an interview with an experienced industry professional, providing both theoretical grounding and practical insights to support the study's conclusions and to encourage further research in the field.

The main takeaways from this thesis show that in life sciences, scientific and technical precision is critical, whereas in other industries, the team's ability to execute ideas effectively often determines success. Since the primary obstacles to success in life sciences arise from the science itself rather than market competition, investors must demonstrate exceptional ability to evaluate both scientific and commercial potential. This inherent need for precision fosters a collaborative investment environment, where venture capitalists gather the strongest expertise behind the most promising companies.

These takeaways stem from the distinct market dynamics in life sciences. Development companies compete against scientific and technical challenges when developing therapeutics or medical devices for which demand is established. In other sectors, competition occurs between companies pursuing similar business ideas, and the team with the strongest ability to execute the concept, respond to setbacks, secure funding, and ultimately scale to profitability emerges as the winner. In life sciences, companies can only enter the market with a complete and approved product, whereas startups in other industries can test market traction with prototypes and develop them further according to the response. The dynamics of product development and its high capital intensity necessitate scientific and technical precision, as the risks of failure in regulatory trials remain significant throughout the entire path to market entry.

Venture capitalists in the life sciences sector must identify companies with strong scientific foundations and clear commercial potential, supporting them throughout lengthy and high-risk

development processes. Success requires combining deep scientific understanding with knowledge of regulation, development, clinical demand, and commercialization. Networks are equally vital, as they underpin deal sourcing, syndication, and exits, which most often take place through M&A with large pharmaceutical firms. Syndication allows investors to pool expertise and resources, aligning the best capabilities behind the most promising ventures. Compared to other VC sectors, life sciences investing demands far greater precision, both scientifically and operationally, fostering a uniquely collaborative ecosystem. Despite its challenges, the sector offers substantial financial potential and plays a crucial role in advancing solutions to major health challenges.

This study specifically focuses on the qualitative dimensions of investment activity within the sector, making a qualitative research approach the most appropriate choice. It integrates the business dynamics of the life sciences sector with the operational logic of venture capital and reinforces theory-based insights through an expert interview, providing an empirically supported perspective on the themes identified in the literature. The interview is essential, as the limited amount of prior research makes practical experience highly illustrative and offers comprehensive insight into the operations of venture capitalists in the sector. The interviewee's extensive background in founding, managing, and investing in life sciences companies allows reflection on the research questions from multiple perspectives, which proved highly valuable for the study. As one of Finland's leading experts in the field, the interviewee further enhances the credibility and depth of the empirical findings. The interview contributed additional perspectives and supported the conclusions derived from the literature review, thereby strengthening the robustness of the study's findings. Although based on a single interview, the study benefits from the interviewee's extensive experience, and the qualitative approach enables an in-depth exploration of sector-specific venture capital practices.

Future research could further develop the theoretical framework for life sciences venture capital by using larger and more geographically diverse samples. Conducting structured interviews would also allow for systematic comparisons between the investment decision-making processes of generalist and life sciences-focused venture capital funds. The interview raised questions regarding the role of corporate venture capital, as literature portrayed its impact much more positively. Examining how CVC involvement affects exit valuations would be a particularly valuable avenue for further research. In addition, exploring the influence of regional clusters and ecosystems on the formation and growth of life sciences companies could provide further insights into the factors shaping innovation and investment outcomes in the sector.

7 Summary

In today's economy, a growing number of the world's most prominent companies have emerged from venture capital-backed startups. While venture capital financing has received some academic attention, the life sciences sector remains relatively underexplored. Although startup-driven innovation in life sciences is critical, it is far less visible in everyday life than in other sectors. Life sciences innovations typically reach the market through large established firms via M&A, which obscures the role of the original small development companies, unlike the clear visibility often enjoyed by technology startups. The sector plays a vital role in promoting societal well-being and sustainable economic growth. Innovations in the life sciences have a significant impact not only on addressing the unsustainable costs of healthcare but also on improving health outcomes on a broad scale. This thesis contributes to the literature by examining what additional dimensions life sciences-focused venture capital acquires on top of the general VC business logic. Beyond its academic contribution, the findings also carry practical implications for professionals working in VC funds, potential LP investors, and life sciences founders seeking venture financing for their companies.

Venture capital investing in the life sciences sector is distinguished by the combination of strong networks, deep scientific expertise, and strategic collaboration. Staying informed about market developments is essential, as the strategic priorities of large pharmaceutical companies shape exit opportunities. Investors must understand precisely what a company needs to achieve scientifically and technologically to reach a successful exit, including key regulatory requirements and the stages of product development. Compared to general VC investing, this knowledge must be particularly exact, reflecting the inherently precise nature of the life sciences, where the main obstacles to success often arise from scientific challenges rather than market competition. Consequently, life sciences VCs collaborate more closely than in other industries, adopting a partner-oriented approach to leverage expertise and access the best opportunities. While the complex regulation, high capital intensity, and scientific and commercial risks may appear formidable to VCs outside the sector, experienced life sciences professionals treat them as routine. The critical success factors involve combining rigorous scientific and business analysis with strong networks and strategic collaboration. Overall, success depends on integrating expertise, networks, and precise evaluation, which sets life sciences venture capital apart from traditional VC investing.

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Appendices

Appendix 1 Explanation of the use of AI

The content, ideas and analysis this thesis presents are entirely my own. AI-based tools were used in language refinement and proofreading (ChatGPT), as a support tool when searching for literature (ScopusAI) and in transcribing the interview (Whisper).

Appendix 2 Interview questions

1. Voisitko kertoa lyhyesti urapolustasi ja siitä, miten päädyit life sciences -painotteiseen VC-rahastoon? / Could you briefly describe your career path and how you ended up working at a life sciences–focused VC fund?
2. Mikä tekee life sciences -sektorista houkuttelevan VC-sijoittajan näkökulmasta? / What makes the life sciences sector attractive from a venture capital investor's perspective?
3. Mitkä ovat keskeisimpiä eroja life sciences -sektorin ja esimerkiksi teknologia-startupien välillä VC-sijoittajan kannalta? / What are the key differences between the life sciences sector and, for example, technology startups from a VC investor's standpoint?
4. Onko tieteen ymmärtämisellä merkittävä rooli sijoittajan näkökulmasta? / How important is scientific understanding from the investor's perspective?
5. Vaikuttaako sektorifokus jotenkin fundraisingiin? / Does the sector focus have any impact on fundraising?
6. Mistä yleensä löydätte potentiaaliset sijoituskohteet? / How do you typically identify potential investment targets?
7. Mitkä ovat keskeiset asiat due diligence -prosessissa life sciences -sijoituksissa? / What are the key elements of the due diligence process in life sciences investments?
8. Voitko kertoa jotain esimerkkejä tekijöistä, joiden ilmeneminen johtaa kielteiseen sijoituspäätökseen? / Could you provide some examples of factors that typically lead to a negative investment decision?

9. Liittyykö alan innovaatioiden kaupallistamiseen jotain erityispiirteitä tai haasteita? / Are there any particular characteristics or challenges related to the commercialization of innovations in this field?

10. Millainen merkitys verkostoilla on alalla menestymiseen? / How significant are networks for achieving success in the industry?

11. Mikä on CVC:n rooli Pohjoismaisessa life sciences -ekosysteemissä? / What role do corporate venture capital (CVC) investors play in the Nordic life sciences ecosystem?

12. Mitkä ovat suurimmat haasteet, joita VC-sijoittajat kohtaavat life sciences -sektorilla? / What are the main challenges VC investors face in the life sciences sector?

13. Miten pitkät tuotekehityssyklit ja regulaatio vaikuttavat sijoituspäätöksiin? / How do long development cycles and regulatory requirements affect investment decisions?

14. Kuinka arvioitte tieteellistä ja teknologista riskiä varhaisessa vaiheessa olevissa yhtiöissä? / How do you assess scientific and technological risk in early-stage companies?

15. Miten vertailette M&A vs IPO exit -strategioita? / How do you compare M&A and IPO as exit strategies?

16. Vaikuttaako tieteeseen nojaava liiketoiminta IPOihin, kun liiketoiminta on vaikeasti ymmärrettävää keskivertosijoittajille, ja hinnanmuodostus ei siten välttämättä tehokasta? / Does science-based business make IPOs more challenging, as the business model may be difficult for average investors to understand and pricing therefore not entirely efficient?

17. Miten lähestytte yhtiöiden arvonmääritystä, johon perinteiset kassavirtaperusteiset eivät usein sovellu? / How do you approach company valuation when traditional cash flow methods are often not applicable?

18. Onko jotain erityisiä faktoreita, jotka yleensä kasvattavat yritysten onnistumistodennäköisyyttä? / Are there any particular factors that tend to increase a company’s likelihood of success?

19. Mitkä trendit näyttävät tällä hetkellä lupaavimmilta sijoituskohteilta? / Which trends currently appear the most promising from an investment perspective?

20. Miten näette life sciences -markkinoiden kehittyvän Pohjoismaissa ja Suomessa tulevina vuosina? / How do you see the life sciences market developing in the Nordic countries and in Finland in the coming years?