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**TISSUE STRUCTURE DEVELOPER (TSD): JELLYFISH-BASED COLLAGEN AS  
AN INNOVATIVE WOUND HEALING TREATMENT – BUSINESS MODEL,  
FUNDING & EXIT STRATEGIES**

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## **Abstract**

TSD, a novel biotech venture, aims to revolutionise the wound healing market by utilising jellyfish, a new source of collagen. Its product, the CollaPatch™, harnesses the benefits of jellyfish collagen across social, environmental, and ecological dimensions, offering a superior alternative to bovine- and porcine-based collagen products for wound healing.

This paper introduces the product with its scientific work, analyses the stakeholders and the competitive environment of the product and presents a detailed business model. It then outlines the funding requirements, targeted sources of funding and exit strategies.

## **Keywords**

Biotechnology, Biomedical Innovation, Business Strategy, Intellectual Property, Pharmaceutical, Competitive Analysis, Funding, Ulcers, Wound Healing, Chronical Wounds, Jellyfish, Marine Collagen, Venture Capital, Intrapreneurship, Entrepreneurship, Science-Based Entrepreneurship, Research and Development, Clinical Trials, Innovation

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## **Executive Summary**

We, Tissue Structure Developer (TSD), are pleased to introduce the CollaPatch™. Our innovative wound care product is based on the revolutionary scientific breakthrough of type 0 collagen, a unique universal collagen type that integrates the various features of multiple collagen types, all required for an optimal wound healing process, in just one molecule. Making use of this breakthrough, we have developed a wound patch that not only incorporates all state-of-the-art technologies in wound care, but also utilises type 0 collagen to significantly accelerate the wound healing process.

With the global wound care market currently being valued at \$21.5 billion, at a compound annual growth rate (CAGR) of 5.9% projected, the market is expected to grow to \$28.6 billion by 2032, creating an attractive opportunity for our CollaPatch™. This trend is consistent with chronic wound management becoming increasingly challenging, driven by an ageing population and rising diabetes prevalence. These conditions result in prolonged and costly care, placing a significant burden on healthcare systems. CollaPatch™ addresses these challenges with a highly biocompatible and ethically sourced formulation that accelerates healing and reduces overall healthcare costs.

Our strategy at TSD is to advance the CollaPatch™ through research and development (R&D) to the completion of clinical trial phase II. We estimate the cost of reaching this milestone at approximately €20 million. To achieve a return on investment, we aim to prepare our company for a strategic exit after phase II, targeting a valuation of approximately €250 million. We plan to achieve this by selling to a large pharmaceutical company that can fully commercialise the product. This approach is designed not only to demonstrate the efficacy of our CollaPatch™, but also to increase the likelihood of subsequent commercialisation to drive the wound care market forward in the long term.

## 1. Problem

The complex and dynamic process of wound healing exemplifies the body's remarkable ability to repair itself, yet significant hurdles often disrupt this intricate process, resulting in chronic wounds that refuse to heal (Schilrreff & Alexiev, 2022). From the moment an injury occurs, a carefully orchestrated sequence of events aims to restore skin integrity (Ibrahim et al., 2018). Collagen, a key protein in wound healing, provides structural support and facilitates cellular processes (Mathew-Steiner et al., 2021). Despite its importance, current collagen-based products face limitations such as biocompatibility issues, variable efficacy and ethical concerns due to their mammalian origin, which increases the risk of immunogenic reactions and disease transmission (Lee & Lee, 2016).

### *1.1. The Wound Healing Process*

According to Ibrahim et al. (2018), the process of wound healing consists of a sequence of precisely organised steps that restore the structural integrity and functional capability of the injured tissue. The body's largest organ, the skin has complex reparative mechanisms that enable rapid and effective healing (Wilkinson & Hardman, 2020). According to a classical analysis, the wound healing response can be divided into four main phases: haemostasis, inflammation, proliferation, and dermal remodelling. Each of these processes are essential for completing tissue restoration (Wilkinson & Hardman, 2020). Haemostasis, which aims to stop bleeding by blood vessel constriction and clot formation, starts shortly after injury during the early phase of wound healing (Guo & DiPietro, 2010). This step prepares the body for the inflammatory phase, which is when infection is avoided, and the immune system is triggered to get rid of dead cells. During this stage, neutrophils, macrophages, and lymphocytes are important participants because they invade the wound site and release growth factors and cytokines that control the succeeding stages of healing (Ibrahim et al., 2018; Wang et al., 2022). Nevertheless, excessive inflammation can result in chronic wounds that never heal, which

emphasises the significance of a balanced inflammatory response (Wang et al., 2022). After inflammation, several cell types, including keratinocytes, fibroblasts, and endothelial cells, migrate and proliferate to restore the damaged tissue during the proliferative phase. This phase is characterised by the creation of collagen by fibroblasts and the generation of new blood vessels, or angiogenesis, which lays the groundwork for the growth of new tissue (Álvarez & Zuñiga, 2023; Mathew-Steiner et al., 2021). The maturation and reshaping of the newly created tissue and collagen occur during the remodelling phase, which is the last step of wound healing. This process might take many months to years, and it ultimately determines the strength and look of the healed area (Álvarez & Zuñiga, 2023).

Wounds can be classified based on their healing duration into acute and chronic wounds. Acute wounds usually heal in a matter of days to weeks, following the prompt, organised healing process mentioned above (Ibrahim et al., 2018). In contrast, chronic wounds are characterised by a failure to progress through the normal healing stages, leading to a state of prolonged inflammation, persistent infection, and necrosis (Schilrreff & Alexiev, 2022). They have higher protease levels, which lead to a persistent, self-reinforcing inflammatory environment (Gould, 2016). Such wounds are a significant burden on healthcare systems globally, primarily affecting the elderly and individuals with diabetes, and are associated with an increased risk of morbidity (Wilkinson & Hardman, 2020).

Infections and other wound complications can have a major effect on the healing process. Chronic wound problems can arise due to infection, which can prolong inflammation, delay the initiation of the proliferation phase, and interfere with the regular healing phases (Schilrreff & Alexiev, 2022). The development of biofilms by pathogenic bacteria further complicates the treatment of infected wounds, as they are resistant to antibiotics and the host's immune response (Schilrreff & Alexiev, 2022).

### *1.2. The Role of Collagen in the Process of Wound Healing*

The most prevalent protein in the body, collagen, is essential to the control of several biological processes that are involved in the healing of wounds. Collagen is produced in the healing wound by cells called fibroblasts, which then modify it into complex morphologies. Collagen serves as a natural substrate for cellular adhesion, proliferation, and differentiation in addition to giving tissues their mechanical strength and flexibility (Mathew-Steiner et al., 2021). The tensile strength of the repaired skin is dependent on the kind, quantity, and arrangement of collagen in the wound. Collagen type III is initially produced during the initial phases of wound healing and aids in cell adhesion and migration. Collagen I, the dominant collagen in the skin, eventually replaces this collagen, which is primarily involved in early repair and forms the granulation tissue. Collagen type I is induced by the oxidase enzyme to form covalent cross-links that allow it to mature into complex structures that are reoriented for the restoration of tensile strength. After the wound closes, the collagen continues to remodel for several months, during which time the healed tissue's tensile strength reaches 80–85% of that of normal tissue. In the skin, the fibrillar collagen types I, III and V are the most common, followed by fibril-associated collagens type XII, XIV, XVI, and VI. The non-fibrillar collagens type IV, XVIII are found in the basement membrane of the skin (Mathew-Steiner et al., 2021).

Notable is collagen's function in inflammation during wound healing. When injury exposes collagen to the bloodstream, the clotting cascade is triggered, resulting in a fibrin clot that halts the bleeding. Fragments of collagen types I and IV can function as strong chemo attractants for neutrophils, boosting phagocytosis and immunological responses and influencing gene expression (Mathew-Steiner et al., 2021).

When a wound heals, scarring is a normal by-product since the newly created tissue is not the same as the original in terms of texture or quality. Scars are a sign of effective healing, however extensive or hypertrophic scarring can cause functional limitations and aesthetic issues (Shen

et al., 2021). Factors contributing to impaired wound healing and excessive scarring include systemic conditions such as diabetes, poor nutrition, and specific medications, alongside local factors like infection and repeated trauma to the wound site (Guo & DiPietro, 2010).

Chronic wounds, on the other hand, typically heal slowly, incompletely, and uncoordinatedly, with poor anatomic and functional outcomes. A clinical expression of this phenomena is chronic, non-healing ulcers, which emphasises the significance of the wound cytokine profile and the essential balance required for normal healing to happen (Schultz et al., 2011). For instance, in diabetics, collagen is glycosylated, and even if the gene encoding collagen is highly expressed, there is less collagen deposited in wounds. This results in a net breakdown of the extracellular matrix and extended inflammation. It is accompanied by increased matrix metalloproteinase (MMP) and elastase activity, whereas tissue-derived inhibitors of metalloproteinases (TIMPs) are diminished (Gould, 2016).

### *1.3. Current Solutions & Their Limitations*

Collagen-based wound healing remains one of the most intricate processes within the domain of healthcare. The journey to find effective wound healing products has been both diverse and challenging, reflecting the complexity of human physiology and the varying nature of wounds (Nguyen et al., 2023). Initially, this chapter delves into the broad spectrum of wound healing products, outlining their development from traditional remedies to advanced biomedical inventions. This exploration provides a foundation to understand the critical aspects of wound healing, including factors like speed, infection control, and tissue regeneration (Mirhaj et al., 2022).

As the narrative progresses, it is examined why certain materials excel in facilitating wound healing. Here, the focus sharpens on the characteristics necessary for ideal wound healing products, such as biocompatibility, efficacy, and safety (Nguyen et al., 2023). The discussion naturally leads to collagen, a standout material in the realm of wound care. Unlike dressings

that primarily function to protect the wound (like gauze or hydrocolloid dressings), maintain moisture (like hydrogels), or absorb exudate (like alginates or foam dressings), collagen dressings are actively involved in the healing process at a biochemical level (Shen et al., 2021; Zhang & Zhao, 2020). While other dressings might create an optimal healing environment, collagen directly interacts with the cell structure to stimulate and support the healing process (Ying et al., 2019).

A variety of such products, each designed with distinct functionalities, has been formulated to target various facets of the wound healing cascade (Lee & Lee, 2016). Collagen dressings, used in chronic wounds, act as substrates to assist in forming new tissue, but may be less effective in highly exudative wounds or those needing frequent dressing changes (Ying et al., 2019). Collagen sponges, improved with hyaluronic acid and fibronectin, enhance cell attraction and collagen deposition, yet might lack mechanical strength for diverse wound types (Sawaragi et al., 2023). Collagen hydrogels, with impressive structural properties, notably improve wound closure but can struggle to maintain consistent moisture over time (Jridi et al., 2015). Collagen-based scaffolds, critical for dermal substitution, provide a platform for cell growth but may not fully mimic the natural skin matrix's complexity and function (Ruszczak, 2003). Finally, collagen powder, aiding in chronic wound healing by stimulating cells, faces challenges in maintaining its stability and biological activity both in storage and upon application (Qureshi et al., 2019). In the context of wound healing, a diversity of collagen types is requisite for optimal tissue repair. However, the predominant composition of commercially available products is centred around collagen types I and III (Clare et al., 1979). This prevalence is attributed to several factors: their extensive applicability in various healing scenarios, the relative simplicity of their extraction process, and their abundant presence in typical mammalian sources. In contrast, the inclusion of other collagen types needed in a later stage

during the healing process, such as types V, VI and VII, is markedly limited in these products (Mathew-Steiner et al., 2021).

In conclusion, while collagen-based products play a critical role in wound healing, their application is met with considerable challenges that necessitate a nuanced, stage-specific approach. The reliance on mammalian collagen, particularly of bovine origin, introduces complexities including immunogenic reactions, variable efficacy, and the risk of disease transmission, which significantly impairs its practicality in clinical settings (Lee & Lee, 2016; Mathew-Steiner et al., 2021). These limitations, along with the high costs and partial resolution of complications associated with these products, underscore a critical need for continued innovation and improvement in wound healing methodologies (Harding & Queen, 2017). There is a clear imperative for advancing wound healing methodologies by exploring alternative sources like marine collagen and refining existing collagen-based strategies (Salvatore et al., 2020). This evolution in wound healing practices is essential not only for enhancing the efficacy of treatments but also for reducing potential risks, thereby contributing to more effective and safer healthcare solutions (Mathew-Steiner et al., 2021).

## **2. Opportunity**

Recent research has identified a collagen source that provides multiple collagen types in one, significantly expanding the possibilities for innovative medical applications. Jellagen, the laboratory behind this breakthrough, extract the so-called “type 0 collagen” from the *Rhizostoma pulmo* jellyfish off the coast of the UK. Collagen type 0, or "stem collagen", integrates the functionalities of several collagen types essential for different stages of wound healing into a single, versatile biomaterial, and works as a generalist source (Spragg et al., 2020).

Although jellyfish collagen has been known as an alternative to conventional collagen sources since the 2000s, it has never been a truly viable option, partly because previous extraction

methods were inefficient and costly, and partly because the added value of jellyfish collagen had not been explored at the time. This made it unattractive for commercial usage. With recent research presenting more efficient extraction methods and the advanced benefits, this opens the door to multiple medical applications (Khong et al., 2018).

This development not only opens a new chapter in the field of sustainable and ethically sourced biomaterials, but also presents a unique opportunity to address and mitigate several pressing concerns associated with conventional collagen sources. Through the lens of emerging potential in biomedical applications, jellyfish type 0 collagen provides an opportunity that holds advanced medical benefits over conventional collagen sources (Alkildani et al., 2021).

### *2.1. Jellyfish Collagen*

Traditional collagen sources, such as bovine and porcine collagens, have long been used in various biomedical applications due to their structural and functional compatibility with human tissues. However, concerns about the transmission of zoonotic diseases, ethical dilemmas regarding animal welfare and the potential allergenicity of mammalian collagen have driven the search for alternatives. Such challenges have catalysed the need for safer, more sustainable, and ethically sourced biomaterials, with jellyfish collagen emerging as a prominent candidate due to its distinctive advantages (Addad et al., 2011).

Offering several advantages over mammalian collagens, such as being less dependent on religious restrictions, getting cheaper with advanced extraction methods, as well as offering an addition to existing sources with the increasing demand of a growing population, jellyfish collagen identifies as an attractive alternative (Addad et al., 2011; Alkildani et al., 2021; Khong et al., 2018).

Recent research conducted by Jellagen classifies jellyfish collagen as a generalist collagen with a higher degree of molecular simplicity that results into greater flexibility in tissue structure and multifunctionality. The fact that jellyfish collagen combines the properties of several different

types of collagens in a single molecule indicates jellyfish collagen as a generalist. Consequently, Jellagen uses the name “type 0 collagen” to refer to jellyfish-derived collagen (Spragg et al., 2020).

Characterised by its biocompatibility, minimal risk of disease transmission and unique biochemical properties, type 0 collagen has attracted attention for its potential in medical applications, particularly in tissue engineering (Addad et al., 2011; Pesterau et al., 2023).

Type 0 collagen has demonstrated its ability to serve as an ideal scaffold material in tissue engineering and regeneration due to its generalist collagen properties. These scaffolds support the growth and maturation of cells into functional tissues, which is essential for the advancement of regenerative medicine strategies. Biocompatibility and bioactivity of jellyfish collagen, demonstrate its supportive role in cell adhesion, proliferation, and differentiation. Furthermore, the hypoallergenic nature and safety profile of jellyfish collagen, combined with its sustainability and ethical sourcing, underscore its attractiveness amongst other for medical applications, potentially enhancing the functional integration of engineered tissues into the human body (Alkildani et al., 2021; Pesterau et al., 2023).

The work of Khong et al. (2018) represents a pivotal moment in the exploitation of jellyfish collagen through the introduction of a physically induced solubilisation process, which significantly increased the yield of collagen extraction beyond conventional methods (Khong et al., 2018). These innovative methods have streamlined the process, making jellyfish collagen more accessible, while also improving its purity (James et al., 2023). By maintaining the integrity and biocompatibility of the extracted collagen, this method paves the way for its wider application in the biomedical industry, thus providing a tangible opportunity to utilise jellyfish collagen as a competitive and sustainable biomaterial, opening the door to the commercial scalability of jellyfish collagen (Addad et al., 2011; Pesterau et al., 2023).

## *2.2. Benefits of Type 0 Collagen in the Wound Healing Process*

Jellyfish derived type 0 collagen has a unique mode of activity that significantly enhances the wound healing process. Its structure closely mimics the human extracellular matrix (ECM), providing a more favourable environment for cell attachment, migration, and proliferation - key processes in tissue regeneration. This compatibility facilitates the early stages of wound healing when rapid cellular activity is critical for wound closure (Khong et al., 2018).

In addition, type 0 collagen has an enhanced ability to modulate the MMP activity. This modulation is critical for the remodelling phase of wound healing, where the balance between collagen deposition and degradation determines the functional and aesthetic quality of the healed tissue. By fine-tuning MMP activity, jellyfish collagen ensures a more controlled remodelling process, reducing the risk of hypertrophic scarring and improving the overall healing outcome (Felician et al., 2019; Salvatore et al., 2020).

The incorporation of type 0 collagen into the ECM not only supports structural repair, but also actively participates in signalling pathways that promote healing. It has been shown to enhance the recruitment and proliferation of fibroblasts, which are essential for the synthesis of new collagen fibres, and to support angiogenesis, ensuring adequate blood supply to the healing tissue. This multifaceted support accelerates the proliferation phase and smoothly transitions to remodelling (Felician et al., 2019). In addition, collagen type 0 stimulates tissue regeneration by modulating macrophage activity. It increases M2 macrophages, which encourage tissue repair and regeneration, and decreases M1 macrophages, which are known to cause inflammation, thereby preventing a prolonged inflammation phase, and enhancing the overall healing efficacy. As a result, a recent study by Jellagen showed that wounds treated with collagen type 0 reached 80% of closure nearly twice as quickly as those untreated. Additionally, collagen type 0 demonstrated superior uniformity, ensuring complete and consistent closure of

the final 20% of the wounds, compared to wounds treated with mammalian collagen sources (see Appendix A) (Spragg et al., 2020).

The role of type 0 collagen as a generalist is particularly beneficial in the wound healing process, where different types of collagens are required at different stages. For example, while type I collagen is crucial for strength and structure, type III collagen plays a key role in the early stages of wound repair, and type IV collagen supports basement membrane repair. Type 0 collagen, with its versatile nature, can effectively fulfil the roles of these specific collagen types, acting as a universal scaffold to support all phases of wound healing, from haemostasis to remodelling (Flaig et al., 2020). This versatility extends to its application in tissue engineering, where the need for different collagen types can complicate scaffold design. By using type 0 collagen, researchers and clinicians can simplify the development of regenerative therapies, making them more efficient and widely applicable (Song et al., 2006).

Overall, the utilisation of jellyfish-derived type 0 collagen introduces an innovative breakthrough in wound healing and tissue engineering. Its improved mode of action, superior ECM integration, and role as a generalist collagen offer significant advantages over conventional collagen sources. This breakthrough not only enhances the physiological wound healing process but also opens new avenues for the development of advanced biomedical applications, promising better outcomes for patients worldwide (Felician et al., 2019).

### *2.3. Economic, Ecologic, and Social Benefits of the Use of Jellyfish-Collagen*

Jellyfish collagen emerges as a promising and multifaceted alternative to traditional sources of collagen, offering a unique blend of economic, ecological, and social benefits.

In the economic realm, the use of jellyfish as a source of collagen presents a highly cost-effective solution. The cultivation and maintenance of jellyfish for collagen extraction are significantly less resource-intensive compared to traditional livestock farming, which involves high costs associated with feeding, land use, and animal welfare management. Furthermore,

jellyfish offer a higher yield of collagen per individual compared to common livestock, making the process more efficient and sustainable (Khong et al., 2018). Additionally, the burgeoning interest in marine-derived bioproducts positions jellyfish collagen as a high-value commodity in the global market, enhancing its potential for generating substantial economic returns. This aspect is particularly vital considering the growing demand for alternative and sustainable sources of collagen in various industries, including pharmaceuticals, cosmetics, and food production (Pesterau et al., 2023).

From an ecological standpoint, harvesting jellyfish for collagen is inherently sustainable and contributes positively to the health of marine ecosystems. Unlike the extraction of collagen from traditional marine sources, such as fish, which often disrupts marine biodiversity and leads to overfishing, the utilisation of jellyfish is less likely to cause such ecological imbalances. This practice is partly due to the abundance and rapid reproduction rates of jellyfish, which ensure a steady and sustainable supply without the risk of overharvesting (Coppola et al., 2020). In addition, the controlled harvesting of jellyfish can aid in managing their populations, which is crucial in regions where jellyfish blooms pose environmental and economic threats to marine systems and fisheries. This management can inadvertently lead to the preservation and restoration of affected marine habitats and species, thereby enhancing overall marine biodiversity (Edelist et al., 2021).

Moreover, jellyfish collagen stands out due to its substantial social and health benefits. It notably differs from mammalian collagen, often linked to allergies and ethical issues, by exhibiting higher biocompatibility and reduced allergenicity (Alkildani et al., 2021). These characteristics not only diminish the risk of allergic reactions but also address ethical and religious concerns associated with animal-derived products, making it a favourable option for those with specific dietary, ethical, or religious considerations (Chiarelli et al., 2023). Furthermore, the extraction and processing of jellyfish collagen can stimulate socio-economic

growth in coastal communities by creating jobs, especially where traditional fisheries are in decline. This encompasses roles in harvesting, processing, and sustainable jellyfish farming, enhancing economic resilience (Coppola et al., 2020). Moreover, the burgeoning jellyfish collagen industry may drive research and innovation, notably in medical fields like wound healing and tissue engineering, promising significant healthcare advancements, especially in resource-limited areas (Geahchan et al., 2022).

In conclusion, jellyfish collagen emerges as a groundbreaking, sustainable, and ethically sourced alternative to traditional mammalian collagen. Technological advancements have enhanced its commercial viability, particularly in medical fields like tissue engineering and wound healing. Jellyfish collagen's biocompatibility, hypoallergenic nature, and structural similarity to human ECM address the limitations of mammalian collagens. It effectively modulates MMP activity, supporting various stages of healing. Economically, it offers cost-effectiveness and higher yields, while benefiting marine ecosystems and coastal communities. This makes jellyfish collagen a superior choice in the collagen market, aligning with global trends towards sustainable, ethically responsible resources and promising further innovations in healthcare and biomaterials.

### **3. Solution**

In today's rapidly evolving healthcare landscape, TSD, as an innovative, cutting-edge venture is poised to revolutionise wound healing concepts. Therefore, we aim to disrupt the traditional approaches of wound healing treatment by pioneering the development of the CollaPatch™, an advanced medical product tailored for enhanced wound healing. Our CollaPatch™, an innovative wound patch, is integrating the breakthroughs in biotechnology with type 0 collagen to accelerate tissue regeneration, while simultaneously combating infection effectively. The company's overarching goal is to maximise both the market and therapeutic value of the CollaPatch™ by strategically navigating through the early stages of development with a view

to divestment at the completion of Phase 2 of the clinical trials and consequently de-risking further commercialisation approaches.

TSD is committed to address the urgent needs of patients for quicker healing processes and of healthcare providers for reliable, effective treatments. By focusing on innovative, patient-centred solutions, TSD aims to significantly advance current standards in wound care. At the core of its vision is the positioning of the CollaPatch™ as a transformative force in wound care, using advanced biotechnology to redefine standards of treatment efficacy and patient comfort worldwide.

### *3.1. Target Product*

As type 0 collagen from jellyfish provides the highest added value in tissue regeneration, the focus will henceforth be on the treatment of acute wounds, such as abrasions, incisions or burns, as well as chronic wounds. In the treatment of such wounds, both healthcare professionals and patients prioritise different features, either to speed up healing, reduce complications, or favour comfort. The ideal wound dressing should balance clinical efficacy with patients valued attributes.

Extensive inputs from Dr. Till Ossenkop (Pharmacist), Dr. Hans Peter Weinschenk (Pharmacist) and Dr. Sabine Coulon (Doctor of Medicine) underline the exceptional efficacy of closed wound dressings for wound management and identifies these as most widely adopted. Further, the interviewed healthcare professionals outlined, that an optimal wound dressing should provide a comprehensive approach to wound management, effectively preventing infection and creating an environment conducive to healing (Coulon, 2024; Ossenkop, 2024; Weinschenk, 2024). Key features include:

- **Barrier function against micro-organisms:** This critical feature prevents the ingress of bacteria and pathogens, significantly reducing the risk of infection.

- **Antimicrobial properties:** The integration of antimicrobial substances actively fights infections.
- **Sterility:** Sterile packaging is essential to prevent the introduction of new pathogens.
- **Moisture retention:** A moist environment is promoted, facilitating faster and more efficient healing.
- **Exudate management:** Maintains optimal moisture levels, preventing wound dryness or damage to surrounding skin.
- **Gas permeability:** Essential for healing, this feature allows for the necessary gas exchange.
- **Durability and Resilience:** The dressing withstands physical stress, reducing the need for frequent changes.
- **Compatibility with medical procedures:** Ensures the dressing does not interfere with diagnostic tests or treatments.
- **Bioactivity and tissue regeneration:** The incorporation of type 0 collagen significantly enhances this aspect. It supports cellular healing processes and tissue regeneration by providing a scaffold for new tissue growth, making it a key advancement in wound care.

Information on customer prioritised attributes of an optimal wound dressing was obtained from a comprehensive open survey conducted by 33 participants (see Appendix B).

Users prioritise:

- **Comfort:** A high level of comfort provided by the dressing's ability to conform to body contours was highlighted as critical. A dressing that fits the body seamlessly is perceived as less intrusive and more comfortable for daily activities.
- **Handling** (application/replacement): Ease of use, especially when applying and changing the dressing, was identified as a key factor. Consumers prefer dressings that are easy to apply and change without causing pain or interfering with wound healing. A

- self-adhesive design that provides secure adhesion without causing pain when removed is highly valued.
- **Water resistance:** Another important feature is water resistance. Consumers appreciate a dressing that retains its functionality and protects the wound when exposed to water, such as showering, without the need for immediate replacement.
- **Appearance:** The aesthetic appearance of the dressing is also important. Consumers prefer a discreet design that blends in with their appearance and does not draw attention to itself.

Other attributes highlighted include breathability to prevent moisture build-up under the dressing and flexibility to allow unrestricted movement. These findings emphasise the importance of a holistic approach to wound dressing development, going beyond wound healing to improve user comfort and ease of use.

The introduction of type 0 collagen into closed wound dressings represents a significant advancement in wound care. This innovative addition will significantly enhance tissue regeneration capabilities and set new standards for clinical efficacy. The proposed target product combines the best features of closed wound dressings with the regenerative benefits of type 0 collagen. This advanced dressing should not only deliver high efficacy, pioneering a new approach to healing that promises faster and more extensive tissue regeneration, but also incorporate the highest standards of comfort. With this product, the aim is to redefine excellence in wound care, ensuring superior healing outcomes and an improved patient experience.

### *3.2. Our Product*

Our solution, the CollaPatch™, is a beacon of innovation in wound care, combining unparalleled clinical efficacy with a deep commitment to patient comfort. Developed through extensive consultation with healthcare professionals and utilising the latest advances in biotechnology, the CollaPatch™ redefines excellence in wound dressings. Its cornerstone, type

0 collagen, is processed into a sophisticated solution that impregnates the dressing, ensuring accelerated skin tissue regeneration while maintaining patient comfort and convenience.

In order to deliver the characteristics necessary for the ideal targeted solution, the final product will contain the following key components. The exact components, as well as composition of the ingredients, will be finalised during the product development process.

- **Type 0 collagen solution:** At the heart of the CollaPatch's™ regenerative capabilities is type 0 collagen, which is processed into a potent solution that thoroughly impregnates the dressing material. This innovative application method allows the collagen to act directly at the wound site, providing a dynamic scaffold that promotes rapid cell proliferation and tissue regeneration.
- **Antimicrobial agents:** To strengthen the wound against infection, silver nanoparticles are incorporated into the collagen solution. Known to be effective against a wide range of pathogens, these nanoparticles provide powerful antimicrobial protection that is evenly distributed throughout the dressing.
- **Sterile, breathable outer layer:** A layer of medical grade polyurethane encapsulates the dressing, acting as a sterile and breathable shield. This advanced barrier technology prevents microbial penetration while facilitating essential gas exchange to optimise the wound healing environment.
- **Moisture retaining hydrogel and alginate:** Positioned adjacent to the wound surface, a dual-layer approach combining a polyethylene glycol (PEG)-based hydrogel with alginate significantly enhances moisture retention. Alginate, known for its superior exudate absorption properties and biocompatibility, complements the hydrogel to maintain ideal moisture levels, promoting a more efficient healing process by absorbing excess fluid and preventing wound dryness.

- **Self-adhesive perimeter:** The edges of the dressing are lined with a silicone-based adhesive known for its gentle yet firm adherence to the skin. This design ensures that the dressing can be applied and removed with minimal discomfort, significantly improving the patient experience.
- **Water-resistant coating:** To ensure durability and function in daily use, a fluoropolymer coating provides water resistance to the dressing. This feature allows patients to participate in daily activities, including showering, without compromising dressing integrity or wound protection.
- **Flexibility and conformability:** Manufactured from soft elastomers, CollaPatch™ is designed to conform to the contours of the body. This flexibility ensures a comfortable fit that accommodates movement, reducing discomfort and facilitating patient activity.
- **Aesthetic design:** With a discreet, skin-tone appearance, CollaPatch™ is designed to be as unobtrusive as possible, increasing patient confidence and comfort through its minimal visual impact.

As different wound care needs demand different dressing sizes, CollaPatch™'s assortment will be based on the most requested sizes and forms of current dressings in wound care to ensure users can select the optimal model for treating a wound, increasing efficacy and patient satisfaction. This will make the CollaPatch™ a versatile choice.

The CollaPatch™ will represent a breakthrough in wound care, meticulously designed to meet the dual requirements of clinical excellence and patient comfort. By combining the regenerative power of type 0 collagen with a range of advanced features such as silver nanoparticles, alginate, silicone-based adhesives, and water-resistant coatings to prevent infection and ensure comfort and facilitate ease of use, the CollaPatch™ not only accelerates the healing process but also redefines the patient experience in wound management. This innovative product

underscores our commitment to advance healthcare outcomes and improve quality for a superior care experience.

## **5. Stakeholders**

As we delve into the chapter 'Stakeholders' we will first discuss 'Segmentation,' examining the broad categories of our target market, followed by 'Patients and Doctors,' which will provide a more detailed and nuanced understanding of individuals and their characteristics such as patients and doctors. Lastly, we will look at the composition of hospitals and insurances to get a better understanding of TSD's involvement within the process of the German healthcare reimbursement standards. This approach ensures a comprehensive understanding of our audience, aligning our product development with the specific needs and preferences of those we aim to serve, thereby ensuring more impactful and successful engagement with our market.

### *5.1. Segmentation*

In the realm of advanced wound care, the CollaPatch™ represent a groundbreaking innovation, offering significant benefits over traditional treatments. This chapter delves into the primary segmentations for this product: patients with chronic wounds and specialised staff, working within hospitals such as physicians and nurses. Understanding the distinct characteristics and needs of both parties is fundamental for a successful development and utilisation of our product. Patients with chronic wounds, such as diabetic ulcers, venous ulcers, and pressure ulcers, constitute a significant demographic in need of effective, painless, and conducive wound care solutions. The CollaPatch™, with its inherent biocompatibility and potential for accelerated wound healing, cater perfectly to this group. Its hypoallergenic nature and superior healing properties are ideal for patients prone to allergic reactions or with compromised healing capabilities. Addressing potential patient concerns regarding the novel use of jellyfish collagen, through educational initiatives and demonstrable evidence of efficacy, is crucial. Additionally, ensuring accessibility through insurance coverage and affordability are key factors for this segment's adoption of the product.

In the context of healthcare institutions, hospitals and clinics are continuously in pursuit of advanced wound care products that offer better outcomes, ease of use, and cost-effectiveness. The advantages of the CollaPatch™ in a clinical setting are manifold. These include enhanced healing, reduced risk of infection, and ease of application, which align well with the needs of healthcare providers. These benefits can lead to shorter hospital stays, improved wound management and significant metrics in healthcare quality assessments. The introduction of a new product in a clinical setting necessitates training and integration into existing wound care protocols. Collaborations with healthcare professionals for pilot studies and training programs are essential for the adoption of our product. Furthermore, conducting economic analyses, including cost-benefit comparisons with existing wound care products, is crucial for adoption in hospitals. Demonstrating the long-term economic advantages, such as reduced recurrence of wounds and lesser need for additional treatments, can position the CollaPatch™ as a preferred choice for these institutions.

## **6. Competitors**

In this chapter, we focus on identifying competitors in the wound care market, categorising them into direct, indirect, and potential competitors. Direct competitors include those offering similar collagen-based wound care products, crucial for understanding our market position and strategy. Indirect competitors encompass a range of alternative wound care solutions like foam dressings and Negative Pressure Wound Therapy (NPWT), serving similar patient needs (Pollak, 2008). Additionally, we must consider potential competitors, who may operate outside the wound care market or perhaps have products under development and will have the capability to become direct competitors. This comprehensive analysis is essential for strategic planning and maintaining a competitive edge in the evolving wound care market.

### *6.1. Direct Competitors*

Within the chapter of direct competitors in the wound care market, we delve into the analysis of companies that directly parallel our product offerings in terms of technology and market approach. This section aims to dissect the strategies, product offerings, and market positions of firms specialising in collagen-based wound care solutions. By closely examining these competitors, we can better understand the market dynamics, identify key areas for differentiation, and sharpen our competitive edge. This analysis is crucial in framing our strategic responses and aligning our product development to effectively meet market demands.

**Human BioSciences** is recognised for its pioneering work in collagen-based wound care products, notably through their first FDA-cleared product, Kollagen™. Their product range includes various forms such as SkinTemp® II and Collatek® Gel, emphasising innovation in biocompatible and advanced healing solutions. Kollagen™ stands out for its proprietary technology that preserves the native triple helix structure of collagen, ensuring stability and effectiveness throughout all wound healing phases (Human BioSciences, 2024).

**Covalon**, another key player in this market, offers products like ColActive® Plus and ColActive® Plus-AG, which combine collagen with antimicrobial silver. Their focus is on infection control and promoting faster healing while minimising scarring. Covalon is recognised for its innovative solutions in wound care, emphasising the incorporation of antimicrobials to prevent wound infections (Covalon, 2024).

**3M Health Care** contributes to the market with its 3M™ Promogran™ Collagen Matrix with ORC, a unique blend of 45% oxidised regenerated cellulose and 55% collagen. This product, designed for sterile, freeze-dried application, aids in creating a moist wound healing environment. 3M's reputation in healthcare innovation is reflected in their approach to wound healing, which combines different materials for optimal outcomes (3M Health Care, 2024).

**L&R, Inc.** offers BIOCOL™, a bovine collagen powder that forms a gel to provide a moist wound healing environment. This product focuses on reducing inflammation and promoting cellular regeneration, highlighting L&R's emphasis on natural healing processes and the use of bovine collagen (L&R USA, 2024).

**Smith+Nephew, Inc.** distinguishes itself with the BIOSTEP\* Collagen Matrix, targeting excess Matrix Metalloproteinases in chronic wounds to optimise wound closure. Known for its high conformability and ease of application, Smith+Nephew focuses on managing chronic wounds and optimising the healing process through biochemical interventions (Smith+Nephew, 2024)

Lastly, **HARTMANN, Inc.** brings to the market ColActive® Plus Collagen Sheets and Powder, featuring fish-derived collagen and Ethylenediaminetetraacetic Acid to target elevated MMP activity. These products also incorporate alginate and carboxymethyl cellulose to maintain an optimal moisture balance, reflecting HARTMANN's commitment to advanced wound care solutions that combine collagen with other materials for enhanced healing environments (HARTMANN, 2024).

### *6.2. Indirect Competitors*

In the German wound care market, several non-collagen-based products emerge as potential substitutes for collagen-based dressings in the treatment of chronic wounds. Foam dressings are highly absorbent, ideal for wounds with heavy exudation, while hydrocolloid dressings support moist healing environments for ulcers and pressure sores (Dumville JC & Speak, 2013; Trucillo & Di Maio, 2021). Alginate dressings, made from seaweed, excel in absorbing excess fluid from heavily exuding wounds (Zhang & Zhao, 2020). Antimicrobial dressings, which may contain silver, iodine, or honey, help prevent or treat infections in chronic wounds (Lin et al., 2019). NPWT uses suction to enhance healing in complex wounds, and skin substitutes or regenerative products facilitate skin regeneration in severe cases like burns and ulcers (Pollak,

2008). Each product type offers specific advantages for different wound conditions, underscoring the importance of tailored wound care management. As our target market is mainly focused on chronic wounds such as ulcers this should be taken into consideration while analysing indirect competitors:

While **3M and Smith + Nephew** have been mentioned already, it is important to note that both companies account as direct and indirect competitors, since both companies have a wide range of products focusing on the wound care market in its entirety. 3M is a multifaceted industry corporation with a strong presence in healthcare and advanced wound care, offering a variety of high-quality wound dressings and a reputation for merging innovation with practical healthcare solutions (3M Health Care, 2024). Smith + Nephew, meanwhile, is a medical technology leader focused on advanced wound management, delivering a wide range of clinically tested products, with a strong commitment to research and development to stay at the cutting edge of the field (Smith+Nephew, 2024).

**ConvaTec** presents a diverse array of wound care solutions, catering to a wide spectrum of wound types and stages. Their innovative approach is evident in products like unique foam dressings and hydrocolloids. With a strong global market presence, ConvaTec is backed by extensive research and is renowned for its patient-centered products (ConvaTec, 2024).

**Mölnlycke Health Care** specialises in providing medical solutions, with a strong emphasis on wound care. They offer a range of products, including foam and antimicrobial dressings, tailored for effective wound management. Mölnlycke is particularly valued for its focus on quality and patient comfort, ensuring their products are both effective and gentle for wound care (Mölnlycke Health Care, 2024).

**Coloplast** focuses on developing user-friendly and efficient wound care products. Their range, including hydrocolloid and foam dressings, is designed with patient comfort and ease of use in

mind. Coloplast's products are widely used and trusted in healthcare settings around the world, reflecting their commitment to quality and innovation (Coloplast, 2024).

**B. Braun** offers a wide range of healthcare solutions, with wound care being a significant part of their portfolio. Their offerings include various types of dressings and skin care products, known for their quality and efficacy. The company is committed to patient care and safety, focusing on providing reliable and effective wound management options (B. Braun, 2024).

### *6.3. Potential Competitors*

In the evolving landscape of advanced wound care, identifying the most formidable competitors for our product requires a focus on companies that are pioneering in biocompatible materials and regenerative properties. While there are a lot of ideas and companies forming around advanced wound care, it is important to note that many are focusing on other elements such as new technologies for early-stage diagnosis, innovative therapies to find the right treatment for every stage, surgical aids, and wound protection. Determining the top five closest competitors to our CollaPatch™ involves considering companies that are innovating in the area of advanced wound dressings, particularly those focusing on biocompatible materials and regenerative properties. Leading the charge is **Organogenesis**, a company known for its innovative use of living cells and naturally occurring materials in products such as Apligraf and Dermagraft. Their dedication to regenerative medicine aligns closely with the biocompatible aspect of jellyfish collagen (Organogenesis, 2024).

Another notable player is **MiMedx**, which specialises in regenerative biomaterials. Their product, EpiCord Expandable, derived from the umbilical cord, mirrors the natural and regenerative properties of a collagen wound patch. Their focus on biologically active wound care solutions earmarks them as another potential competitor (MiMedx, 2024).

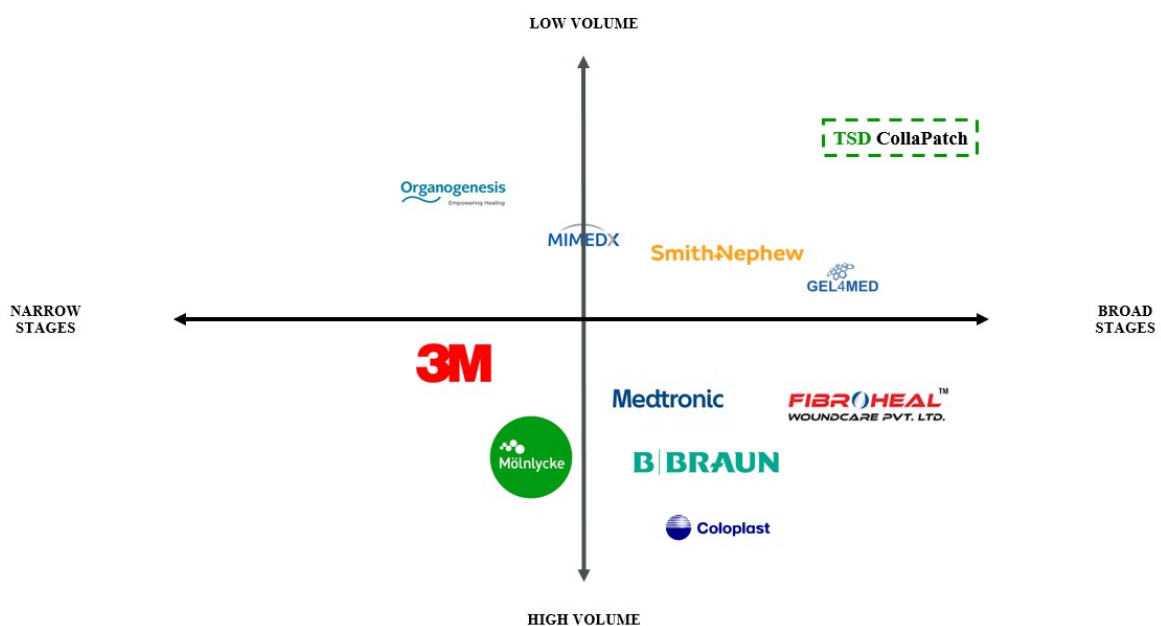
**Fibroheal Woundcare's** use of silk proteins as biomaterials for active wound management, including dressings and gels that promote tissue regeneration, draws a parallel to the natural

and healing-oriented approach of jellyfish collagen. This focus on biomaterials for tissue regeneration places them in the realm of direct competition (Fibroheal, 2024).

Similarly, **RenovoDerm's** approach, particularly with their Phoenix Wound Matrix that leverages 3D scaffold technology for in-situ tissue regeneration, reflects the regenerative aspect of jellyfish collagen patches (RenovoDerm, 2024). Lastly, **Gel4Med's** development of advanced biomaterials, such as G4Derm and G4Derm Plus, which aim to mimic the extracellular matrix and provide antibacterial barriers, is akin to the natural healing facilitation offered by jellyfish collagen. Their emphasis on biomimicry and wound healing efficacy aligns them closely as a competitor (Gel4Med, 2024).

#### 6.4. Competitive Advantage

Based on the perceptual map shown in figure 5, direct-, indirect- and potential- competitors are visualised on the following parameters, firstly, the breadth of application in terms of wound healing stages (x-axis) and the volume of product usage (y-axis). This mapping aids in visualising the competitive landscape, direct- and indirect- competitors, and potential market entrants in order to understand where to position ourselves relative to others in terms of product versatility and usage frequency.



*Figure 1: Perceptual Map*

On the x-axis, we have "Narrow Stages" on the left and "Broad Stages" on the right, which indicates whether the companies' products are specialised for specific stages of wound healing or can be used across multiple stages. For instance, companies placed towards the "Narrow Stages" end would have products designed for a particular phase of wound healing, whereas those towards "Broad Stages" provide solutions that cover a range of healing stages. On the y-axis, "Low Volume" at the top indicates companies whose products require a smaller amount or less frequent application. "High Volume" at the bottom signifies companies whose products are used in larger quantities or more frequently. Quick breakdown of the competition:

- **Mölnlycke:** Positioned centrally on the x-axis but lower on the y-axis, suggesting that their products have a moderate range of applications in wound healing stages and require a high volume of product usage.
- **Medtronic, B. Braun, and Coloplast:** These companies are centred on the x-axis, which means their products are likely versatile across different wound healing stages. They are placed variably on the y-axis, with Coloplast notably lower, implying higher volume use.
- **3M:** Located at the origin, suggesting an average application range and volume usage.
- **Organogenesis and MiMedx:** These companies are towards the "Low Volume" and "Narrow Stages" quadrant, indicating specialised, infrequently used products.
- **Smith&Nephew and GEL4MED:** These are positioned towards the "Broad Stages" but still closer to the centre on the y-axis, suggesting a wide range of application with moderate volume usage.
- **FIBRHEAL:** Found on the far right, close to the "High Volume" on the y-axis, indicating that their products are used across all stages and in higher quantities.

TSDs CollaPatch™ is strategically positioning itself in the market with its type 0 collagen solution, which is versatile enough to be used across all stages of wound healing without requiring modification for different phases. Wound patches can be worn for a duration of 5-8 days, as the CollaPatch™ effectively shortens the healing time for chronic wounds, this can significantly reduce the frequency of application. The following attributes provide a competitive advantage over other existing products within the Market:

- **Enhanced Tissue Regeneration – Effectiveness:** Unlike our direct competitors whose products are mainly based on mammalian collagens sources, that often induce inflammation, the CollaPatch™ promotes tissue regeneration. This is attributed to its ability to modulate macrophage responses—decreasing the M1 macrophages which are pro-inflammatory and increasing the M2 macrophages which aid in tissue repair. Utilising this technology, it has been reported that the healing process in chronic wounds can be accelerated by up to 80% compared to untreated wounds and much better chances of closing chronic wounds compared to those treated with products derived from bovine collagen sources (Spragg et al., 2020). This finding was underlined by another study that focused on the physiological mechanisms of healing in chronic diabetic wounds (Sumiyoshi et al., 2021).
- **Biocompatibility and Ancestral Simplicity:** The CollaPatch™ is inherently biocompatible with human tissues due to its simpler chemical structure, which is ancestrally more ancient than any other collagen source. Resulting in far less adverse reactions such as inflammation. This simplicity allows for better integration and less complexity in interaction with human tissues (Khong et al., 2018).
- **Safety & Allergy free:** The CollaPatch™ does not cause allergic reactions, offering an advantage over most mammalian collagens which can induce such responses, furthermore it lacks the risk of transmitting diseases such as bovine spongiform

- encephalopathy, which are typical concerns with mammalian collagen sources (Spragg et al., 2020).
- **Multi-phase Efficacy:** The CollaPatch™ acts as a universal scaffold, effectively fulfilling the roles of various collagen types needed across different healing phases, from hemostasis to remodelling. It supports essential processes like fibroblast recruitment and angiogenesis, key to tissue regeneration (Khong et al., 2018).
- **Modulation of MMP Activity:** The CollaPatch™ modulates MMP activity. This is crucial during the remodelling phase of healing, thus improving the aesthetic and functional quality of healed tissue and reducing scarring (Salvatore et al., 2020).

As TSD we offer a revolutionary approach to chronic wound management. Unlike traditional treatments that may induce inflammation or fail to integrate seamlessly with human tissues, our CollaPatch™ minimises inflammation and enhance natural healing processes through a favourable macrophage response. This leads to much faster, safer, and more reliable healing outcomes with reduced scarring. Moreover, our sourcing from sustainably managed jellyfish populations ensures an environmentally responsible choice, aligning with modern healthcare's move towards sustainable medical products. This combination of clinical efficacy, patient comfort, and environmental sustainability sets our jellyfish collagen patches apart in the competitive landscape of wound care products.

## 7. Business Concept

With TSD, our strategy for the CollaPatch™ is to leverage strategic partnerships and benefit from the robust capabilities of larger companies. Central to our approach is our collaboration with Jellagen, which secures a steady supply of high-quality jellyfish derived collagen, which is critical to the efficacy of the product. After taking the CollaPatch™ through the essential development and clinical trial phases, we aim to position ourselves strategically for an acquisition by an established pharmaceutical company as an attractive investment. This

approach enhances market readiness and sets the stage for a successful strategic exit, effectively leveraging the strengths of industry leaders to manage complex market launches and regulatory landscapes. Therefore, the following examines the process of generating income with our Business Model, provides an overview of the steps of the value chain that we will directly target on our path as well as the key resources and partnerships necessary.

### *7.1. Company Rational*

We are strategically choosing not to commercialise our innovative CollaPatch™ independently. Instead, the overall goal is to advance the product through the critical development and clinical trials stages, beyond the efficacy trials of clinical trial phase II, and prepare it for an acquisition by a larger pharmaceutical company. This strategy leverages the strengths of larger companies in the management of the complexities of market launches and distribution, thereby maximising the commercial viability of the product. Moreover, it makes use of their financial resources to go through the clinical trial phase III and approval process. It also reduces the risk of failure of pharmaceutical companies of going through the product development process independently (Markan, 2021).

As highlighted in recent industry analyses, it is becoming increasingly common for biotech companies to form strategic partnerships early in their development process, which significantly increases their chances of success by providing access to critical resources and expertise that may not be available internally (Fujiwara, 2014). For TSD, a strategic partnership with Jellagen, the research lab that discovered the advancements of jellyfish derived collagen, is envisaged as a key component of our development strategy for the CollaPatch™, where Jellagen will serve as the source of collagen for our innovative patch. This collaboration is essential to ensure a high quality and sustainable source of collagen, which is critical to the efficacy and reliability of CollaPatch™. A more detailed view on the partnership with Jellagen is provided in Chapter 7.3.

In addition to the collaboration with Jellagen, we plan to engage early on with companies that represent potential exit options, either as a source of early-stage funding or as a supplier of other necessary materials for our patch. Thereby, it's not uncommon for an early partner to acquire the company later on (Fernald et al., 2015). These strategic alliances are critical to accelerating product development and laying the groundwork for a successful exit. By establishing these relationships early, we aim to ensure that our processes are streamlined and aligned with the structures of future acquirers, as well as to benefit from their industry knowledge (Slowinski et al., 1993). Therefore, we seek for early partnerships with industry leaders such as Coloplast or 3M Health Care, known for their expertise in medical devices and services, particularly in wound care and continence management. A detailed analysis of potential acquirers is presented in Chapter 12.2, with a comprehensive evaluation provided in Appendix Z.

With the aim of an early exit after clinical trial phase II, it will be important to secure robust legal and commercial protection for the CollaPatch™, as this also includes the added value we provide to the future acquirer. Through careful IP management strategies, including patent filings and strategic evergreening, TSD will build a strong legal framework that significantly enhances the asset's market appeal (see Chapter 8.2). These protections not only safeguard TSD's innovations, but also increase the value of the asset and position it attractively in the competitive healthcare market (Fernandez & Chow, 2005).

Although TSD's preferred exit scenario is clearly defined, if interest from potential acquirers does not meet expectations, we need to shift our strategy to other options such as licensing our recipe. This alternative approach would involve granting another company the rights to manufacture and distribute the CollaPatch™, allowing TSD to generate revenue and achieve market penetration without direct commercial involvement.

The various strategic routes that TSD may pursue to optimise the return on its investment in case of a different exit scenario are explored in more detail in Chapter 12.2 'Exit Options'.

## 7.2. Value Chain

Our innovative product, the CollaPatch™, is set to revolutionise wound healing through a carefully planned value chain, which includes several critical phases: raw material sourcing, product development, testing and strategic exit. To secure the key raw material, type 0 collagen, we will partner with Jellagen, which specialises in the extraction and purification process (see Chapter 7.3). This collaboration will enable us to purchase high quality purified type 0 collagen, ensuring a steady and reliable supply for our product development. Here we already outreached to Thomas-Paul Descamps the CEO of Jellagen.

Eliminating the harvesting and extraction of the jellyfish shifts our starting point directly to prototype development of our CollaPatch™ (as shown in Figure 5). This involves careful consideration of various factors such as size, thickness, flexibility and biocompatibility. Prototypes are developed and iteratively refined to ensure that the patches adhere properly to the skin and effectively promote wound healing (Baur et al., 2021).

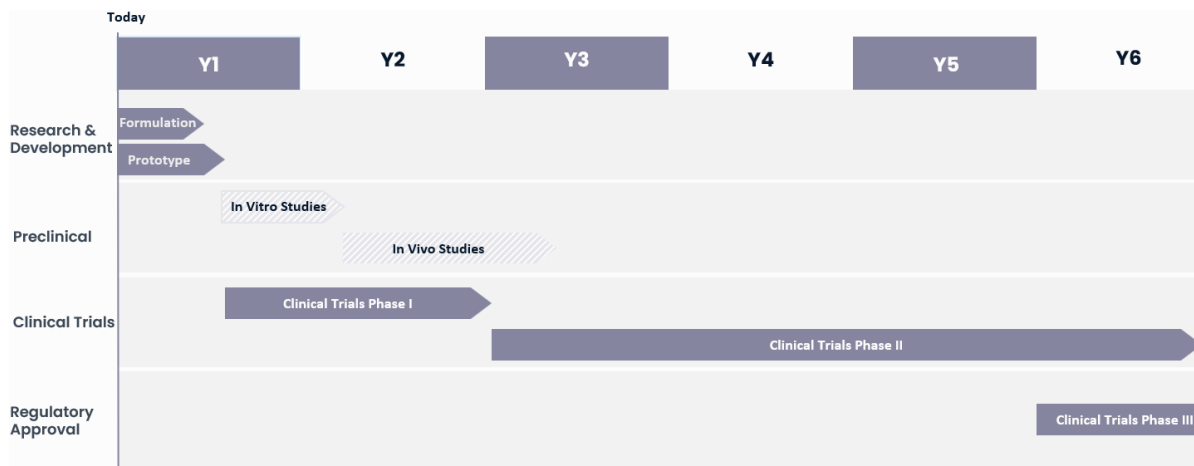


Figure 2: Product Development Roadmap

Once the prototype has been successfully constructed, the conventional pathway would dictate that it be submitted for preclinical testing, an essential phase involving thorough evaluations to determine biocompatibility and cell growth promoting capabilities, which are fundamental to effective wound healing. Typically, promising in vitro results would lead to subsequent in vivo studies using animal models to gather comprehensive data on the efficacy, safety, immune

response and potential side effects of the CollaPatch™ (Rick, 2008). However, Jellagen's extensive prior research allows us to bypass some of these stages and move directly into clinical trials. Jellagen has already conducted both in vitro and in vivo studies that have thoroughly investigated the effects and importance of type 0 collagen in wound healing (Spragg et al., 2020). This advanced groundwork streamlines our development process and enables a more expedient progression to clinical trials (Rahmani & Dahaghin, 2023).

The clinical trial phase for the CollaPatch™, which is estimated to take approximately 7-9 years, is divided into several distinct phases. Phase I studies, lasting from several months to two years, focus on safety. They involve a small cohort of volunteers to establish safe dose ranges and identify potential side effects. Phase II trials, which last 1-4 years, involve a larger number of participants. The aim is to rigorously assess both the efficacy and safety of the patch, and to benchmark its performance against existing standard of care (Wright, 2017).

Our strategic exit is planned after the completion of phase II clinical trials. At that time, we will actively seek to attract potential acquirers, in order to increase market awareness and position ourselves as an attractive acquisition target. Therefore, we will complement our previous established relationships, by actively participate in key industry events such as the MedTech Conference and engage in targeted networking through relevant associations.

Following our exit, the subsequent stages of the value chain will be managed by the acquiring company. These phases include phase III clinical trials, regulatory compliance, manufacturing and commercialisation. Phase III trials, which typically last 2-4 years, involve an even larger number of participants. The aim of these trials is to further evaluate the efficacy and safety of the CollaPatch™ and to compare its performance with existing treatments on a larger scale.

After successful phase III clinical trials, the acquiring company will need to seek regulatory approval, a process that typically takes 1-2 years. This phase involves compiling research data, manufacturing protocols and clinical trial results (Healy & Kaitin, 1999) and submitting them

to authorities such as the Food and Drug Administration (FDA) or the European Medicines Agency (EMA). The submission is thoroughly reviewed to ensure that the product meets all safety and efficacy standards before it is approved for medical use (Marshall et al., 2021).

Once regulatory approval is secured, the acquiring company will proceed to large-scale manufacturing, including rigorous quality control to maintain consistent quality per regulatory standards. This process transforms jellyfish collagen into a ready-for-use medical product, blending scientific innovation, testing, and compliance.

As a final steps in the value chain the acquiring company will incorporate a comprehensive go-to-market strategy, which includes sourcing suppliers, managing manufacturing quality control, and overseeing logistics and distribution to healthcare facilities. Sales and management strategies will be developed to integrate the product into existing care pathways and monitor patient feedback. These steps ensure that the CollaPatch™ is effectively positioned for successful market entry and a strong presence in the healthcare sector.

### *7.3. Key Partnerships & Resources*

To ensure the successful development and strategic exit of TSD after phase II clinical trials, the prioritisation of key resources and the establishment of strategic partnerships are critical, designed to support the progression of the project from concept through development and strategic exit.

As already introduced earlier, a key partner in our project will be **Jellagen**, which specialises in the extraction and purification of type 0 collagen from jellyfish. Founded in 2015 and based in the UK, Jellagen has mastered proprietary techniques to sustainably harvest jellyfish and extract high-quality collagen, primarily sourced from the species *Rhizostoma pulmo* which is abundant in UK and EU waters, for medical and research purposes. Their rigorous in vitro and in vivo studies validate the efficacy and safety of their jellyfish-derived collagen over traditional mammalian sources (see Appendix A). This partnership not only provides a reliable source of

key raw materials, but also enhances the credibility and safety profile, as well as the product development duration of our product. Details of this collaboration, including negotiations for the larger scale sourcing required for commercial production, remain to be discussed.

Access to **state-of-the-art laboratory facilities** is essential to the development of TSD. These facilities serve as hubs for our intensive research and development activities and are equipped with the tools and environment necessary to conduct high-level biotechnology work. We plan to partner with CROs such as **Charles River Laboratories**, renowned for their comprehensive support of the pharmaceutical, biotechnology and medical device industries. Charles River Laboratories' facilities are not only equipped with the advanced bioprocessing tools and analytical instruments essential for the detailed analysis and quality control of biomedical materials such as collagen, but also comply with global regulatory standards.

Another key resource essential for supporting the extensive research, development and clinical trials required for TSD is **the funding** structure. The specifics of potential funding sources and strategic funding plans are detailed in Chapter 11.2. In addition, the specific needs arising from the development and research costs that drive these funding requirements are discussed in detail in Chapter 10.1. Contacts with venture capitalists and angel investors specialising in biotechnology and healthcare innovation are essential to secure the capital required to move the project forward.

The recruitment and retention of high calibre biochemists, **biomedical engineers, and technical staff** will be discussed in Chapter 9, and are critical to the innovative development and implementation of the CollaPatch™. The success of our product depends on the skills, creativity, and continuous professional development of our team. This means not only recruiting the best talent in the field, but also investing in ongoing training and development to ensure they remain at the forefront of biotechnological advances.

Furthermore, we plan to work with healthcare professionals and regulators, including the **European Medicines Agency**, to ensure that the CollaPatch™ is developed in compliance with health regulations and meets the practical needs of patients and healthcare providers. These collaborations are expected to facilitate regulatory approvals and increase the uptake of our product through public health programmes.

Additionally, further partnerships, such as with the **Instituto Português do Mar e da Atmosfera (IPMA)** through their GelAvista program, offer strategic benefits by providing potential alternative sourcing opportunities for raw materials. This partnership can offer insights into future vertical integration, potentially enhancing our supply chain resilience.

## 11. Funding

Navigating the venture capital (VC) landscape has become increasingly challenging for pharmaceutical start-ups such as TSD. This difficulty is due to a complex set of factors, including changing investment criteria, evolving technology trends and a less favourable economic environment. The current VC landscape is affected by rising interest rates, which make other forms of investment more attractive due to their lower risk. This shift in the investment environment has led to a more selective VC market, focusing on high-potential startups while avoiding riskier ventures (Siddiqui et al., 2020).

In addition, pharmaceutical start-ups face significant hurdles when trying to secure VC funding, often related to the high upfront investment requirements to bring a new product to market (Kang, 2018). Given these challenges, in this chapter we include certain incentives to attract our target investors to effectively navigate TSD through the fundraising process in the current VC landscape. This chapter outlines TSD's funding requirements, identifies potential sources of funding and discusses equity distribution, highlighting the impact of different funding rounds on shareholder dilution through a capitalisation table.

### 11.1. *Funding Need*

The funding requirements for TSD have been calculated based on the costs outlined in Chapter 10.1 and the P&L statement presented in Chapter 10.2. From this analysis we have identified a total funding requirement of €18,774,000 to sustain our business until the strategically planned exit at the end of phase II clinical trials. Our strategy is to raise this capital through three distinct rounds of funding from Seed to Series B. These rounds are structured around key milestones in the company's progress, allowing us to target VCs with specific investment focuses, ensuring optimal targeting and maximising investment opportunities.

It is common practice for start-up funding to include a 30% contingency to ensure adequate reserves to meet unexpected challenges. This practice is crucial in the start-up environment due

to the inherent uncertainties and unpredictability. However, exceeding the 30% markup is generally discouraged as it can lead to inflated valuations that may deter potential investors or result in excessive dilution of existing shareholders (Giakoumelou et al., 2023). To comply with industry standards and maintain investor confidence, we also apply the standard 30% mark-up, rounding up to the nearest €100,000, resulting in the following funding requirements:



*Figure 3: Funding Need Projection*

Seed funding of €1.2 million in early 2025 will be used for prototyping and building the infrastructure required for subsequent clinical trials. The Series A funding requirement of €4.6 million at the beginning of 2026 will be used to conduct phase I safety trials to ensure the product is safe for human use.

Finally, the Series B financing requirement of €19.7 million starting 2028 will cover the costs of phase II efficacy trials to demonstrate that the product achieves the desired clinical outcomes.

## 11.2. Funding Sources

Identifying and securing the right investors is one of the most challenging aspects of funding for any startup. The competitive landscape and varying investment criteria result in a low success rate, with studies suggesting that only around 1% of startups succeed in raising venture capital (CBINSIGHT, 2018). To effectively address this challenge, it is critical to understand investor expectations and tailor funding strategies accordingly. At TSD, we recognise that

aligning our goals with investors' requirements is essential to attracting the right partners. We have therefore analysed investors for attributes such as sector focus, ticket size, strategic alignment with our product and, amongst other things, investment stage in their current fund generation to see if they are currently investing. Once a prominent investor is secured, the likelihood of attracting follow-on investors increases significantly, as this creates a lighthouse effect that helps attract additional investors (Fung et al., 2017). This strategic alignment improves the chances of successfully securing funding by ensuring that we only engage with investors who are best suited to our goals, including their perspective. The investors mentioned within the next paragraph represent targeted prospects that have the characteristics we seek at each funding stage. They are examples rather than definitive choices and we remain open to alternative investors who bring similar qualities. A comprehensive list of evaluation criteria can be found in Appendix T.

To complement our funding strategy, we will also plan with €200,000 in government grants as non-dilutive funding, which refers to capital that doesn't require the surrender of equity. These grants allow start-ups to raise valuable funds without diluting ownership or compromising control. Notable grants include the EXIST start-up grant, which supports innovative technology start-ups in Germany (EXIST, 2024). In addition, the ZIM (Zentrales Innovationsprogramm Mittelstand) grant (ZIM, 2024), and the KMU-innovative programme (KMU, 2024), which provide funding opportunities for small and medium-sized enterprises in the healthcare sector, are highly relevant to our product focus.

For the seed round, we have identified SHS as the most suitable investor due to its sector focus on healthcare and life sciences start-ups (SHS, 2018). We plan to approach SHS with a tranche-based funding structure. This means that only a portion of the investment will be provided upfront, with subsequent tranches paid out upon the achievement of pre-defined milestones, such as the selection and negotiation of clinical trial sites or the hiring of key personnel.

Tranching is a common strategy for attracting investors at the seed stage, providing a degree of risk mitigation while ensuring that start-ups remain incentivised to achieve critical development milestones (Bigus, 2006). This staged funding approach will help us secure SHS as a lighthouse investor, with the primary purpose of signalling credibility to future investors (Gompers & Lerner, 2001).

For the Series A and B, we plan to approach Earlybird Health Tech and the Boehringer Ingelheim Venture Fund (BIVF). Earlybird focuses on early-stage investments in healthcare startups, particularly in the areas of digital health, diagnostics, and medical devices (Earlybird, 2024). Their strategic guidance and networks will be invaluable as we progress through phase I clinical trials. For the Series B round, BIVF's expertise in regenerative medicine aligns perfectly with our needs for phase II efficacy trials (BIVF, 2024). Their strategic advice and extensive network will be critical to our growth and to accelerating the regulatory process with their support. Both Earlybird and BIVF frequently lead or co-invest in financing rounds ranging from €1 million to €15 million, making them ideal partners.

By tailoring our financing strategy to the investment criteria of each investor group and using milestone-based tranches, we can secure sufficient capital to progress through clinical trials while minimising dilution and aligning investor incentives with our development goals.

### *11.3. Capitalisation Tables*

Appendix Y provides a detailed overview of TSD's ownership structure and dilution over successive funding rounds, highlighting the evolution of founders' and investors' equity stakes. The capitalisation tables capture key data on pre- and post-money valuations, share price changes and investor contributions. For simplicity, we have not included anti-dilution rights or preferred share rights. In addition, we have based our pre-money valuations on comparable seed financings within the biotechnology industry (Walter, 2024).

At the start of the seed round (Tranche 1), TSD's co-founders each will hold 23.3% of the equity, Dr Gonçalo Costa 2%, and 5% of the shares get allocated to both the Board Share Option Pool (BSOP) and the Employee Share Option Pool (ESOP). SHS Capital will initially lead the investment with a significant contribution, securing a 18% stake. As funding progresses through the Seed Tranche 2 and Series A rounds, the co-founders' collective equity stake will decrease due to dilution from new investments.

By the final Series B round, the individual shares of the founders will be diluted over 13.1% to finally 6.9%, reflecting the influx of large venture capital investments. The Boehringer Ingelheim Venture Fund becoming a lead investor in the Series B round by securing a significant equity stake of 24 % for a € 10 million investment. Despite the dilution, the funding strategy will ensure that resources are aligned with each development milestone, providing the necessary financial support for TSD to complete phase II clinical trials.

## **12. Exit**

This chapter provides a comprehensive analysis of the forecasted valuation and exit strategies for our biotechnology product. However, as there remains an inherent risk at that time, we include a proposal for a final sales price. While our preferred exit strategy still stays an acquisition by a strategic buyer, we also analyse alternatives such as an IPO, licensing agreements or strategic partnerships to maximise shareholder value and ensure a successful market entry of the CollaPatch™.

### *12.1. Exit Options*

Our preferred strategy is to be acquired by a strategic acquirer who can effectively integrate and advance our lead product, the CollaPatch™, beyond phase II of the clinical trials into successful commercialisation. We plan to engage early with potential acquirers to gauge their interest. They have been carefully assessed for strategic fit, market capability and resource availability, as well as the option to utilise existing relationships for initial discussions. A

comprehensive list of potential acquirers and their evaluation is provided in Appendix Z, which provides a detailed assessment of each candidate's suitability to acquire TSD, considering factors such as current market focus, R&D synergies, and distribution strengths.

In our view, the most suitable acquirers include **Johnson & Johnson, Coloplast, 3M** and **Boehringer Ingelheim**. Their extensive expertise in healthcare and medical technology, coupled with their established market presence and distribution networks, make them ideal candidates (see Appendix Z).

Should an M&A transaction not materialise, there are several alternative exit strategies:

- **IPO:** Pursuing an IPO would allow us to raise significant capital to support ongoing R&D and commercialisation efforts. This approach would be highly dependent on market conditions and investor interest as well as the financial backing necessary to bring TSD to market independently.
- **Licensing agreements:** Licensing out the CollaPatch™ recipe could provide a steady revenue stream through upfront, milestone and royalty payments. This strategy would leverage the manufacturing, marketing, and distribution strengths of more established pharmaceutical companies, allowing us to capitalise on our innovation while minimising the financial burden of extensive market entry.
- **Strategic partnerships:** Entering strategic partnerships or joint ventures could provide critical support in areas such as clinical development, regulatory navigation, and market entry strategies. These partnerships could include co-development arrangements that not only spread financial and operational risks, but also enhance development capabilities through shared expertise and resources.

Each alternative exit strategy offers a different way to realise the potential of TSD, providing flexibility in our approach to maximise shareholder value and ensure the successful deployment of our innovative wound care technology in the healthcare market.

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## **Limitations & Assumptions**

Our startup, TSD, aims to provide innovative jellyfish collagen wound patches. However, our research and business plan are based on several assumptions and face significant limitations inherent in the biotech industry. This industry is characterised by high uncertainty, with rapid technological advancements, regulatory changes, and volatile market dynamics potentially affecting our project's trajectory. Our business model relies heavily on strategic partnerships, particularly with Jellagen for high-quality jellyfish collagen and other research institutions for clinical trials. The success of TSD is contingent on the stability and effectiveness of these partnerships, which can be influenced by changes in our partners' priorities or external conditions. The pathway to market approval for our CollaPatch™ involves multiple stages of clinical trials, each fraught with high risks and uncertainties. Delays or failures at any stage could significantly impact our timelines and costs. Even with successful trials, market adoption and profitability are not guaranteed. Our estimated timeframes, costs, and development periods, though meticulously researched, are subject to variability due to potential regulatory delays, unforeseen scientific challenges, and shifting market conditions. Similarly, market size estimates and penetration rates are based on current healthcare trends and market research but can fluctuate due to changes in demand, competitive landscape, and healthcare policies. Valuations of biotech startups like TSD can vary widely among investors due to differing risk appetites and market conditions. Our financial projections, though based on comprehensive models, may not align with investor perceptions at the time of fundraising.

Despite reaching out to various companies through LinkedIn, websites, emails, and referrals from friends and family, we encountered numerous denials and non-responses, which hindered the validation of our assumptions. Nevertheless, we made every effort to build the strongest case possible with the resources available to us.

## **Acknowledgments**

While working on this project, we gained a lot of knowledge and insights through conversations with professionals and experts in the pharmaceutical and medical field. The following people deserve our sincere gratitude for their insightful comments and efforts, which have greatly enhanced our thesis:

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- Ulrich Lückenbach - Health Economist, Expert for German Market
- Dr. Martin Walter - Head of Patient Engagement, Access & Healthcare Affairs at Boehringer Ingelheim
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- Karin Lückenbach - Pharmacist
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- Nuno Arantes-Oliveira - Founder and Partner of Clinical Research Ventures & Invited Associate Professor at Nova School of Business and Economics
- Richard Gartmann – Biochemist, Bruker Corporation, Analytical Solutions
- Dr. Karin Wertz, Head of Global Research, DSM

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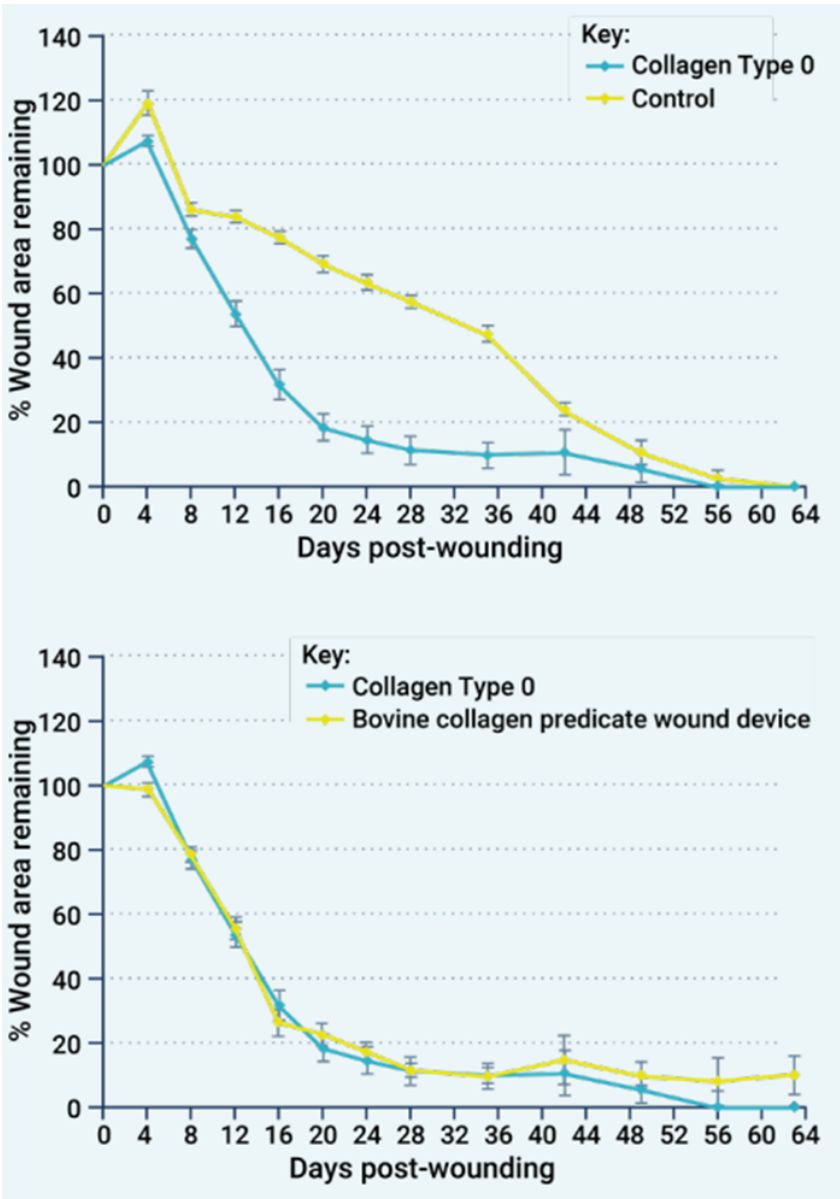
## List of Abbreviations

AdvaMed	Advanced Medical Technology Association
API	Application Programming Interface
BIVF	Boehringer Ingelheim Venture Fund
BSOP	Board Share Option Pool
CAGR	Compound Annual Growth Rate
CAD	Computer-Aided Design
CEO	Chief Executive Officer
CFO	Chief Financial Officer
COO	Chief Operating Officer
CROs	Contract Research Organisations
CSO	Chief Scientific Officer
DCF	Discounted Cash Flow
DPMA	German Patent and Trademark Office
DRG	Diagnoses Related Groups
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortisation
ECM	Extracellular Matrix
EMA	European Medicines Agency
EPO	European Patent Office
ESOP	Employee Share Option Pool
EV	Enterprise Value
FDA	Food and Drug Administration
GMP	Good Manufacturing Practices
IMAA	Institute for Mergers, Acquisitions, and Alliances
IP	Intellectual Property

IPMA	Instituto Português do Mar e da Atmosfera
IPO	Initial Public Offering
LOA	Likelihood of Approval
LPS	Lipopolysaccharide
M&A	Mergers and Acquisitions
MMP	Matrix Metalloproteinase
NPWT	Negative Pressure Wound Therapy
NUB	New Examination and Treatment Method
P&L	Profit and Loss
PCT	Patent Cooperation Treaty
PEG	Polyethylene Glycol
PCR	Polymerase Chain Reaction
P/E	Price-to-Earnings
PPC	Porcine Pericardium Collagen
POS	Probability of Success
rNPV	Risk-Adjusted Net Present Value
R&D	Research & Development
SMEs	Small and Medium-Sized Businesses
TIMPs	Tissue-Derived Inhibitors of Metalloproteinases
VC	Venture Capital
WACC	Weighted Average Cost of Capital

Appendix

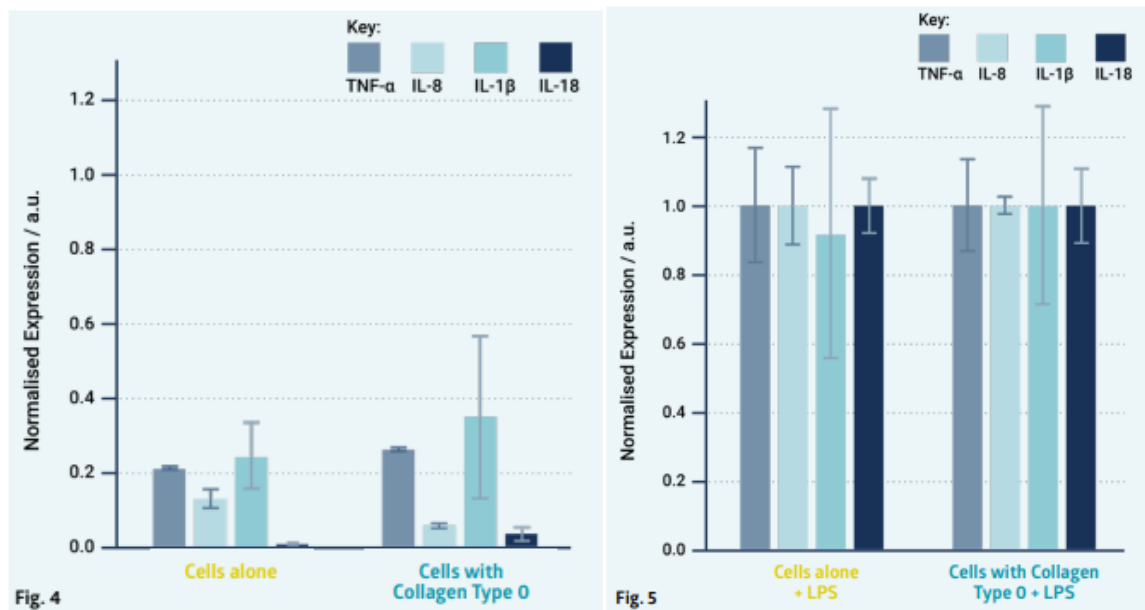
Appendix A: Key Results In Vitro – In Vivo Studies Jellagen



Wound closure

Wounds treated with collagen type 0 achieved 80% closure more rapidly than those untreated, taking less than 20 days compared to 44 days. The bovine collagen predicates wound device produced similar initial outcomes. However, it exhibited considerable variability and suboptimal performance during the final 20% of closure, with numerous wounds failing to close

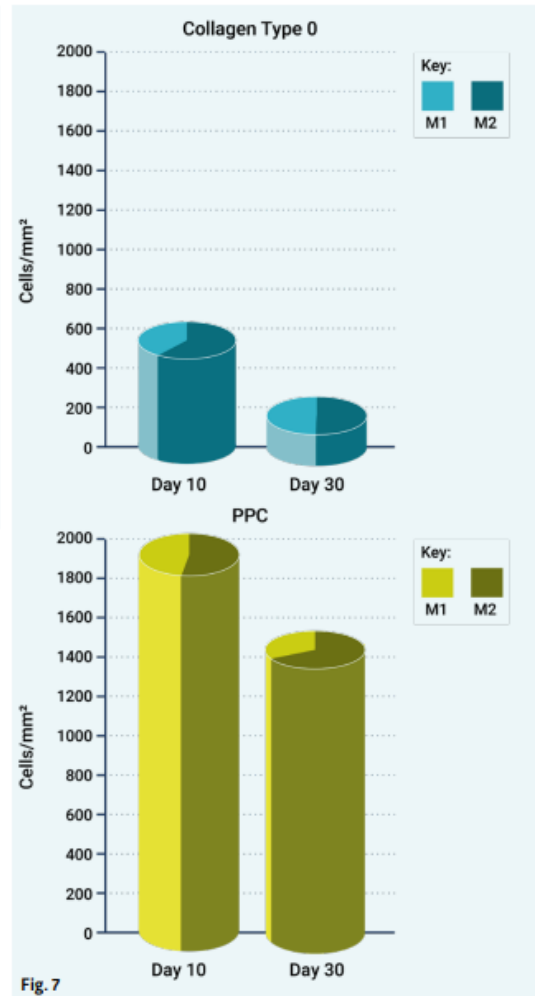
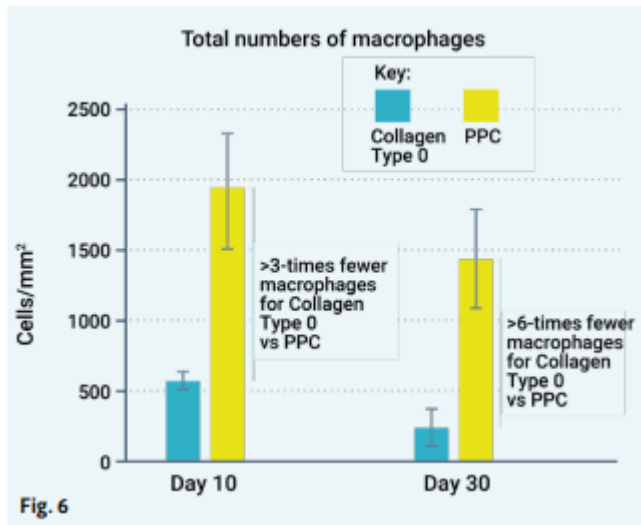
entirely. In contrast, collagen type 0 demonstrated superior uniformity and achieved complete wound closure.



This in vitro study evaluated the effect of jellyfish collagen type 0 on differentiated THP-1 cells, which are associated with wound development. Previous research indicated that collagen extracted from another jellyfish species (*Nemopilema nomurai*) may stimulate the secretion of pro-inflammatory cytokines (TNF- $\alpha$  and IL-6). Consequently, we aimed to determine whether collagen type 0 from *R. pulmo* would elicit a similar or different response.

Inflammatory cytokine secretion: The secretion of TNF- $\alpha$ , along with other inflammation-associated cytokines (IL-8, IL-1 $\beta$ , and IL-18), was assessed in differentiated THP-1 cells both alone and in the presence of collagen type 0. The results showed that collagen type 0 did not induce significant changes in the secretion of pro-inflammatory cytokines (Fig. 4).

Additionally, differentiated THP-1 cells, both alone and with collagen type 0, were exposed to lipopolysaccharide (LPS), a major component of gram-negative bacteria known to trigger an inflammatory immune response. LPS exposure resulted in a pronounced inflammatory response; however, the presence of collagen type 0 did not modify this response in any way (Fig. 5).



collagen type 0 elicits a weaker immune tissue response compared to porcine pericardium collagen (PPC), indicating its biocompatibility. The macrophage balance reveals that collagen type 0 promotes tissue repair, characterised by M2 macrophages, early in the wound healing process, rather than inflammation, characterised by M1 macrophages. In contrast, tissue repair is only stimulated by PPC at later stages of wound healing.

Source: (Spragg et al., 2020)

## Appendix B: Evaluation of Open Customer Preference Survey

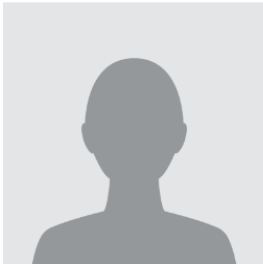
Participant	Age	Most Important Feature of Wound Dressing	Category
P1	22	-Conforms to body contours - Comfortable	Comfort
P2	27	- Easy to change - Minimal irritation	Ease of Use
P3	24	- Effective in wet conditions	Durability
P4	26	- Subtle appearance	Aesthetic
P5	23	- Seamless fit - Enhances mobility	Comfort
P6	25	- Easy application - Painless removal	Ease of Use
P7	28	- Breathable - Prevents moisture buildup	Others
P8	21	- Maintains flexibility	Comfort
P9	29	- Water resistant	Durability
P10	20	- Discreet design	Aesthetic
P11	27	- Prioritizes comfort	Comfort
P12	24	- Simple to handle	Ease of Use
P13	30	- Allows skin to breathe	Others
P14	28	- Adapts to body movements	Comfort
P15	26	- Waterproof	Durability
P16	38	- Aesthetic doesn't attract attention	Aesthetic
P17	42	- Gentle on skin	Others
P18	45	- Conforms closely to body	Comfort
P19	50	- Keeps wound dry	Others
P20	54	- Blends with appearance	Aesthetic
P21	58	- Sticks well without discomfort	Ease of Use
P22	62	- No skin irritation	Others
P23	65	- Flexible without constraint	Comfort
P24	67	- Avoids moisture under dressing	Others
P25	29	- Secure adhesive - No pain when removing	Ease of Use
P26	28	- Matches skin tone	Aesthetic
P27	26	- Durable in moist environments	Durability
P28	30	- Stays functional in showers	Durability
P29	24	- Low profile and effective	Aesthetic
P30	22	- Adapts well to body contours	Comfort
P31	25	- Invisible but functional	Aesthetic
P32	23	- Practical and discreet	Aesthetic
P33	27	- Promotes breathability	Others

## Appendix C: Market Size Wound Healing – avg. Market Share and Penetration of TSD

Market Size Wound Healing in Germany - average Market Share TSD in Estimated Revenues												
CAGR:	5,90%											
	(in billion \$)											
	Years on Market	2023	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Global Wound Healing Market		21,5	45,30	47,97	50,80	53,80	56,97	60,33	63,89	67,66	71,66	75,88
Market Share US		8	16,86	17,85	18,90	20,02	21,20	22,45	23,77	25,18	26,66	28,24
Rest Market Share		13,5	28,44	30,12	31,90	33,78	35,77	37,88	40,12	42,49	44,99	47,65
Europe*		5,38	11,32	11,99	12,70	13,45	14,24	15,08	15,97	16,92	17,91	18,97
Germany		1,61	3,40	3,60	3,81	4,03	4,27	4,53	4,79	5,07	5,37	5,69
Chronic Wounds		1,13	2,38	2,52	2,67	2,82	2,99	3,17	3,35	3,55	3,76	3,98
Acute Wounds		0,48	1,02	1,08	1,14	1,21	1,28	1,36	1,44	1,52	1,61	1,71
	(in million \$)	Year 1-3			Year 4-7			Year 8-10				
	Penetration Rate	Best Case	Base Case	Worst Case	Best Case	Base Case	Worst Case	Best Case	Base Case	Worst Case		
		7%	4%	1%	10%	8%	6%	15%	12%	8%		
Europe*	Pre-Development Phase	840,42	480,24	120,06	1.468,75	1.175,00	881,25	2.690,05	2.152,04	1.434,69		
Germany		252,13	144,07	36,02	440,63	352,50	264,38	807,02	645,61	430,41		
Chronic Wounds		176,49	100,85	25,21	308,44	246,75	185,06	564,91	451,93	301,29		
Acute Wounds		75,64	43,22	10,81	132,19	105,75	79,31	242,10	193,68	129,12		

## Appendix D: Personas of Dr. Ford and Mr. Thompson

### Dr. Alexandra M. Ford



**Age:** 45  
**Work:** Dermatologist and Wound Care Specialist  
**Family:** Married, kids  
**Location:** Urban Medical Center

#### Goals

- Short-term Goal:** To reduce the healing time of chronic wounds in patients, thereby improving their quality of life.
- Long-term Objective:** To be a leader in her field by adopting and advocating for innovative, effective wound care treatments; to contribute to research in wound healing.

#### Challenges & Needs

- Primary Challenges:** Finding effective treatments for patients with slow-healing or non-healing chronic wounds; managing patient discomfort and infection risks; reducing healing time to prevent hospital readmissions.
- Needs:** Advanced wound care products that are clinically proven to expedite healing, reduce infection rates, and are easy to apply and remove. Interest in sustainable and biocompatible materials due to increasing awareness and demand for environmentally friendly medical products.

#### Pain Points

- Limited Treatment Options:** Encountering a lack of effective treatment modalities for chronic wounds, which can lead to patient frustration and decreased trust in medical advice.
- Time Constraints:** Facing time pressure in her practice, with the need to see a high volume of patients, which limits the time available for each individual's comprehensive care.
- Patient Compliance Issues:** Dealing with patients who struggle to adhere to treatment regimens due to complexity, discomfort, or lack of understanding, leading to slower healing and repeated consultations.
- Resource Management:** Balancing the need for cost-effective treatments with the desire to provide the best possible care, especially in a setting with limited healthcare resources.
- Infection Control and Management:** Constant concern about infection risks in chronic wounds, necessitating vigilant monitoring and intervention.

#### Motivation

Fear: ██████████

Anxiety: ██████████

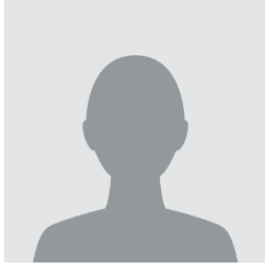
Power: ██████████

Social: ██████████

#### Bio

- Key Role:** Managing a wound care clinic within a large hospital.
- Responsibilities:** Diagnosing and treating patients with chronic wounds, including diabetic ulcers, venous ulcers, and pressure sores; staying updated with the latest treatments and innovations in wound care; conducting minor wound-related surgeries; training medical staff on wound care best practices.

# Michael Thompson



**Age:** 58  
**Work:** Early retired  
**Family:** Married, kids  
**Location:** Suburban area

## Goals

- **Short-term Goal:** To find a more effective treatment for his chronic wounds to reduce pain and accelerate healing.
- **Long-term Objective:** To improve his quality of life by managing his diabetes more effectively and returning to a more active lifestyle.

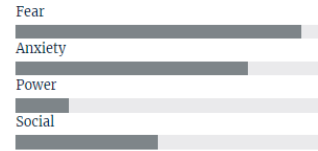
## Challenges & Needs

- **Primary Challenges:** Managing pain and discomfort from chronic wounds: slow healing of foot ulcers leading to reduced mobility and quality of life
- **Needs:** Effective and affordable wound care that accelerates healing, is easy to apply and comfortable to wear, and reduces the risk of infection.

## Pain Points

- **Financial Burden:** Worry about the ongoing costs associated with wound treatment, including medical appointments, dressings, and any additional therapies.
- **Risk of Complications:** Concern about the potential for serious complications, such as infections that can lead to hospitalization or, in severe cases, amputation.
- **Mental and Emotional Stress:** Experiencing anxiety and depression due to the chronic nature of his condition, and the impact it has on his daily life and independence.
- **Limitations in Daily Activities:** Frustration over not being able to perform simple tasks without discomfort or pain. For example, difficulty in standing for long periods, which affects his ability to engage in activities like cooking or attending social events.

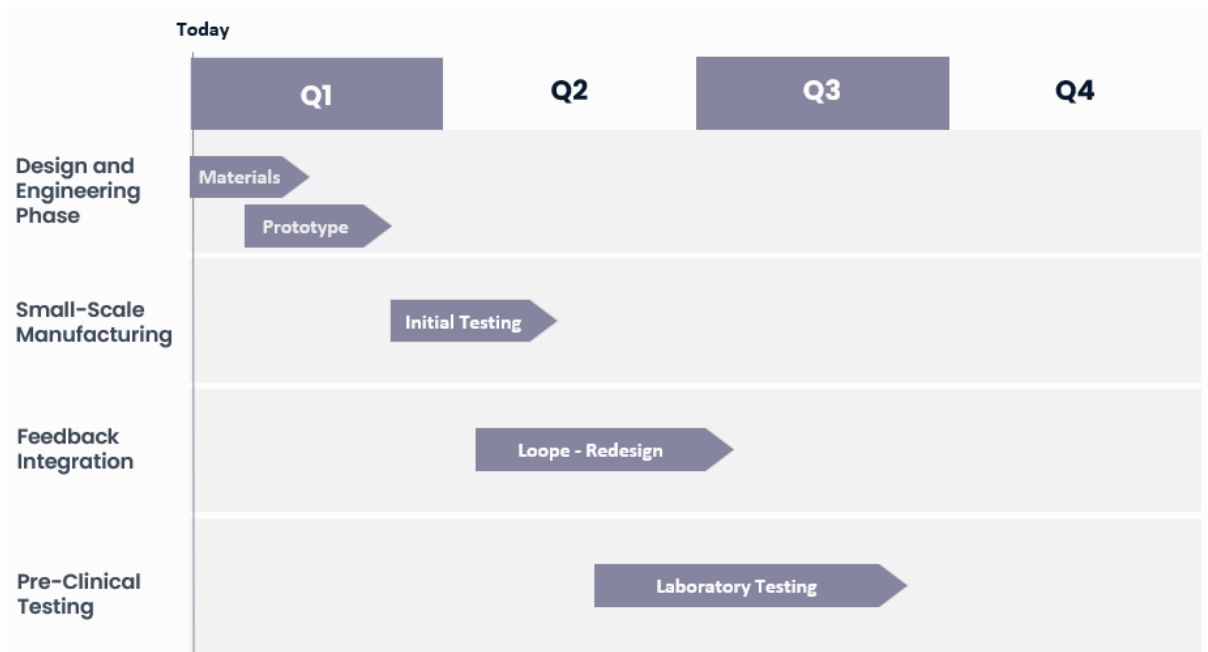
## Motivation



## Bio

- **Health Conditions:** Type 2 Diabetes diagnosed 10 years ago; experiences chronic diabetic foot ulcers.
- **Lifestyle:** Limited mobility due to discomfort from foot ulcers; had to reduce activities he enjoys like gardening and walking his dog
- **Healthcare Access:** Regular visits to a local clinic for diabetes management and wound care; has health insurance but is conscious of out-of-pocket costs

## Appendix E: Development Phase

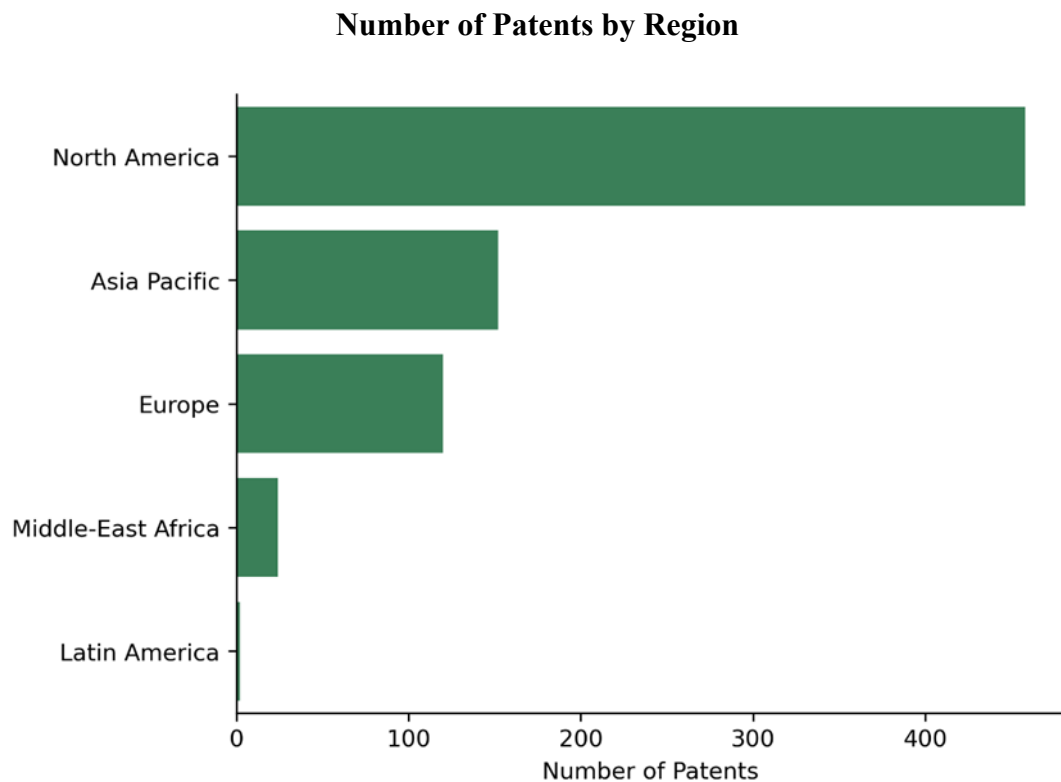


## **Appendix F: Panda Library (Python) – Analysis of Patent Landscape**

In the realm of applied research, patents not only offer a wealth of technical details but also provide insights into competitive landscapes and emerging market trends. For companies in the health and beauty sectors, patent analysis is an essential activity that supports strategic planning and innovation management. It enables businesses to safeguard their innovations, steer clear of potential infringements, carve out niches, and spot early threats or partnership opportunities. Moreover, by understanding the state of the art through patent landscapes, companies can enhance product offerings and align their research and development efforts with market demands. However, conducting a comprehensive patent analysis often involves substantial financial and human resources, which can be prohibitive for smaller entities or academic researchers. Thus, providing accessible tools like Python scripts for patent data extraction and analysis democratises the ability to engage in this sophisticated work. Using the Python Pandas library, for instance, researchers and entrepreneurs can efficiently parse, analyse, and visualise patent data related to collagen and marine collagen. This approach not only saves time and money but also levels the playing field, fostering innovation across various sizes of enterprises engaged in the collagen market.

**Solution approach:** By employing simple, yet powerful, Python tools for analysing patent data, companies and researchers can maintain a competitive edge, develop informed innovation strategies, and stay abreast of the latest advancements within the collagen industry. Such tools also aid in avoiding patent infringement and in making strategic decisions that are critical to success in the fast-evolving biotech and cosmetic industries. The underlying patent data was obtained through an API (application programming interface) query at Patents View. The Patents View database is compiled under the auspices of the US Patent Office, as well as the European Patent Office (EPO), and is updated on an ongoing basis. The source can therefore be considered trustworthy. The data query was made from combined search terms. Different

variants of the spellings of "marine collagen, jellyfish collagen, collagen etc." were used in patent titles and abstracts. Since API query functionality was limited at the time the search was created, no further narrowing or expansion was done. The data obtained was converted to lowercase to avoid duplication in follow-up analyses. No duplicates had to be removed from the data set.

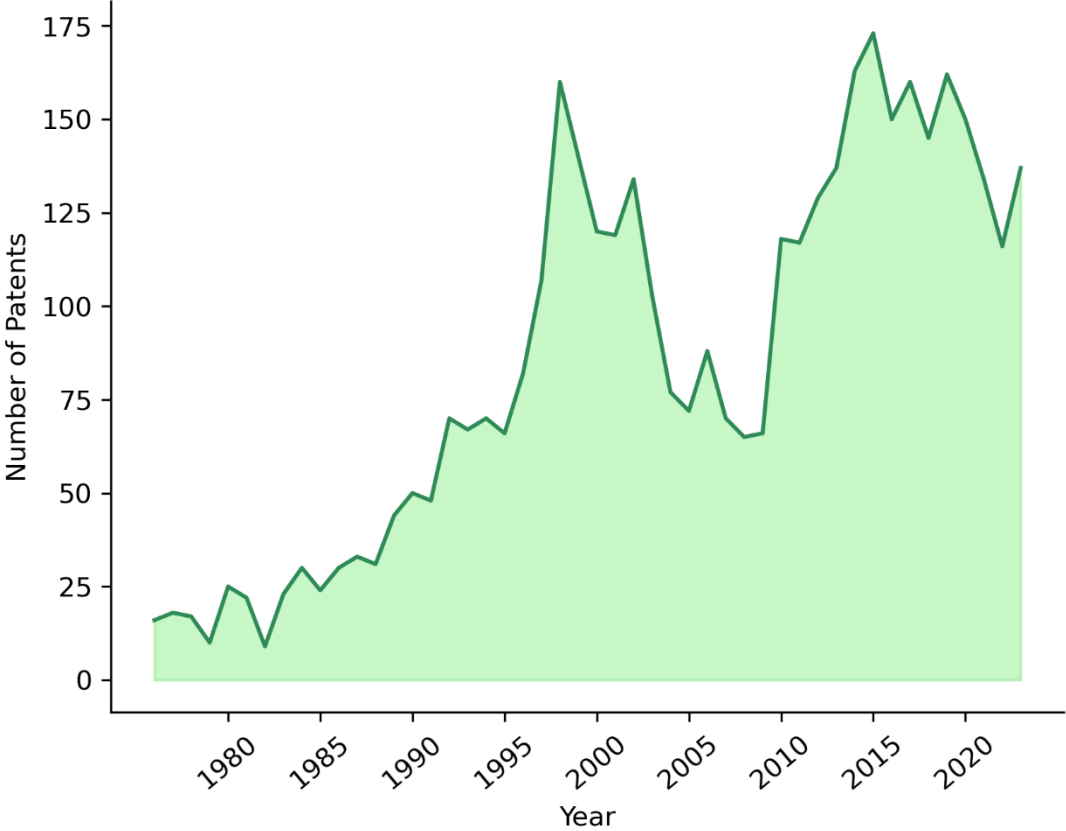


The first graph shows the distribution of patents across various regions: North America, Asia Pacific, Europe, Middle East-Africa, and Latin America. It indicates North America as having the highest number of patents, followed by Asia Pacific, Europe, Middle East-Africa, and Latin America with the fewest.

This kind of data visualisation is helpful for understanding the regional distribution of patent filings, which can reflect the innovation landscape and the investment in R&D within different areas. For instance, the high number of patents in North America could suggest a robust infrastructure for research and innovation within the field of collagen and marine collagen,

while the lower numbers in Latin America and Middle East-Africa might indicate either a smaller market or different focuses within their respective biotech industries.

**Total Filing of Patents**

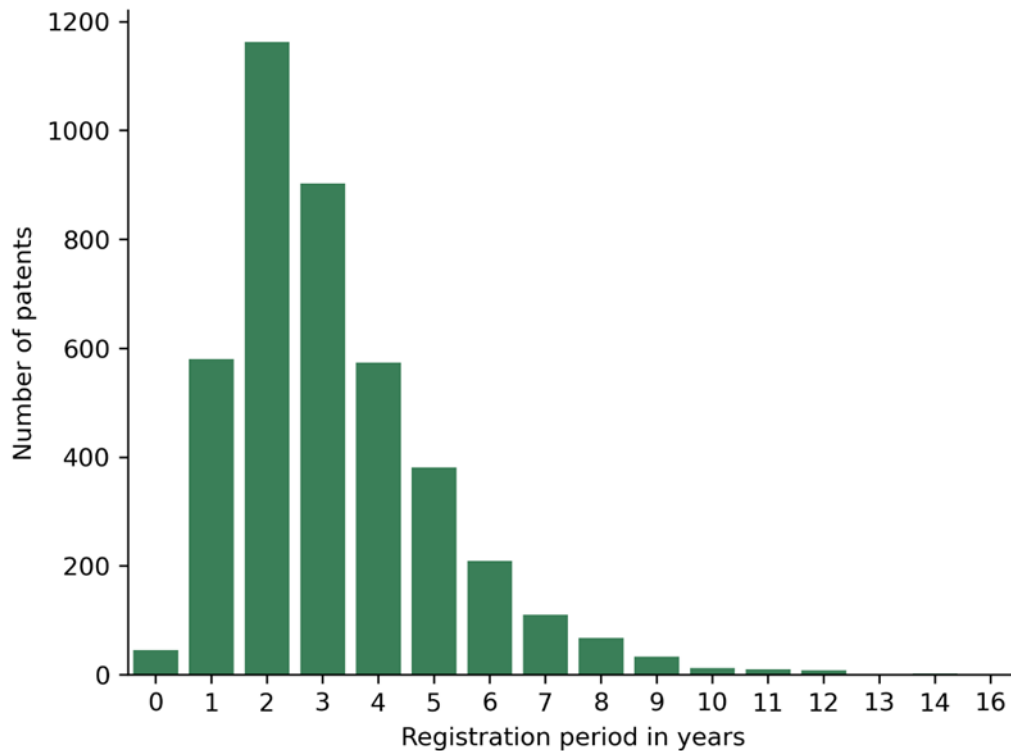


The second graph is a time series plot, showing the trend of patent filings over years from around 1980 (where the first patents have started to show up within the field of collagen) to 2022. The graph exhibits a general upward trend in the number of patents over time with some fluctuations, including what appears to be a peak in patent activity followed by a decline and then a resurgence.

This type of visualisation can be very telling in the context of collagen and marine collagen research and development. The increasing trend could be indicative of growing interest and investment in this sector, with particular surges potentially corresponding to key technological breakthroughs or increased market demand. Peaks and troughs could also correspond to changes in regulatory environments, availability of funding, or shifts in public or scientific

interest. For example, an increase in patent filings might coincide with the discovery of new extraction methods or identification of novel applications of collagen in medical treatments.

### Average Time to Approval



The third graph displays a right-skewed distribution, with a large number of patents being granted within the first couple of years, and progressively fewer patents taking longer times to be approved. This pattern is typical in patent registration processes, where a majority of applications are resolved in the initial years following their filing. The diminishing number for longer durations likely reflects a combination of more complex cases, possible legal challenges, requests for additional information, or other complications that can delay the approval process. For patents in the field of collagen and marine collagen, this graph could indicate that while many patents are granted relatively quickly, which could be due to well-established protocols for evaluation and a clear scope of innovation, there remains a subset of patent applications that encounter challenges that require more time for a thorough review.

Understanding the distribution of approval times can be crucial for businesses and researchers in planning their R&D timelines and managing the patent application process strategically. For instance, if a company in the collagen industry knows that patents typically take 1-2 years to be granted, they might align their product development and go-to-market strategies accordingly. However, they also need to be prepared for potential delays, which could impact their competitive advantage and time-sensitive opportunities in the marketplace.

**Appendix G: Phase Transition Success Rates by Disease Area**

Phase Success	Phase I to II		Phase II to III		Phase III to NDA/BLA		NDA/BLA to Approval	
	n	Phase POS	n	Phase POS	n	Phase POS	n	Phase POS
Hematology	92	69.6%	106	48.1%	82	76.8%	72	93.1%
Metabolic	136	61.8%	149	45.0%	66	63.6%	48	87.5%
Infectious disease	403	57.8%	414	38.4%	197	64.0%	156	92.9%
Others	154	63.6%	228	38.6%	90	60.0%	69	88.4%
Ophthalmology	88	71.6%	200	35.5%	82	51.2%	45	91.1%
Autoimmune	413	55.2%	471	31.4%	219	65.3%	202	94.1%
Allergy	55	56.4%	92	28.3%	34	64.7%	20	100.0%
Gastroenterology	45	46.7%	73	34.2%	35	57.1%	33	90.9%
All indications	4414	52.0%	4933	28.9%	1928	57.8%	1453	90.6%
Respiratory	179	55.9%	215	21.9%	62	64.5%	45	95.6%
Psychiatry	150	52.7%	164	26.8%	71	56.3%	57	91.2%
Endocrine	319	43.3%	293	26.6%	151	66.2%	124	86.3%
Neurology	516	47.7%	504	26.8%	226	53.1%	165	86.7%
Oncology	1628	48.8%	1732	24.6%	495	47.7%	324	92.0%
Cardiovascular	214	50.0%	252	21.0%	105	55.2%	80	82.5%
Urology	22	40.9%	40	15.0%	13	69.2%	13	84.6%

For disease area-level reporting, we analysed 14 major groupings in the Figures: Allergy, Autoimmune, Cardiovascular, Endocrine, Gastroenterology (non-IBD), Hematology, Infectious Disease, Metabolic, Neurology, Oncology, Ophthalmology, Psychiatry, Respiratory, and Urology. The remaining disease areas were categorised as "Other," which includes Dermatology, Renal, Obstetrics, Rheumatology (for non-autoimmune indications),

ENT/Dental, and Orthopedics. These major disease areas encompass 573 indications, which will be analysed and discussed in subsequent reports.

Moving Forward, every aspect of the profitability of success, likelihood of approval rates and the average time to approval, TSD will be ranked within the category “Others”, as wound healing is part of Dermatology.

### Appendix H: Likelihood of Approval Rates




Likelihood of Approval	Phase I to Approval		Phase II to Approval		Phase III to Approval		NDA/BLA to Approval	
	LOA n	Phase LOA	LOA n	Phase LOA	LOA n	Phase LOA	LOA n	Phase LOA
Hematology	352	23.9%	260	34.4%	154	71.5%	72	93.1%
Metabolic	399	15.5%	263	25.0%	114	55.7%	48	87.5%
Infectious disease	1170	13.2%	767	22.8%	353	59.4%	156	92.9%
Others	541	13.0%	387	20.5%	159	53.0%	69	88.4%
Ophthalmology	415	11.9%	327	16.6%	127	46.7%	45	91.1%
Autoimmune	1305	10.7%	892	19.3%	421	61.4%	202	94.1%
Allergy	201	10.3%	146	18.3%	54	64.7%	20	100.0%
Gastroenterology*	186	8.3%	141	17.8%	68	51.9%	33	90.9%
All indications	12728	7.9%	8314	15.1%	3381	52.4%	1453	90.6%
Respiratory	501	7.5%	322	13.5%	107	61.6%	45	95.6%
Psychiatry	442	7.3%	292	13.8%	128	51.4%	57	91.2%
Endocrine	887	6.6%	568	15.2%	275	57.1%	124	86.3%
Neurology	1411	5.9%	895	12.3%	391	46.0%	165	86.7%
Oncology	4179	5.3%	2551	10.8%	819	43.9%	324	92.0%
Cardiovascular	651	4.8%	437	9.6%	185	45.6%	80	82.5%
Urology	88	3.6%	66	8.8%	26	58.6%	13	84.6%

## Appendix I: Average Time to Approval

Phase Duration	Phase I to II		Phase II to III		Phase III to NDA/BLA		NDA/BLA to Approval	
	Advanced	Duration	Advanced	Duration	Advanced	Duration	Advanced	Duration
Allergy	31	1.5	26	3.8	22	2.9	20	1.1
Metabolic	84	2.0	67	3.2	42	3.1	42	1.2
Infectious disease	233	2.0	159	3.5	126	3.1	145	1.2
Ophthalmology	63	2.1	71	2.9	42	3.4	41	1.3
Autoimmune	228	2.1	148	3.6	143	3.2	190	1.1
Oncology	795	2.7	426	3.7	236	3.1	298	0.8
Respiratory	100	2.1	47	3.5	40	3.3	43	1.5
Psychiatry	79	2.3	44	3.4	40	2.8	52	1.8
Others	98	1.9	88	3.5	54	3.2	61	1.8
All indications	2296	2.3	1424	3.6	1115	3.3	1316	1.3
Endocrine	138	1.8	78	3.4	100	3.7	107	1.8
Hematology	64	2.2	51	3.4	63	3.6	67	1.5
Gastroenterology	21	1.6	25	3.9	20	3.9	30	1.4
Neurology	246	2.1	135	3.7	120	3.7	143	1.6
Cardiovascular	107	2.4	53	3.8	58	4.2	66	1.2
Urology	9	2.7	6	5.0	9	2.9	11	1.6

Source: (Thomas et al., 2021)

## Appendix J: Signed Founder's Agreement

<p style="text-align: center;"><b>Founders' Agreement</b></p> <p style="text-align: center;"><b>FOUNDERS AGREEMENT</b></p> <p>This <b>FOUNDERS' AGREEMENT</b> (the "Agreement") is made as of March 28<sup>th</sup>, 2024 by and among ISD (Tissue Structure Developer) (the "Company"), and the following founders (the "Founders").</p> <ul style="list-style-type: none"> <li>CEO: Timm Yusuf</li> <li>COO: Arthur Carl Ulrich Lickenbach</li> <li>CFO: Martin Gartmann</li> </ul> <p>Now, therefore, in consideration of the foregoing and the mutual covenants and agreements hereinafter set forth, the parties hereto agree as follows:</p> <p><b>I. BUSINESS VENTURE.</b> The Founders have created the business venture. The Company's initial place of business is located at R. da Holanda 1, 2775-405 Caracaras.</p> <p><b>II. OWNERSHIP STRUCTURE.</b> Upon the formation of the company, ownership shares will be equally divided among the Founders. These shares are meant to establish the initial proportional ownership of the Founders of the Company. These shares are not transferable and do not constitute securities of any kind.</p> <p><b>III. VOTING.</b> If a matter arises that pertains to the Business Venture and requires a majority vote in order to proceed, voting powers shall align with the distribution of each Founder's percentage of shares.</p> <p><b>IV. VESTING SCHEDULE.</b> Should the Founders elect to do so, they may create a vesting schedule. The shares issued to each Founder shall vest on a vesting schedule to be established later by mutual consent of all of the Founders. If a Founder terminates his or her relationship with the Company for any reason, prior to the full vesting of all shares entitled to the Founder, the remaining portion of such shares will be returned to the Company.</p> <p><b>V. INTELLECTUAL PROPERTY OWNERSHIP.</b> Each Founder shall grant and assign all of his or her right, title, and interest in the Business Venture to the Company, including all ideas (however formed or unformed) and work product that results from any task performed by the Founder for the full term of this agreement. Each Founder shall also perform all such actions that may be necessary to bestow absolute legal ownership of the Business Venture and any related intellectual property to the Company. Any other agreement that requires an ownership interest in the Business Venture and related intellectual property to be transferred to a third party must be agreed upon by each Founder. In the event of such an agreement, the obligations of this Agreement must be disclosed to that third party. The provisions in this section do not pertain to any inventions developed by a Founder entirely on his or her own time, entirely unrelated to the Business Venture, without the utilization of any of the Company's resources such as, without limitation, equipment, supplies, and facilities.</p>	<p style="text-align: center;"><b>Founders' Agreement</b></p> <p><b>VI. RESIGNATION AND REMOVAL.</b> Any Founder may resign from the Company by giving written notice to the other Founders. Upon a Founder's resignation, the Company will pay out to the resigning Founder any positive capital account balance within 180 days of resignation. Should all of the Founders resign, the Company shall dissolve and this Agreement will terminate immediately upon completion of the winding up of the Company's affairs and distribution of its assets and liabilities in accordance with this agreement. For a period of 2 years following the termination of the engagement with the Company, the Founders agree not to engage in any business activity that is in direct competition with the Company. The Founders further agree not to solicit or accept business from any clients or customers of the Company for a period of 2 years following the termination of the engagement with the Company. The Founders acknowledge that this clause is reasonable and necessary to protect the business interests of the Company, and that any breach of this clause will result in irreparable harm to the Company.</p> <p style="text-align: center;"><b>VII. MISCELLANEOUS PROVISIONS</b></p> <p><b>A. ATTITUDES AND BEHAVIOR.</b> The Founders agree to conduct themselves professionally and ethically, and to promote a positive work environment. They will treat each other with respect, comply with laws, and avoid risks. The Founders will devote their best efforts to the Startup and work a minimum of 40 hours per week. They will communicate their availability and minimize disruptions.</p> <p><b>B. CONFIDENTIALITY.</b> The Founders shall take necessary steps to ensure that anything deemed "Confidential Information" will remain confidential. Confidential Information shall include, without limitation, business records and plans, trade secrets, technical data, product ideas, contracts, financial information, pricing structure, discounts, computer programs and listings, source code and/or object code, copyright and intellectual property, inventions, sales leads, strategic alliances, partners, and customer and client lists. The nature of the information and the manner of disclosure are such that a reasonable person would understand it to be confidential. Disclosure of Confidential Information will only occur on an as-needed basis and only upon consent of all the Founders.</p> <p><b>C. DISPUTE RESOLUTION.</b> If a dispute, controversy, or claim arises out of or relates to this Founders' Agreement or the breach thereof, and if the dispute cannot be settled through negotiation, the Founders agree first to try in good faith to settle the dispute by mediation administered by Dr. Gonçalo Costa.</p> <p><b>D. SEVERABILITY.</b> If a court holds any provision of this Agreement to be illegal, invalid or unenforceable, the remaining provisions shall remain in full force and effect and the parties will amend this Agreement to give effect to the stricken clause to the maximum extent possible.</p>	<p style="text-align: center;"><b>Founders' Agreement</b></p> <p><b>E. ENTIRE AGREEMENT.</b> All understandings and agreements previously existing between the parties, if any, are merged into this Agreement, which alone fully and completely expresses their agreement. Neither party will rely upon any statement or representation made by the other not embodied herein. This Agreement may be modified only by a written amendment by all parties.</p> <p>IN WITNESS WHEREOF, the parties hereto have caused this Founders' Agreement to be duly executed as of the date first set forth above.</p> <p> Timm Yusuf, CEO</p> <p> Martin Gartmann, CFO</p> <p> Arthur Carl Ulrich Lickenbach, COO</p>
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## Appendix K: Detailed Cost Summary

Item / Task Description	Amount
	Total
<b>Prototype Development</b>	<b>50,000.00 €</b>
Design and Engineering Phase (3-6 months)	20,000.00 €
Small-Scale Manufacturing (2-3 months)	15,000.00 €
Feedback Integration (1-2 months)	15,000.00 €
<b>Pre-Clinical Testing (3-6 months)</b>	<b>100,000.00 €</b>
<b>Intellectual Property</b>	<b>25,000.00 €</b>
Patent Search	2,000.00 €
Filing Fees	11,000.00 €
German Patent and Trademark Fees	3,000.00 €
Patent Prosecution Phase	3,000.00 €
PCT Filing Fees	3,000.00 €
Other	3,000.00 €
<b>Clinical Phase I &amp; II</b>	<b>14,500,000.00 €</b>
Phase 1: Safety Trial (1 - 2 year)	2,000,000.00 €
Phase 2: Efficacy Trial (3 - 4 years)	12,500,000.00 €
<b>Labour Costs</b>	<b>2,529,000.00 €</b>
CEO	240,000.00 €
COO	240,000.00 €
CFO	240,000.00 €
CSO	702,000.00 €
Product Development Manager (Bio-Tech)	354,000.00 €
Biochemists	378,000.00 €
Laboratory Assistant	225,000.00 €
Advisory Board	150,000.00 €
<b>PPE / Facility (third party laboratory)</b>	<b>1,080,000.00 €</b>
Rent	720,000.00 €
Machinery usage / Equipment	360,000.00 €
<b>General and Administrative</b>	<b>490,000.00 €</b>
Day to day laboratory Equipment	220,000.00 €
Administrative Costs	270,000.00 €
<b>Total Costs</b>	<b>18,774,000.00 €</b>

## Appendix L: Detailed Annual Cost Structure

Item / Task Description	Years					
	2025	2026	2027	2028	2029	2030
<b>Development Phase</b>	<b>150,000.00 €</b>					
Design and Engineering Phase (3-6 months)	20,000.00 €	-	-	-	-	-
Small-Scale Manufacturing (2-3 months)	15,000.00 €	-	-	-	-	-
Feedback Integration (1-2 months)	15,000.00 €	-	-	-	-	-
<b>Pre-Clinical Testing (3-6 months)</b>	<b>100,000.00 €</b>					
<b>Intelecutal Property</b>	<b>25,000.00 €</b>					
Patent Search	2,000.00 €	-	-	-	-	-
Filing Fees	11,000.00 €	-	-	-	-	-
German Patent and Trademark Fees	3,000.00 €	-	-	-	-	-
Patent Prosecution Phase	3,000.00 €	-	-	-	-	-
PCT Filing Fees	3,000.00 €	-	-	-	-	-
Other	3,000.00 €	-	-	-	-	-
<b>Clinical Phase I &amp; II</b>		<b>2,000,000.00 €</b>		<b>12,500,000.00 €</b>		
Phase 1: Safety Trial (1 - 2 years)	-	2,000,000.00 €	-	-	-	-
Phase 2: Efficacy Trial (3 - 4 years)	-	-	-	12,500,000.00 €	-	-
<b>Labour Costs</b>	<b>421,500.00 €</b>	<b>421,500.00 €</b>	<b>421,500.00 €</b>	<b>421,500.00 €</b>	<b>421,500.00 €</b>	<b>421,500.00 €</b>
CEO	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €
COO	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €
CFO	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €
CSO	117,000.00 €	117,000.00 €	117,000.00 €	117,000.00 €	117,000.00 €	117,000.00 €
Product Development Manager (Bio-Tech)	59,000.00 €	59,000.00 €	59,000.00 €	59,000.00 €	59,000.00 €	59,000.00 €
Biochemists	63,000.00 €	63,000.00 €	63,000.00 €	63,000.00 €	63,000.00 €	63,000.00 €
Laboratory Assistant	37,500.00 €	37,500.00 €	37,500.00 €	37,500.00 €	37,500.00 €	37,500.00 €
Advisory Board	25,000.00 €	25,000.00 €	25,000.00 €	25,000.00 €	25,000.00 €	25,000.00 €
<b>PPE / Facility (third party laboratory)</b>	<b>180,000.00 €</b>	<b>180,000.00 €</b>	<b>180,000.00 €</b>	<b>180,000.00 €</b>	<b>180,000.00 €</b>	<b>180,000.00 €</b>
Rent	120,000.00 €	120,000.00 €	120,000.00 €	120,000.00 €	120,000.00 €	120,000.00 €
Machinery usage / Equipment	60,000.00 €	60,000.00 €	60,000.00 €	60,000.00 €	60,000.00 €	60,000.00 €
<b>General and Administrative</b>	<b>65,000.00 €</b>	<b>85,000.00 €</b>	<b>85,000.00 €</b>	<b>85,000.00 €</b>	<b>85,000.00 €</b>	<b>85,000.00 €</b>
Day to day laboratory Equipment	20,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €	40,000.00 €
Administrative Costs	45,000.00 €	45,000.00 €	45,000.00 €	45,000.00 €	45,000.00 €	45,000.00 €
<b>Total Costs</b>	<b>841,500.00 €</b>	<b>2,686,500.00 €</b>	<b>686,500.00 €</b>	<b>13,186,500.00 €</b>	<b>686,500.00 €</b>	<b>686,500.00 €</b>

\*Cost projections are laid out on the "base case" scenario analysis, due to changes within the process costs can be highly volatile.

## Appendix M: Cash Flow Calculation for rNPV

in million €	Comments	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
<b>PDS (Probability of Success)</b>		100.00%	83.80%	69.60%	58.80%	50.00%	42.00%	35.00%	28.00%	22.00%	17.00%	13.00%	10.00%	7.00%	5.00%	4.00%	3.00%	2.00%	1.50%	1.00%	0.70%	0.50%
<b>LDM (Likelihood of Approval)</b>		100.00%	83.80%	69.60%	58.80%	50.00%	42.00%	35.00%	28.00%	22.00%	17.00%	13.00%	10.00%	7.00%	5.00%	4.00%	3.00%	2.00%	1.50%	1.00%	0.70%	0.50%
<b>Revenue:</b>	starting year 12	-	-	-	-	-	-	-	-	-	-	-	480.2	480.2	480.2	1,175.0	1,175.0	1,175.0	1,175.0	2,152.0	2,152.0	2,152.0
<b>Operating Income (EBIT):</b>		(0.8)	(2.7)	(0.7)	(13.2)	(0.7)	(0.7)	(20.7)	(0.7)	(0.7)	(3.7)	(0.7)	48.0	48.0	48.0	235.0	235.0	235.0	235.0	645.6	645.6	645.6
<b>Operating Margin:</b>		-	-	-	-	-	-	-	-	-	-	-	10.0%	10.0%	10.0%	20.0%	20.0%	20.0%	20.0%	30.0%	30.0%	30.0%
<b>(-) Taxes: Excluding Effect of Interest:</b>		0.2	0.7	0.2	3.3	0.2	0.2	5.2	0.2	0.2	0.3	0.2	(12.0)	(12.0)	(12.0)	(58.8)	(58.8)	(58.8)	(58.8)	(161.4)	(161.4)	(161.4)
<b>Tax Rate (25%):</b>		0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
<b>Net Operating Profit After Taxes (NOPAT):</b>		(0.8)	(2.0)	(0.5)	(9.9)	(0.5)	(0.5)	(15.5)	(0.5)	(0.5)	(2.8)	(0.5)	36.0	36.0	36.0	176.3	176.3	176.3	176.3	484.2	484.2	484.2
<b>Adjustments for Non-Cash Charges:</b>		-	-	-	-	-	-	-	-	-	-	-	24.0	24.0	24.0	58.8	58.8	58.8	58.8	107.6	107.6	107.6
<b>(+) Depreciation &amp; Amortization:</b>		-	-	-	-	-	-	-	-	-	-	-	24.0	24.0	24.0	58.8	58.8	58.8	58.8	107.6	107.6	107.6
<b>(-) Revenue:</b>		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Net Change in Working Capital:</b>		-	-	-	-	-	-	-	-	-	-	-	9.6	9.6	9.6	23.5	23.5	23.5	23.5	43.0	43.0	43.0
<b>(-) Change in Revenue:</b>		-	-	-	-	-	-	-	-	-	-	-	9.6	9.6	9.6	23.5	23.5	23.5	23.5	43.0	43.0	43.0
<b>(+) Revenue:</b>		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
<b>(-) Capital Expenditures:</b>		-	-	-	-	-	-	-	-	-	-	-	(9.6)	(9.6)	(9.6)	(23.5)	(23.5)	(23.5)	(23.5)	(43.0)	(43.0)	(43.0)
<b>(+) Revenue:</b>		-	-	-	-	-	-	-	-	-	-	-	(9.6)	(9.6)	(9.6)	(23.5)	(23.5)	(23.5)	(23.5)	(43.0)	(43.0)	(43.0)
<b>Unlevered Free Cash Flow:</b>		(0.8)	(2.0)	(0.5)	(9.9)	(0.5)	(0.5)	(15.5)	(0.5)	(0.5)	(2.8)	(0.5)	60.0	60.0	60.0	255.0	255.0	255.0	255.0	591.8	591.8	591.8
<b>Discount Period:</b>		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<b>Discount Rate (WACC):</b>		12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	
<b>Cumulative Discount Factor:</b>		0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404	0.361	0.322	0.287	0.257	0.231	0.208	0.187	0.168	0.150	0.134	0.119	0.106	
<b>PV of Unlevered FCF:</b>		(0.8)	(1.6)	(0.4)	(6.3)	(0.3)	(0.3)	(7.0)	(0.2)	(0.2)	(0.3)	(0.1)	15.4	13.8	12.3	42.9	38.3	34.2	30.6	68.7	61.4	54.8
<b>EBITDA:</b>		(0.8)	(2.7)	(0.7)	(13.2)	(0.7)	(0.7)	(20.7)	(0.7)	(0.7)	(3.7)	(0.7)	72.0	72.0	72.0	293.0	293.0	293.0	293.0	753.2	753.2	753.2

## Appendix N: rNPV Formula

$$rNPV_{total} = LOANPV_{rev} - proNPV_{dev} = \sum \frac{r_{LOA}CF_t}{(1+a)^t} - \sum \frac{Pro_{pt}C_{pt}}{(1+a)^{pt}}$$

Description of variables in the r-NPV formula,

$pt$ : Development period in each phase,

$r_{LOA}$ : LOA (Likelihood of Approval),

$Pro_{pt}$ : Entry POS (Pro: Probability) in each phase,

$a$ : Discount rate,

$CF_t$ : Cash flow after release,

$C_{pt}$ : Development cost in each phase,

$t$ : Period until the expiration of the patent.

## Appendix O: rNPV – 2025 Calculations for all Scenarios

<b>Worst Case Valuation</b>	
<b>rNPV total</b>	<b>25,71 €</b>
LOAN PV rev	31,66 €
pro NPV dev	(4,0)
<b>Base Case Valuation</b>	
<b>rNPV total</b>	<b>41,36 €</b>
LOAN PV rev	48,48 €
pro NPV dev	(4,0)
<b>Best Case Valuation</b>	
<b>rNPV total</b>	<b>55,14 €</b>
LOAN PV rev	63,30 €
pro NPV dev	(4,0)

## Appendix P: EV to EBITDA and Revenue Multiples Valuation

Multiples 2023 - Biotech and Pharma				
LOA		13,02%		
EV/EBITDA		22,38X		
EV/Revenue		9,71X		
	in million \$	<b>Best Case</b>	<b>Base Case</b>	<b>Worst Case</b>
<b>TSD EBITDA for strongest market penetration year</b>	\$	66,71	\$ 47,40	\$ 28,09
<b>TSD Revenue for strongest market penetration year</b>	\$	341,17	\$ 236,92	\$ 132,67
<b>Estimated Enterprise Value (EV) - EBITDA</b>	\$	1.492,97	\$ 1.060,82	\$ 628,66
<b>Estimated Enterprise Value (EV) - Revenue</b>	\$	3.312,79	\$ 2.300,50	\$ 1.288,20
<b>Average EV (in €)</b>		<b>2.234,68 €</b>	<b>1.563,01 €</b>	<b>891,34 €</b>
<b>Risk Adjusted EV - multiplied by LOA of 13.02% (in €)</b>		<b>270,59 €</b>	<b>189,26 €</b>	<b>107,93 €</b>

## Appendix Q: rNPV – 2030 Calculations for all Scenarios

<b>rNPV - 2030 (in millions)</b>	
<b>Worst Case Valuation</b>	
<b>rNPV total</b>	<b>233,16 €</b>
LOAN PV rev	254,54 €
pro NPV dev	(3,8)
<b>Base Case Valuation</b>	
<b>rNPV total</b>	<b>358,96 €</b>
LOAN PV rev	389,81 €
pro NPV dev	(3,8)
<b>Best Case Valuation</b>	
<b>rNPV total</b>	<b>469,77 €</b>
LOAN PV rev	508,96 €
pro NPV dev	(3,8)

## Appendix R: Sensitivity Analysis – Base Case

Sensitivity Analysis			
Weighted Average Cost of Capital - WACC			
	10,00%	12,00%	14,00%
rNPV (LOAN PV rev - pro NPV dev)	58,05 €	41,36 €	29,56 €

## Appendix S: Funding Need per Stage

Funding Need	Years					
	2025	2026	2027	2028	2029	2030
Total Costs	841.500 €	2.686.500 €	686.500 €	13.186.500 €	686.500 €	686.500 €

Assumption on Funding Need	Projected Costs	with MarkUp (~30%)
Seed (2025)	841.500 €	1.200.000 €
Series A (2026)	3.373.000 €	4.600.000 €
Series B (2028)	14.559.500 €	19.700.000 €
Sum	18.774.000 €	25.500.000 €

*\*Seed before Grant Subsidy Recognition*

## Appendix T: Target Funding Venture Capital Partners

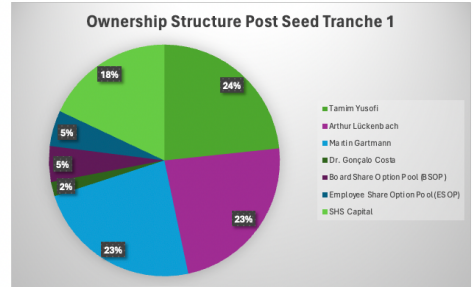
Investor Name	Fund Manager Size (in million €)	Fundraising Stage	Latest Fund Generation	Latest Fund Size (in million)	Time latest FR (Month, Year)	Ticket Size (in million €)	Target Sector	Success Rate (%)	Preferred Development Stage	Website
Wellington Partners	265	Investment	Fund V	210	April, 2022	2 - 20	Healthcare, Life Sciences	42.86%	Pre-clinical, Phase 1, Phase 2	<a href="https://www.wellington-partners.com/">https://www.wellington-partners.com/</a>
Earlybird Health Tech	250	Investment	Fund III	250	October, 2022	2 - 15	Healthcare, Life Sciences	50.00%	Pre-clinical, Phase 1, Phase 2	<a href="https://earlybird.com/">https://earlybird.com/</a>
Forbion	350	Investment	Fund VI	460	October, 2022	2 - 20	Healthcare, Life Sciences	50.00%	Phase 1, Phase 2	<a href="https://www.forbion.com/">https://www.forbion.com/</a>
LSP (Life Sciences Partners)	850	Investment	Fund VII	850	June, 2022	2 - 25	Life Sciences, MedTech	40.00%	Phase 1, Phase 2	<a href="https://www.lspvc.com/">https://www.lspvc.com/</a>
Glide Healthcare	450	Investment	Fund V	517	October, 2022	2 - 15	Healthcare, Life Sciences	42.86%	Phase 1, Phase 2	<a href="https://glidehealthcare.com/">https://glidehealthcare.com/</a>
BioGeneration Ventures	85	Investment	Fund V	140	March, 2022	2 - 10	Life Sciences	44.44%	Pre-clinical, Phase 1, Phase 2	<a href="https://www.biogenerationventures.com/">https://www.biogenerationventures.com/</a>
Inventures	300	Investment	Fund III	300	July, 2022	2 - 10	Healthcare, Life Sciences	42.86%	Seed, Pre-clinical, Phase 1, Phase 2	<a href="https://www.inventures.vc/">https://www.inventures.vc/</a>
Heal Capital	150	Investment	Fund II	150	January, 2023	2 - 15	Healthcare, Digital Health	40.00%	Pre-clinical, Phase 1, Phase 2	<a href="https://healcapital.com/">https://healcapital.com/</a>
SHS Capital	650	Investment	Fund VI	250	June, 2022	1 - 20	Healthcare, Life Sciences	42.86%	Seed, Pre-clinical, Phase 1, Phase 2	<a href="https://www.shs-capital.eu/">https://www.shs-capital.eu/</a>
MTIP	100	Investment	Fund II	250	September, 2023	2 - 15	Healthcare, MedTech	50.00%	Pre-clinical, Phase 1, Phase 2	<a href="https://mtip.ch/">https://mtip.ch/</a>
EQT Life Sciences	900	Investment	Fund I	1.000	November, 2022	5 - 50	Healthcare, Life Sciences	45.45%	Pre-clinical, Phase 1, Phase 2	<a href="https://eqtgroup.com/">https://eqtgroup.com/</a>
Elytra Ventures	70	Raising	Fund I	70	February, 2024	2 - 7	Healthcare, Life Sciences	50.00%	Pre-clinical, Phase 1, Phase 2	<a href="https://elytraventures.com/">https://elytraventures.com/</a>
Ysios Capital	150	Investment	Fund III	300	December, 2022	5 - 20	Healthcare, Life Sciences	40.00%	Pre-clinical, Phase 1, Phase 2	<a href="https://ysioscapital.com/">https://ysioscapital.com/</a>
Boehringer Ingelheim Venture Fund	300	Investment	Fund V	300	October, 2022	5 - 15	Healthcare, Life Sciences	41.67%	Pre-clinical, Phase 1, Phase 2	<a href="https://www.boehringer-ingelheim-venture.com/">https://www.boehringer-ingelheim-venture.com/</a>
Medicxi	400	Investment	Fund IV	400	June, 2022	2 - 20	Healthcare, Life Sciences	37.50%	Pre-clinical, Phase 1, Phase 2	<a href="https://www.medicxi.com/">https://www.medicxi.com/</a>
Kurma Partners	300	Investment	Fund IV	300	December, 2022	5 - 15	Healthcare, Life Sciences	44.44%	Pre-clinical, Phase 1, Phase 2	<a href="https://www.kurmapartners.com/">https://www.kurmapartners.com/</a>
Omnesc Capital	500	Investment	Fund V	500	July, 2022	5 - 20	Healthcare, Life Sciences	42.86%	Pre-clinical, Phase 1, Phase 2	<a href="https://www.omnescapital.com/">https://www.omnescapital.com/</a>
Seventure Partners	500	Investment	Fund V	500	February, 2023	5 - 20	Healthcare, Life Sciences	38.46%	Pre-clinical, Phase 1, Phase 2	<a href="https://www.seventure.fr/">https://www.seventure.fr/</a>
TVM Capital Life Science	900	Investment	Fund VII	476	September, 2023	2 - 20	Healthcare, Life Sciences	46.67%	Pre-clinical, Phase 1, Phase 2	<a href="https://www.tvmlifescience.com/">https://www.tvmlifescience.com/</a>
Partech	750	Investment	Fund IV	750	January, 2023	0.5 - 2	Healthcare, Digital Health	41.7%	Seed, Pre-clinical, Phase 1, Phase 2	<a href="https://partechpartners.com/">https://partechpartners.com/</a>
Atlantic Labs	100	Investment	Fund II	150	March, 2023	0.5 - 2	Digital Health	50.0%	Seed, Pre-clinical, Phase 1, Phase 2	<a href="https://atlanticlabs.de/">https://atlanticlabs.de/</a>
HV Capital	500	Investment	Fund VIII	710	July, 2022	0.5 - 2	Healthcare, Digital Health	47.1%	Seed, Pre-clinical, Phase 1	<a href="https://hvcapital.com/">https://hvcapital.com/</a>
Speedinvest	450	Investment	Fund IV	450	November, 2022	0.5 - 2	Digital Health, MedTech	42.9%	Seed, Pre-clinical, Phase 1, Phase 2	<a href="https://www.speedinvest.com/">https://www.speedinvest.com/</a>
Cherry Ventures	300	Investment	Fund IV	300	October, 2022	0.5 - 2	Digital Health, MedTech	44.4%	Seed, Pre-clinical, Phase 1, Phase 2	<a href="https://www.cherry.vc/">https://www.cherry.vc/</a>

## Appendix U: Capitalisation Table Seed (Tranche 1) Funding

Seed Valuation 2025 (Tranche 1)	
Government Grants	200.000
SHS Capital (Seed Financing VC)	500.000
<b>Total Seed Tranche 1 Financing</b>	<b>700.000</b>
Implied post-money Valuation	2.777.778
Equity Ownership	18%
Price per share	1,00 €

Shareholder	Investment	Share Value	Shares	% of Ownership
Tamim Yusoffi	- €	648.148,15 €	648.148	23,3%
Arthur Lückenbach	- €	648.148,15 €	648.148	23,3%
Martin Gartmann	- €	648.148,15 €	648.148	23,3%
Dr. Gonçalo Costa	- €	55.555,56 €	55.556	2,0%
Board Share Option Pool (BSOP)	- €	138.888,89 €	138.889	5,0%
Employee Share Option Pool (ESOP)	- €	138.888,89 €	138.889	5,0%
SHS Capital	500.000,00 €	500.000,00 €	500.000	18,0%
<b>Total</b>	<b>500.000,00 €</b>	<b>2.777.777,78 €</b>	<b>2.777.778</b>	<b>100%</b>

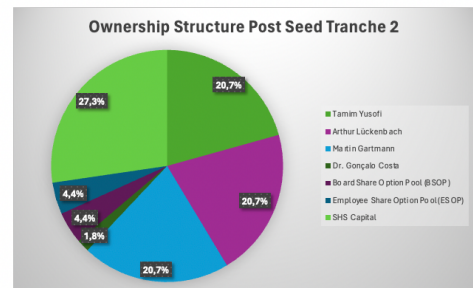


## Appendix V: Capitalisation Table Seed (Tranche 2) Funding

Seed Valuation 2025 (Tranche 2)	
Pre-money Valuation	3.400.000
SHS Capital (Seed Financing VC)	500.000
<b>Total Seed Tranche 2 Financing</b>	<b>500.000</b>
Implied post-money Valuation	3.900.000
Pre-money share price	1,40 €
Value Step-up	1,15

Shareholder	Investment	Share Value	Shares	% of Ownership
Tamim Yusoffi	- €	806.590,91 €	648.148	20,7%
Arthur Lückenbach	- €	806.590,91 €	648.148	20,7%
Martin Gartmann	- €	806.590,91 €	648.148	20,7%
Dr. Gonçalo Costa	- €	69.136,36 €	55.556	1,8%
Board Share Option Pool (BSOP)	- €	172.840,91 €	138.889	4,4%
Employee Share Option Pool (ESOP)	- €	172.840,91 €	138.889	4,4%
SHS Capital	500.000,00 €	1.065.409,09 €	856.125	27,3%
<b>Total</b>	<b>500.000,00 €</b>	<b>3.900.000,00 €</b>	<b>3.133.903</b>	<b>100%</b>

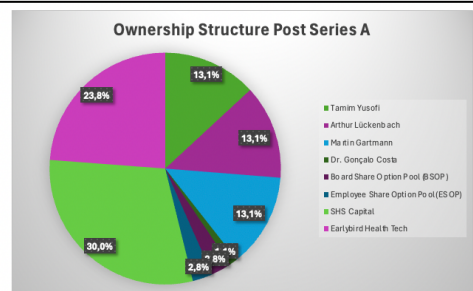


## Appendix W: Capitalisation Table Series A Funding

Series A Valuation 2026	
Pre-money Valuation	8.000.000
SHS Capital (Refinancing)	1.600.000
Earlybird Health Tech (Series A Financing VC)	3.000.000
<b>Total Series A Financing</b>	<b>4.600.000</b>
Implied post-money Valuation	12.600.000
Pre-money share price	2,55 €
Value Step-up	1,58

Shareholder	Investment	Share Value	Shares	% of Ownership
Tamim Yusoffi	- €	1.654.545,45 €	648.148	13,1%
Arthur Lückenbach	- €	1.654.545,45 €	648.148	13,1%
Martin Gartmann	- €	1.654.545,45 €	648.148	13,1%
Dr. Gonçalo Costa	- €	141.818,18 €	55.556	1,1%
Board Share Option Pool (BSOP)	- €	354.545,45 €	138.889	2,8%
Employee Share Option Pool (ESOP)	- €	354.545,45 €	138.889	2,8%
SHS Capital	1.600.000,00 €	3.785.454,55 €	1.482.906	30,0%
Earlybird Health Tech	3.000.000,00 €	3.000.000,00 €	1.175.214	23,8%
<b>Total</b>	<b>4.600.000,00 €</b>	<b>12.600.000,00 €</b>	<b>4.935.897</b>	<b>100%</b>

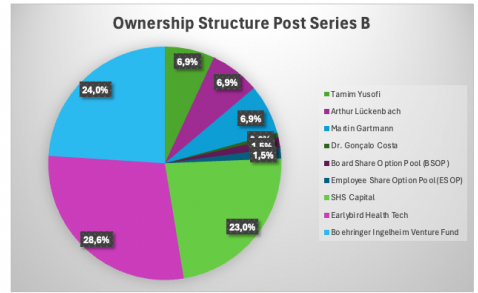


## Appendix X: Capitalisation Table Series B Funding

Series B Valuation 2028	
Pre-money Valuation	22.000.000
SHS Capital (Refinancing)	3.000.000
Earlybird Health Tech (Refinancing)	6.700.000
Boehringer Ingelheim Venture Fund	10.000.000
<b>Total Series A Financing</b>	<b>19.700.000</b>
Implied post-money Valuation	41.700.000
Pre-money share price	4,46€
Value Step-up	1,90

Shareholder	Investment	Share Value	Shares	% of Ownership
Tamim Yusufi	- €	2.888.888,89€	648.148	6,9%
Arthur Lückenbach	- €	2.888.888,89€	648.148	6,9%
Martin Gartmann	- €	2.888.888,89€	648.148	6,9%
Dr. Gonçalo Costa	- €	247.619,05€	55.556	0,6%
Board Share Option Pool (BSOP)	- €	619.047,62€	138.889	1,5%
Employee Share Option Pool (ESOP)	- €	619.047,62€	138.889	1,5%
SHS Capital	3.000.000,00€	9.609.523,81€	2.155.983	23,0%
Earlybird Health Tech	6.700.000,00€	11.938.095,24€	2.678.419	28,6%
Boehringer Ingelheim Venture Fund	10.000.000,00€	10.000.000,00€	2.243.590	24,0%
<b>Total</b>	<b>19.700.000,00€</b>	<b>41.700.000,00€</b>	<b>9.355.789</b>	<b>100%</b>



## Appendix Y: Capitalisation Table Summary

Summary: Cap Table TSD	Seed Round (Tranche 1) - 01/2025				Seed Round (Tranche 2) - 07/2025				Series A - 01/2026				Series B - 01/2028			
Price per share (€)	1,00 €				1,40 €				2,55 €				4,46 €			
Pre-money valuation (€)	0 €				3.900.000 €				8.600.000 €				22.000.000 €			
Post-money valuation (€)	2.777.778 €				4.400.000 €				12.600.000 €				41.700.000 €			
	Investment (€)	Newshares	Totalshares	%	Investment (€)	Newshares	Totalshares	%	Investment (€)	Newshares	Totalshares	%	Investment (€)	Newshares	Totalshares	%
Tamim Yusufi	- €	0	648.148	23,3%	- €	0	648.148	20,7%	- €	0	648.148	13,1%	- €	0	648.148	6,9%
Arthur Lückenbach	- €	0	648.148	23,3%	- €	0	648.148	20,7%	- €	0	648.148	13,1%	- €	0	648.148	6,9%
Martin Gartmann	- €	0	648.148	23,3%	- €	0	648.148	20,7%	- €	0	648.148	13,1%	- €	0	648.148	6,9%
Dr. Gonçalo Costa	- €	0	55.556	2,0%	- €	0	55.556	1,8%	- €	0	55.556	1,1%	- €	0	55.556	0,6%
Board Share Option Pool (BSOP)	- €	0	138.889	5,0%	- €	0	138.889	4,4%	- €	0	138.889	2,8%	- €	0	138.889	1,5%
Employee Share Option Pool (ESOP)	- €	0	138.889	5,0%	- €	0	138.889	4,4%	- €	0	138.889	2,8%	- €	0	138.889	1,5%
SHS Capital	500.000 €	500.000	500.000	18,0%	500.000 €	356.125	856.125	27,3%	1.600.000 €	626.781	1.482.906	30,0%	3.000.000 €	673.077	2.155.983	23,0%
Earlybird Health Tech	- €	0	0	0,0%	- €	0	0	0,0%	3.000.000 €	1.175.214	1.175.214	23,8%	6.700.000 €	1.503.205	2.678.419	28,6%
Boehringer Ingelheim Venture Fund	- €	0	0	0,0%	- €	0	0	0,0%	- €	0	0	0,0%	10.000.000 €	2.243.590	2.243.590	24,0%
	<b>500.000 €</b>	<b>500.000</b>	<b>2.777.778</b>	<b>100,0%</b>	<b>500.000 €</b>	<b>356.125</b>	<b>3.133.903</b>	<b>100,0%</b>	<b>4.600.000 €</b>	<b>1.801.984</b>	<b>4.936.897</b>	<b>100,0%</b>	<b>19.700.000 €</b>	<b>4.419.872</b>	<b>9.355.789</b>	<b>100,0%</b>

## Appendix Z: Target Exit Options and their Strategic Fit

Company	Headquarters	Description	Market Cap (bln \$)	Type	Public	Strategic Fit	Evaluation of Fit	Link
Johnson & Johnson	USA	A global healthcare leader manufacturing a broad range of medical devices, pharmaceutical, and consumer health products.	428.5	Healthcare	Yes	10	Perfect complement to their surgical and wound closure products, TSD would introduce a new advanced wound care technology, enhancing their portfolio and leveraging their strong market presence in healthcare. This aligns perfectly with their strategic focus on	<a href="http://www.jnj.com">www.jnj.com</a>
Medtronic	Ireland	Specializes in medical technologies for various health conditions, particularly in cardiac and vascular health, diabetes, and minimally invasive therapies.	133.6	Medical Technology	Yes	8	Medtronic's existing focus on broad medical technologies provides a good, but less direct, synergy for integrating TSD's collagen-based innovations into their surgical and wound management portfolio.	<a href="http://www.medtronic.com">www.medtronic.com</a>
3M	USA	A diversified technology company heavily invested in health care, particularly known for its products in infection prevention and wound healing.	102.6	Diversified	Yes	8	3M's broad healthcare portfolio would benefit from the addition of TSD, adding advanced collagen-based technology to their offerings and enhancing their wound care segment, though their diversified focus may dilute the strategic impact of this addition.	<a href="http://www.3m.com">www.3m.com</a>
Coloplast	Denmark	Develops and markets medical devices for wound care, ostomy, continence, and urology, focusing on improving patient comfort and clinical outcomes.	28.6	Medical Technology	Yes	10	TSD would strategically expand Coloplast's wound care capabilities with cutting-edge collagen-based technology, offering significant advancements in patient care and treatment outcomes. This acquisition perfectly matches their core mission of enhancing	<a href="http://www.coloplast.com">www.coloplast.com</a>
ConvaTec	UK	Manufactures innovative medical products for the management of chronic conditions, including a wide range of wound care therapies.	1.9	Healthcare	Yes	7	TSD could provide ConvaTec a novel product in the collagen-based wound care segment, enhancing their offerings but with a lesser impact compared to others due to their broader focus on chronic conditions.	<a href="http://www.convatec.com">www.convatec.com</a>
Stryker	USA	A medical technology company focused on surgical equipment and neurotechnology, with a growing presence in the medical products market.	79.2	Medical Technology	Yes	7	Stryker would gain a new foothold in the wound care market with TSD, complementing its surgical solutions; however, their primary focus remains on broader surgical technologies and equipment.	<a href="http://www.stryker.com">www.stryker.com</a>
Zimmer Biomet	USA	Specialized in musculoskeletal healthcare, interested in expanding into related medical sectors to complement their orthopedic and surgical solutions.	33.1	Medical Technology	Yes	7	While Zimmer Biomet could benefit from entering the wound care market with TSD, their core focus on orthopedics makes the strategic fit slightly less compelling compared to firms with a direct stake in wound care technologies.	<a href="http://www.zimmerbiomet.com">www.zimmerbiomet.com</a>
Cardinal Health	USA	A global healthcare services and products company, providing a comprehensive range of customized solutions for healthcare systems, including distribution and product supply for various medical needs.	16.0	Healthcare	Yes	6	Cardinal Health could expand into direct product manufacture with TSD, but as a distributor primarily, the strategic impact and alignment might be less direct compared to firms focused on manufacturing and product innovation.	<a href="http://www.cardinalhealth.com">www.cardinalhealth.com</a>
Baxter International	USA	Provides essential healthcare products, including dialysis therapies, sterile IV solutions, and infusion systems, but lacks a presence in the wound care sector.	38.9	Healthcare	Yes	6	Baxter's entry into wound care with TSD would diversify their portfolio; however, their primary focus on critical care and infusion systems may not align as closely with wound care technologies, making the strategic fit moderate.	<a href="http://www.baxter.com">www.baxter.com</a>
Becton Dickinson	USA	A leading medical technology company that produces medical devices, instrument systems, and reagents, with a strong focus on infection prevention and biosciences but limited involvement in wound care.	74.0	Medical Technology	Yes	6	Adding TSD would expand Becton Dickinson's product range but may not fully align with their core activities focused on biosciences and infection prevention, making the strategic fit less compelling.	<a href="http://www.bd.com">www.bd.com</a>
Boehringer Ingelheim	Germany	A global research-driven pharmaceutical company with significant expertise in animal health and prescription medicines, focusing on respiratory, cardiovascular, metabolic, and central nervous system diseases.	N/A	Pharmaceutical	No	8	The acquisition of TSD would complement Boehringer Ingelheim's strong presence in pharmaceuticals, allowing them to expand strategically into the wound care market. The advanced wound healing technology aligns well with their innovation goals and expands their global portfolio.	<a href="http://www.boehringer-ingelheim.com">www.boehringer-ingelheim.com</a>