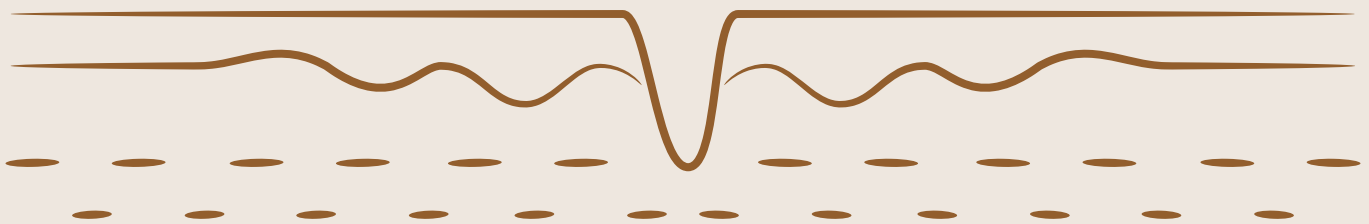


# HEALING

## FROM WITHIN

A NEPALI SUCCESS STORY

YUGESHWOR KOIRALA & YUGOTTAM KOIRALA



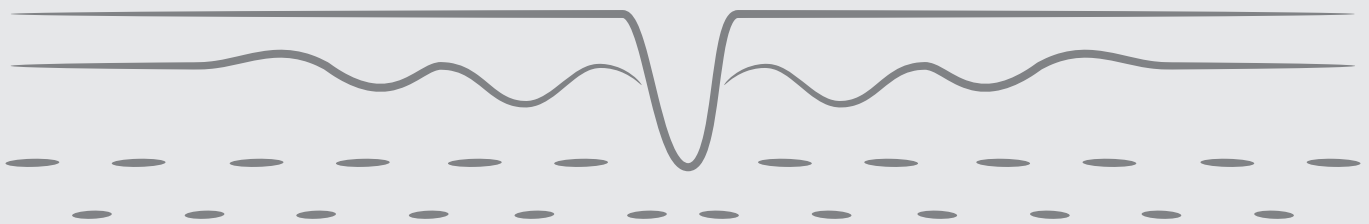


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A NEPALI SUCCESS STORY

YUGESHWOR KOIRALA & YUGOTTAM KOIRALA





Punyaarjan Foundation.

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Message



I am pleased to hear that the Punyaarjan Foundation is releasing its publication, 'Healing from Within: A Nepali Success Story', to mark seven years of success of its 'Chronic Wound Healing' program. By bringing into Nepal the 'L-PRF Natural Guided Regeneration' technology, and making it accessible through the establishment of nine wound-healing clinics across Nepal, this program has revolutionized the wound-care sector. On behalf of the Ministry of Health, it is my pleasure to extend our warmest felicitations and gratitude to the Foundation for the noteworthy impact it has created in the lives of many patients living with chronic wounds.

Further, I also commend the roles played by the team of professionals, surgeons, and nurses for their voluntary efforts in improving treatment outcomes for patients afflicted by chronic wounds. With such noble efforts, I hope Nepal can soon emerge as a pioneer in chronic wound-healing service

Thank You.

11 January, 2024

  
Mohan Bahadur Basnet  
Minister

Hon'ble Mohan Bahadur Basnet  
Minister

**Dedicated to all resilient souls worldwide enduring the profound challenges of chronic wounds, may this book offer solace, guidance, and hope on their journey toward healing.**

IN GIVING, YOU RECEIVE.

## 1

## Life-changing L-PRF

Yugeshwor Koirala, Yugottam Koirala

*Volunteers, Chronic Wound Healing Project*

In June of 2017, we found our thirteen-year-old selves in an operating room at Anandaban Leprosy Hospital. Seated meekly in a corner, we were trying to process all that was happening before us: a leprosy patient lay on a bed at the center of the room while doctors and nurses gathered around him, discussing the details of the procedure soon to begin.

To an observer, the room would have seemed to buzz with subdued energy, but everyone inside could feel the palpable tension and high-stakes: Natural-Guided Regeneration Therapy (N-GRT)—the treatment about to be carried out on the patient—could potentially heal the stubborn wound on his leg that had persisted for over a decade.

The two of us were watching the treatment live for the first time, but we knew what to expect. We had spent nights poring over articles about the therapy, and though our newly adolescent minds couldn't understand the complex underlying biology, we could easily recite the steps in order: a nurse would first draw blood from the patient and spin in a centrifuge to form jelly-like clots called L-PRF (Leukocyte-Platelet Rich Fibrin); after flattening them in a compression box, a surgeon would place the clots on the patient's wound, which would be wrapped up in white gauze.

But being able to outline the procedure was different than being able to watch it unfold before our eyes, because without even knowing it, we had to be escorted out of the room by the nurses that day. The sight of blood had rendered us both unconscious.

Blood was scary. We only ever knew it as a symbol of suffering—as the immediate aftermath of our playground mishaps, as food for prickly needles probing into our veins, and now, as something that made us black out. But how could blood, so suggestive of suffering, house the very end of pain for the patient at the hospital? How could L-PRF, derived from his own blood, cure his decades-old wound? We itched to know.

With each new treatment we observed, the procedure that once felt so unnerving to watch started becoming fascinating. And as our tolerance to the sight of blood grew, so did our understanding of its biology. We started to grasp how blood had marvelous healing properties. We learned how its minuscule constituents—cells and proteins—worked together to fight off pathogens and repair damaged tissue. This very natural property of blood was precisely what L-PRF leveraged to accelerate healing.

In the summer of 2023, we delved deeper into this biochemistry of L-PRF, working on literature reviews to examine the mechanisms and efficacy of this technology. Through this independent endeavor, driven by our willingness to closely understand the intricate process of healing, we got to appreciate this technology we had grown up watching.

The human body is nothing short of a marvel. Left on its own, it works its magic to maintain the optimum, to repair itself the best it can when damage is incurred. But through clever engineering that respects this natural tendency, this reparative ability of the body can be further amplified, and its true healing potential fully unleashed. That prospect fascinated us.

N-GRT with L-PRF introduced us to this hopeful world of regenerative medicine, but it also revealed to us a harsh reality: when simple yet groundbreaking technologies start changing lives, they face resistance. When hospital beds free up quickly because of speedy recovery from N-GRT with L-PRF, revenue takes a hit. As profits dwindle, hospitals resent the technology altogether, preventing it from being adopted widely and reaching those in need. Dr. Nelson R. Pinto and Dr. Marc Quiryren, pioneers of L-PRF and contributors to this book, feared that this would be a likely possibility; today, it is the reality in developed countries where N-GRT with L-PRF has been proposed for use—to no avail.



But this publication is testament to the fact that life-changing technologies can change lives if we let them. Through L-PRF, scores of scars have been erased for hundreds of patients in wound healing clinics across Nepal, Myanmar and beyond. Careers have been redefined for practicing medical professionals, and chronic wound care has been revolutionized. Additionally, life has changed for the two of us too—once squeamish thirteen-year-olds scared of wounds, now optimistic teenagers looking forward to healing those very wounds through regenerative medicine.

Over these seven years, not only have we witnessed a medical marvel unfolding right before our eyes, but have also been inspired by the hours of hard work, perseverance and determination that those around us—researchers, doctors and social workers—have dedicated toward this cause.

The success of the Punyaarjan Chronic Wound Healing project owes much to the sincere and selfless contributions of several individuals across various stages. Prof. Dr. Nelson Pinto and Prof. Dr. Marc Quiryren, among others, have played a pivotal role as initiators of the Natural-Guided Regeneration Therapy with L-PRF, laying the essential scientific groundwork through years of dedicated research. Their openness and willingness to share their knowledge have been invaluable to this project.

Equally important is the collaboration and connection required to transfer such technologies to those in need. Dr. Sushil Koirala of the Punyaarjan Foundation has been instrumental in introducing the L-PRF technology to Nepal and extending its reach to hospitals domestically and internationally.

Lastly, we commend the tireless efforts of the many doctors in Nepal and Myanmar who not only embraced this technology but also applied it regularly to their patients, resulting in remarkable healing outcomes.

In this story, we have tried to weave together these collective experiences, offering insights from experts and practitioners alike, and highlighting the transformative impact witnessed over the past seven years. Together, we invite you to recount this journey with us, to join us in celebrating the triumphs witnessed by patients and healthcare providers, and to embrace the hope for a future where transformative technologies like L-PRF are unhindered and ever-emerging.

Over 13 million people worldwide suffer from chronic wounds annually, a number that continues to rise with the aging global population.

Source: DOI 10.1016/J.WNDM.2014.09.002

## 2

## Background

### 2.1 Chronic Wounds

A chronic wound is characterized as a wound that either hasn't undergone a systematic and timely healing process to restore structural and functional integrity within three months or has undergone the healing process without achieving a lasting structural and functional outcome.<sup>1</sup> These wounds, including venous leg ulcers (VLU), diabetic foot ulcers (DFU), pressure ulcers (PU), arterial and neurotrophic ulcers, and leprosy ulcers, often share common biologic patterns such as prolonged inflammation, disrupted local vascularization, tissue necrosis, persistent infections, and the formation of drug-resistant microbial biofilms.<sup>2</sup>

Recognizing the root cause and factors influencing ineffective wound healing is essential for effective treatment, given the substantial hurdles chronic wounds present to patients, families, and healthcare providers. These persistent wounds not only diminish patients' quality of life but also contribute to elevated morbidity rates and decreased life expectancy.

### 2.2 Underlying Causes and Risk Factors

Injuries like cuts or bumps typically lead to wounds. However, individuals with chronic wounds often harbor an underlying condition where even minor pressure can result in non-healing wounds. These underlying conditions exacerbate the healing process, making it difficult for wounds to close and recover. The primary factors contributing to this phenomenon encompass various aspects:

**Table 2.1. Main factors that cause chronic wounds.<sup>3</sup>**

Poor circulation	Individuals with inadequate circulation, such as those affected by peripheral artery disease (PAD), often have constricted arteries. Arteries serve as conduits for delivering oxygen and essential nutrients to the body's tissues. When blood flow is compromised, wound healing typically slows down.
Venous insufficiency	Disorders like venous insufficiency in leg veins hinder blood flow to the heart, potentially leading to wounds on the lower limbs. Enlarged veins, known as varicose veins, impede blood circulation, causing swelling. This elevated pressure makes healing difficult, resulting in chronic wounds called venous leg ulcers.
Diabetes	High blood sugar in diabetes can harm foot nerves and blood vessels, leading to reduced sensation. Consequently, minor injuries and pressure (eg. from tight shoes) may go unnoticed. Poor circulation further limits oxygen and nutrient delivery to tissues, elevating the risk of chronic wounds in diabetic individuals.
Weakened immune system	A compromised immune system, such as in cancer patients, increases the risk of slow or infected wound healing. Older individuals or those with inadequate nutrition also experience delayed wound healing.
Accident injuries and destroyed tissue	A severe injury or burn resulting in large and deep wounds may test the limits of the body's natural healing capacity.
Mechanical pressure	People who spend a long time lying in bed or sitting in a wheelchair may develop pressure ulcers (bedsores) from the constant pressure put on some parts of their body by their own body weight. For the ulcers to be able to heal, the pressure needs to be taken off the affected area.

### 2.3 Physical, Psychosocial, and Financial Impacts of Chronic Wounds

Chronic wounds pose a significant global burden, affecting millions of individuals and placing immense strain on healthcare systems worldwide. The prevalence of chronic wounds is increasing due to factors such as population aging, rising rates of diabetes and obesity, and changes in lifestyle factors. According to estimates, chronic wounds affect around 1-2% of the population in

developed countries at any given time, with higher rates observed among older adults and those with underlying health conditions. For example, in the United States alone, nonhealing ulcers affect some 6 million people and present a financial burden of USD 25 billion.<sup>4</sup> Moreover, chronic wounds precede 85% of all amputations, with diabetic ulcers accounting for 70% of lower limb amputations globally. The 5-year mortality rate following amputation ranges from 40 to 70%, emphasizing the severity of the physical toll endured by affected individuals.<sup>1</sup>

<b>Psychological</b>	<b>Physical</b>	<b>Financial</b>
Social discrimination	Pain and discomfort	Medical costs
Social isolation	Obesity	Income loss
Anxiety	Debility	Unemployment
Negative body image	Risk of amputation	Physical hindrances to work
Insecurity		Caretaker costs
Sleep inconveniences		
Depression		

**Figure 2.1. The multi-tiered effects of chronic wounds.**

Chronic wounds not only cause physical discomfort and pain but also have profound psychosocial and financial consequences for individuals and society as a whole. The persistent nature of chronic wounds can lead to depression, anxiety, social isolation, and a decreased quality of life for patients. Family members and caregivers may also experience emotional distress and caregiver burden. Moreover, the financial impact of chronic wounds is significant, encompassing direct healthcare costs, such as wound care supplies, medications, and healthcare provider visits, as well as indirect costs related to lost productivity, disability, and long-term care needs. The socioeconomic burden of chronic wounds underscores the importance of implementing holistic approaches to wound management that address not only the physical aspects but also the psychosocial and financial aspects of care, ultimately improving outcomes and enhancing the well-being of individuals affected by chronic wounds.

In addition to the direct impact on individuals' health and quality of life, chronic wounds also incur substantial healthcare costs, including expenses related to wound care products, hospitalizations,

and long-term management. Furthermore, chronic wounds can lead to complications such as infections, amputations, and disability, further worsening the socioeconomic burden. Addressing the global burden of chronic wounds requires comprehensive strategies focusing on prevention, early detection, and effective management to improve patient outcomes and reduce healthcare costs.

### 2.4 Treatment Strategies

Wound care typically involves regular cleaning with saline solutions during dressing changes, although the advantages and disadvantages of using these solutions remain unclear. Debridement, the removal of dead or inflamed tissue, is a common practice to facilitate healing, employing methods ranging from manual removal to enzymatic gels or even medical-grade maggots. Dressings, including films, gauze, hydrogels, and others, aim to maintain moisture levels and prevent infection, yet their effectiveness varies, lacking comprehensive research-backed guidelines.

For wounds caused by impaired blood circulation, compression stockings or bandages may accelerate healing by improving venous return. Antibiotics may be indicated for infected wounds, though their efficacy in promoting healing is uncertain. Hyperbaric oxygen therapy, involving breathing oxygen under pressure, and negative pressure wound therapy, employing vacuum-assisted closure systems, hold promise but lack conclusive evidence of effectiveness.

In more severe cases, skin grafts may be necessary to close large wounds, with studies indicating higher closure rates compared to conventional dressings. Pain management, crucial for improving quality of life, may involve analgesic medications or specialized dressings containing pain-relieving agents, though their efficacy remains underexplored. Psychological interventions offer additional support for individuals grappling with chronic pain and its emotional toll, providing strategies to enhance coping mechanisms and overall well-being.

#### Leukocyte and Platelet-Rich Fibrin in Wound Healing

In the last five decades, the treatment of skin wounds has seen the use of blood derivatives such as fibrin glues, and platelet-derived wound healing factors, all of which are now regrouped as platelet-rich plasma (PRP), constituting a pivotal subset of platelet concentrate therapies in wound care. PRP harnesses the regenerative potential of platelets, rich in growth factors and cytokines, to promote tissue repair and regeneration. This evolution

in wound management represents a significant advancement in addressing the complex needs of patients with various types of skin wounds, including chronic ulcers and traumatic injuries.<sup>6-9</sup>

Emerging in the late 1990s, Platelet-rich fibrin (PRF) emerged as another form of platelet concentrate. Among the diverse types of PRF, leukocyte-platelet-rich fibrin (L-PRF) stands out as a second-generation platelet concentrate, derived from the patient's own blood. L-PRF has a rich composition of growth factors and proteins, gradually released over prolonged periods, thereby fostering soft tissue repair. With its promising attributes, L-PRF has emerged as a valuable biomaterial for promoting the healing of skin wounds. Numerous studies have highlighted its efficacy in facilitating the healing process of chronic ulcer wounds, underscoring its potential as an effective therapeutic intervention in wound management. These advancements mark significant progress in the quest for improved wound care modalities.<sup>10, 11</sup>

“

“Healing a patient’s wound does not change anything in this world, but it changes the entire world of that patient.”

NELSON R. PINTO

”

## 3

# The Evolution of Naturally Guided Regeneration Therapy with L-PRF

Prof. Dr. Nelson R. Pinto

*Center of Translational Medicine, Faculty of Medicine, Universidad de la Frontera, Temuco, Chile*

*Center of Regenerative Medicine and Tissue Engineering , Concepción, Chile*

*Faculty of Dentistry Universidad de Los Andes-Chile, Santiago, Chile*

The evolution of Naturally Guided Regeneration Therapy (NGR-T) has been a rich journey encompassing professional growth, personal transformation, and an unwavering commitment to advancing medical science. It all began more than two decades ago, in a serendipitous moment when treating wounds in horses with L-PRF alongside my friend and veterinary doctor, Javiera Belart, DVM.

NGR-T's impact on surgical procedures in dentistry and medicine has been profound, paralleled by a deep exploration of the body's natural healing potential. From treating poor prognosis lesions in horses to engaging in in-vitro studies, over time, we discovered the latent healing capabilities within the body.

Transitioning from equine medicine to human clinics brought its own set of challenges and triumphs, and understanding tissue repair and regeneration reshaped my approach, emphasizing the body's innate capacity to heal on its own when guided appropriately.

A pivotal moment came in 2012 when we presented successful findings at the 4th Congress of the World Union of Wound Healing Societies in Japan. This recognition marked a turning

point, fueling my commitment to push the boundaries of medical science. By expanding NGR-T applications to diverse medical areas, we saw continuous evolution and success stories.

Collaborations with professionals worldwide, like Dr. Yelka Zamora from Costa Rica and Dr. Sushil Koirala from Nepal, and encounters with individuals like Dr. Enrico Rescigno, MD, from Italy, who led the medical team in corroborating and publishing our findings, further solidified the transformative nature of NGR-T.

A pivotal contribution to the better understanding of L-PRF and NGR-T comes from the dedicated research of Professor Marc Quiryne and his group from the Catholic University of Leuven. Over the past ten years, Professor Quiryne and his team have delved into the intrinsic characteristics of L-PRF, investigating how it can influence the evolution and management of wounds in both medicine and dentistry. Their comprehensive research efforts have significantly contributed to the growing body of scientific evidence supporting the efficacy and potential applications of L-PRF and NGR-T.

The journey with L-PRF has not been without its share of challenges and controversies. Navigating through the complexities of standardization, dealing with personal and economic interests, and facing the clash of egos have been formidable tests. Yet, these challenges have been instrumental in shaping my resilience, determination, and unwavering commitment to the original concepts of NGR-T and L-PRF.

Looking ahead, the challenges and triumphs of the past are stepping stones for what lies in the future. The work in Nepal, particularly the collaborative efforts with the Punyaarjan Foundation, has been a cornerstone in the transformative journey of NGR-T. It holds paramount significance in shaping the therapy's impact today and lays the groundwork for facing forthcoming challenges..

Trips to Nepal were not merely professional endeavors; they were transformative experiences that left an indelible positive mark on me as a human being. The joint work with the Punyaarjan Foundation, particularly the introduction of L-PRF to treat trophic ulcers in patients with Hansen's disease (leprosy), marked a significant leap forward. This achievement elevated NGR-T to another level, demonstrating its potential to bring relief to individuals facing challenging health conditions.

"The idea that 'in giving, you receive' became more than a guiding principle—it became a tangible reality during our collaborative efforts in Nepal."

Through this partnership, the humanitarian aspect of NGR-T emerged, emphasizing its capacity not only to advance medical science but also to address real-world health challenges in underserved communities.

As we witnessed the positive impact of NGR-T in Nepal, it reaffirmed that our journey was on the right path. The experiences in Nepal became a touchstone for the global application of NGR-T, showcasing its adaptability and effectiveness in diverse medical scenarios. This not only reinforced the importance of NGR-T today but also emphasized its role in providing accessible and impactful healthcare solutions.

Several recognitions and awards have further reaffirmed the solid evolution of NGR-T. These accolades serve as testaments to the therapy's impact, acknowledging the dedication, innovation, and transformative potential embedded in its principles. The recognition received at the 4<sup>th</sup> (2012), 5<sup>th</sup> (2016) and 6<sup>th</sup> (2022) Congress of the World Union of Wound Healing Societies, is a validation that fuels a continued commitment to excellence.

As we gaze into the future, the challenges ahead serve as opportunities for growth and refinement. The transformative power of NGR-T not only revolutionizes medical practices but also propels us forward into a future where the seemingly impossible becomes routine.



[a]



[b]



[c]

[a] The Punyaarjan Foundation welcomes Dr. Nelson Pinto to Nepal for the first time (2016). [b] Dr. Nelson R. Pinto gives a live L-PRF preparation demonstration to dental surgeons in Nepal 2016. [c] Dr. Nelson Pinto presents his journey of developing the Natural Guided Regeneration Therapy with L-PRF during the Asian Congress of Tissue Regeneration in Oral Implantology and Medicine (2018).

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“Our relentless pursuit of excellence propels us forward, shaping the future of L-PRF in dentistry and beyond.”

MARC QUIRYNEN

”

## 4

## L-PRF in Dentistry and Beyond

Prof. Dr. Marc Quirynen

*Em. Professor, Department of Oral Health Science (Periodontology), Katholieke Universiteit Leuven, Belgium*

It was during a presentation by Professor Nelson Pinto from Chile in 2012 that I first encountered the concept of L-PRF. As he spoke, unveiling the potential of this revolutionary technique, I found myself grappling with a sense of disbelief. "If even half of what I'm hearing is true," I thought to myself, "it's truly remarkable." Little did I know, this moment marked the genesis of an extraordinary journey—one that would become a highlight of my career.

Our department, guided by the principle that "what can be asserted without evidence can be dismissed without evidence," emphasized the importance of evidence-based practices. With this in mind, I was driven to seek clarity and validation for the preparation and therapeutic applications of L-PRF. Thus began a series of meticulously planned and executed Randomized Controlled Trials (RCTs), aimed at providing clear recommendations based on solid evidence.

As I delved deeper into the world of L-PRF, I encountered a spectrum of reactions from the scientific community—some were fervent believers, while others remained skeptical. Determined to bridge this gap and foster greater understanding, Professor Nelson Pinto and I embarked on a monumental endeavor. In October 2016, we organized the inaugural Enhanced Natural Healing in Dentistry congress in Leuven—an event that would go down in history. Welcoming over 500 clinicians from 38 countries, including esteemed key-opinion leaders, the congress served as a

platform to exchange knowledge and experiences. The overwhelming success of this gathering spurred us to repeat it in June 2018, with even greater participation and enthusiasm.

These congresses not only validated the applicability of L-PRF but also underscored its simplicity in oral surgery procedures. From guided tissue regeneration to ridge preservation, from sinus floor augmentation to enhancing osseointegration—L-PRF emerged as a versatile tool, transforming the landscape of periodontal techniques. Today, its integration into our perio-clinic is seamless, yielding consistently remarkable results across a myriad of applications.

But our journey didn't end with successful congresses and widespread adoption. Recognizing the need for comprehensive guidance, Professor Nelson Pinto and I embarked on another ambitious project. We decided to distill our collective knowledge and experiences into a comprehensive resource—a book titled "Leukocyte- and Platelet-Rich Fibrin in Oral Regenerative Procedures." This book, free from commercial bias, serves as a beacon of evidence-based recommendations, complemented by step-by-step flow charts and illustrative case studies.

Yet, our efforts extended beyond the realm of dentistry. We recognized the potential of L-PRF in the treatment of chronic wounds, such as diabetic foot ulcers and pressure sores. Despite initial skepticism, we persevered, organizing gatherings and sharing success stories from practitioners worldwide. Gradually, the tide turned, and today, L-PRF is hailed as a game-changer in wound management, with its efficacy validated in universities and specialized centers globally. This would never have happened without the encouraging feedback from colleagues worldwide (Dr. Yelka Zamora from Costa Rica, Dr. Sushil Koirala from Nepal and Dr. Enrico Rescigno from Italy).

However, our journey is far from over. We recognize the importance of continually refining treatment protocols and enhancing procedural techniques. To this end, I took the initiative to create a website—a hub of knowledge and resources dedicated to L-PRF. Though in its nascent stages, the website aims to empower clinicians with educational videos, clinical recommendations, and interactive flow charts.

"Wisdom is not a product of schooling but of the lifelong attempt to acquire it." As I reflect on our journey, I am reminded of the profound truth in these words. Our pursuit of knowledge and excellence knows no bounds, and it is this relentless pursuit that propels us forward, shaping the future of dentistry and beyond.



**[a]** Dr. Marc Quiryren welcomes speakers to the Second Enhanced Natural Healing in Dentistry Congress in Leuven, Belgium (2018). **[b]** Dr. Marc Quiryren gifts the book 'Leukocyte and Platelet-Rich Fibrin in Oral Regenerative Procedures', co-authored by him and Dr. Nelson Pinto, to the Punyaarjan Foundation (2023).

“

“When goodwill connects good people, good impact is guaranteed.”

SUSHIL KOIRALA

”

## 5

# Harnessing the Power of Healing from Within

Dr. Sushil Koirala

*Chronic Wound Healing Project, Punyaarjan Foundation*

*Chairman, National Dental Hospital Ltd, Nepal*

In late 2014, I embarked on a journey to understand the science of L-PRF and its clinical applications. When invited by the Thai Implant Association to chair a scientific session during the 2015 Bangkok Implant Symposium, I was especially fascinated by a lecture towards the end of the session: "Challenging the Paradigms of Hard and Soft Tissue Regeneration; Natural Guided Regeneration," by Prof. Dr. Nelson Pinto.

While initially focused on dental implantology, Dr Pinto's presentation on using Natural Guided Regeneration Therapy (N-GRT) with L-PRF to heal chronic foot ulcers opened my eyes to the profound impact of modern science and technology on humanity. It resonated deeply with the principles of Vedic philosophy—to respect nature, do no harm, and promote healing from within—which have guided my own career.

Inspired by Dr Pinto's work, I reached out to him to bring his expertise to Nepal. At Punyaarjan Foundation, our primary goal has always been to transfer technologies that benefit humanity. Hence, learning about N-GRT and L-PRF marked the beginning of our Chronic Wound Healing Project, aimed at establishing wound healing clinics across South Asia, and providing affordable treatment to those in need.

I consulted regarding this intended pursuit with Prof. Dr. KD Joshi, pioneer of plastic surgery in Nepal, from whom I received great encouragement to move forward with this endeavor of introducing this technology to Nepal's medical sector. In March 2016, Dr Pinto visited Nepal, where he trained medical and dental professionals and inaugurated the first clinic at Kirtipur Hospital. Since then, the Foundation has expanded to nine clinics in Nepal and three in Myanmar, with successful projects treating leprosy-related foot ulcers and other chronic wounds.

In 2018, I had the opportunity to share these very experiences at the second 'Enhanced Natural Healing in Dentistry' congress in Leuven, Belgium on the invitation of the Department of Periodontology, Catholic University of Leuven. Not only was this an amazing platform for showcasing the untapped healing powers of L-PRF, but it also became an important reminder for me: When goodwill connects good people, good impact is guaranteed.

Over time, as the number of wound clinics grew in Nepal, the foundation felt the need to go a step further. Through the Asian College of Oral Implantology & Tissue Regeneration, and in collaboration with Public Health Concern Trust Nepal, National Dental Hospital, and Nepal Oral Implantology Association, we conducted The Asian Congress of Oral Implantology and Tissue Regeneration in Nepal in 2018, featuring speakers and participants from eleven countries. This marked a significant milestone for the Punyaarjan Foundation, solidifying Nepal's position as an Asian hub for Natural Guided Regeneration Therapy in medicine and dentistry.

My gratitude goes to all the doctors and medical professionals dedicated to promoting this technology, especially to Prof. Dr. Shankar Man Rai and Prof. Dr. Indra Napit in Nepal and Dr. Sam Nay Aung in Myanmar. After years of teamwork and numerous successful cases, the Foundation is confident that N-GRT with L-PRF is the simplest, most affordable, and predictable approach to treating extra-oral wounds and for tissue regeneration in dental medicine. Moving forward, we are in the process of setting up the 'Asian Center for N-GRT - Training & Research' at National Dental Hospital, Kathmandu, to further promote this technology in Asia.



**[a]** Dr. Sushil Koirala and Dr. Myat Nyan with Dr. Nelson R. Pinto during the Bangkok Implant Symposium (2015)

**[b]** Members of the Punyaarjan Foundation with Dr. Nelson R. Pinto during the NGRT with L-PRF technology transfer Nepal visit (2016).



[c]



[d]



[f]



[e]



[c] Dr. Nelson Pinto meets Dr. Shankar Rai, a pioneer in plastic reconstructive surgery at Kirtipur Hospital (2016) [d] Dr. Nelson R. Pinto presents about the Natural-Guided Regeneration Therapy to the Department of Burns and Reconstructive Surgery at Kirtipur Hospital (2016) [e] Dr. Nelson R. Pinto presents to undergraduate students at the Dhulikhel Hospital (2016) [f] Dr. Rajendra Koju, Dean of KUSMS, and Dr. Sushil Koirala with Dr. Nelson Pinto.

## HEALING FROM WITHIN



[f] Dr. Nelson R. Pinto presents the use of N-GRT with L-PRF in dentistry at the Nepal Periodontal Society (2016) [g] Dr. Shaili Pradhan, on behalf of Nepal Periodontal Society, presents a memento to Dr. Nelson Pinto [h] [i] Dr. Sushil Koirala with Dr. Nelson R. Pinto at the Western Regional Hospital in Pokhara (2016) [j] Dr. Nelson R. Pinto presents about the use of L-PRF for treating chronic wounds to doctors and nurses at the Western Regional Hospital in Pokhara.



**[k]** Dr. Nelson R. Pinto accepts a token after presenting about the future of wound healing with L-PRF at a Continuing Dental Education program in Pokhara (2016). **[l]** Dr. Nelson Pinto takes an exclusive hands-on workshop on Natural-Guided Regeneration Therapy in dental medicine for Nepali practitioners (2016). **[m]** Dr. Sushil Koirala with Dr. Nelson R. Pinto at the T.U. Teaching Hospital (2016). **[n]** Dr. Nelson R. Pinto presents about the Natural-Guided Regeneration Therapy to the plastic surgery department at Tribhuvan University Teaching Hospital (2016).

Promoting humanity through  
science & technology.



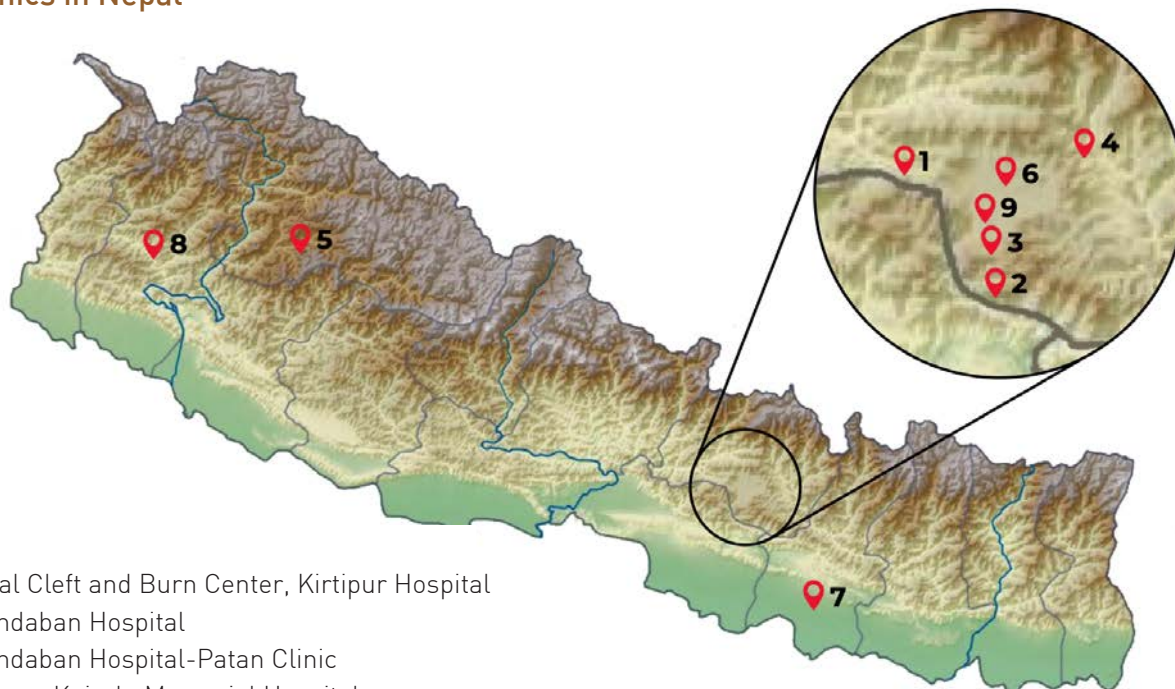
## Punyaarjan Wound Healing Clinics

Punyaarjan Foundation's Chronic Wound Healing Project centers around one pivotal fact: Natural-Guided Regeneration Therapy (N-GRT) with L-PRF is life-changing for the chronically wounded, autologous, cost-effective and also easily transferable. The goal, therefore, is to take it to as many locations as possible.

The Foundation trains local medical professionals through live demonstrations and establishes wound healing clinics under the 'Punyaarjan Wound Healing Clinic Management Protocol'. It donates FDA-cleared medical centrifuges to healthcare organizations with each new clinic, ensuring they have the necessary equipment for L-PRF preparation.

March 2024 marks the seventh anniversary since Punyaarjan embarked on its wound healing journey. With 9 clinics set up across Nepal, treatment with L-PRF is now accessible to people in 4 provinces. Likewise, the project's Myanmar Chapter has established a total of three clinics in Yangon and Mandalay.

### 6.1 Clinics in Nepal



- 1 Nepal Cleft and Burn Center, Kirtipur Hospital
- 2 Anandaban Hospital
- 3 Anandaban Hospital-Patan Clinic
- 4 Sushma Koirala Memorial Hospital
- 5 Karnali Academy of Health Science
- 6 Burn & Plastic Surgery Department (NAMS), Bir Hospital
- 7 Lalgadh Leprosy Hospital
- 8 Bayalpata Hospital
- 9 Hospice Nepal

**Punyaarjan Wound  
Healing Clinics in Nepal**

Clinic	Location	Date of Establishment	Target Wounds
Kirtipur Hospital	Devdhoka, Kirtipur	March 24, 2016	Complex Wounds, Burns
Anandaban Hospital	Lele	February 14, 2018	Leprosy Ulcers
Anandaban Hospital, Patan Clinic	Talchhikhel, Lalitpur	February 18, 2018	Chronic Wounds
Sushma Koirala Memorial Hospital	Sankhu, Kathmandu	24th June 2018	Burns, Complex Wounds
Karnali Academy of Health Science	Khalanga, Jumla	30th June 2018	Burns, Chronic Wounds
Bir Hospital	Kathmandu	25th January 2019	Burns
Lalgadh Leprosy Hospital	Lalgadh, Dhanusa	1st March, 2022	Leprosy Ulcers
Bayalpata Hospital	Sanfebagar, Accham	18th March, 2022	Acute Open Fracture Wounds, Chronic Wounds
Hospice Nepal	Lalitpur	14th June, 2022	Pressure Ulcers (Bedsores)

### 6.1.1 Kirtipur Hospital

Kirtipur Hospital is a community hospital run by the PHECT Nepal (Public Health Concern Trust) along with Kirtipur Municipality. The Nepal Cleft and Burn Center, under Kirtipur Hospital, is an acute burn treatment facility that specializes in the treatment of cleft lip and palate and burns.



## Report

### Dr. Bishal Karki

*Department of Burns, Plastic, and Reconstructive Surgery, Kirtipur Hospital*

A groundbreaking journey in the treatment of chronic and complex wounds began in the Department of Burns, Plastic, and Reconstructive Surgery at Kirtipur Hospital, when the Punyaarjan Foundation introduced the Natural-Guided Regeneration Therapy with Leukocyte-Platelet Rich Fibrin (L-PRF) to the plastic surgery team. The Foundation's pivotal role in introducing Dr. Nelson Pinto and facilitating the generous donation of the L-PRF Intra-spin centrifuge machine and accessories to our department was acknowledged with gratitude.

Dr. Nelson Pinto's presentation of the concept of L-PRF Natural Guided Regeneration to our plastic surgical team was momentous. It not only served as an educational session for us but also ignited a sense of excitement and anticipation among the team members. The prospect of adding this innovative technology to our arsenal of wound treatment options was met with enthusiasm and a collective understanding of its potential impact.

This set the stage for a transformative study I conducted for my thesis for M.Ch. Plastic Surgery under the close supervision of Prof. Dr. Shankar Man Rai and Dr Kiran K. Nakarmi, the visionary leaders of the Department of Burns, Plastic, and Reconstructive Surgery who played pivotal roles in the study. Punyaarjan Foundation's weekly reviews and valuable suggestions contributed significantly to the progress of the study.

The study, aimed at evaluating the efficacy of L-PRF in treating complex wounds, involved 30 patients with various types of chronic ulcers. The outcomes were analyzed meticulously, revealing that L-PRF demonstrated remarkable effectiveness in promoting healing. The majority of patients experienced complete healing in an average period of 5.27 days and the overall healing rate was 73.3%.

This remarkable result was seen in the candidates who were otherwise high-risk patients for surgical treatments, already victims of surgical complications who had treatment at many other centers, or economically challenged.

*“The entirely autologous nature of L-PRF is a game-changer, minimizing the risk of serious adverse effects. This not only ensures the safety of patients but also addresses concerns related to the accessibility of advanced medical interventions.”*

The journey towards integrating an innovative technique like L-PRF into the medical landscape was not without its share of challenges. One obstacle encountered was the requirement for ethical clearance, a necessary step when introducing a novel medical procedure. The research team navigated this hurdle successfully, thanks to the pivotal study that demonstrated the safety of L-PRF, showcasing its potential as a risk-free treatment option for complex wounds. The study's pilot phase, conducted at Kirtipur Hospital, demonstrated promising results, with 75% of patients showing wound healing within seven weeks of L-PRF application. This boosted our confidence in treating the patients with complex and chronic wounds.

Another obstacle faced was the identification of suitable patients willing to undergo the L-PRF procedure. Given that L-PRF was a new and innovative approach, potential patients were cautious or hesitant to participate. The task of finding individuals willing to undergo the procedure hence required a delicate balance of communication, education, and understanding.

Overcoming this challenge involved building trust with potential participants, ensuring they were well-informed about the procedure's safety and potential benefits. Establishing open lines of communication between the medical team and prospective patients played a key role in addressing any concerns and facilitating the willingness to participate in the study.

The study highlighted the versatility of L-PRF, showcasing its success in treating pressure sores, venous ulcers and post-traumatic ulcers, which comprised a significant portion of the complex wounds under investigation.

There was a female patient who had multiple failed surgeries for her lower limb venous ulcer at different hospitals of Nepal and was finally suggested for a below-knee amputation by a surgeon as the wound didn't heal for about 2 years. When she visited us, we explained to her about this technology, and she agreed to undergo L-PRF treatment. Her wound healed in about 10 days. She still comes to our out-patient with fruits and ghee as a gesture of thanks.

I would like to emphasize the importance of this study in the context of Nepal, where most of the people are living below the poverty line. The simplicity and low cost of the procedure make it a promising tool, particularly for economically challenged patients who would otherwise require major surgery, prolonged hospital stay and a huge financial burden.

The research's simplicity and cost-effectiveness underscore its potential to revolutionize wound care in Nepal. As the study paves the way for future research, it marks a significant milestone in the journey toward innovative and accessible wound care solutions for the people of Nepal.

Indeed, the significance of this study extends beyond the confines of Kirtipur Hospital, reaching out to surgeons globally. The findings contribute valuable insights into the treatment of complex wounds, providing a potential alternative that not only proves effective but also offers a cost-effective and innovative solution.

The entirely autologous nature of L-PRF is a game-changer, minimizing the risk of serious adverse effects. This not only ensures the safety of patients but also addresses concerns related to the accessibility of advanced medical interventions. The study, in its simplicity and cost-effectiveness, offers a beacon of hope for economically challenged patients in Nepal and serves as a model for other regions facing similar challenges.

Acknowledging the collaborative efforts, I would also like to express my gratitude to Drs. Mangal Gharti Magar, Krishna Nagarkoti, Sunil Thapa, Piyush Giri, Apar Lamichhane, Niran Maharjan, Sanjay Paswaan, and Anushree Maharjan. Special recognition should also be given to our dedicated nurses, including Rojina Maharjan and Indira Maharjan, who played a vital role in facilitating the procedures. Their contributions were instrumental in the success of the study.

# HEALING FROM WITHIN



**[a]** The unveiling of the first Punyaarjan Wound Healing Clinic at Kirtipur Hospital (2016). **[b]** Dr. Nelson Pinto in conversation with Dr. Kiran Nakarmi, director of Kirtipur Hospital, and Dr. Bishal Karki, before a live L-PRF demonstration. **[c]** Dr. Bishal Karki, after completing his Master's thesis on 'Outcome of Leukocyte-and-Platelet Rich Fibrin Treatment on Complex Wounds', shares a joyful moment with Dr. Sushil Koirala (2017).

### 6.1.2 Anandaban Hospital

Anandaban Hospital is a health facility that has been providing specialist tertiary leprosy care. Operating with the support of The Leprosy Mission (TLM) Nepal, the Hospital, hospital receives a large number of leprosy referrals from across Nepal and India each year, providing service to about 50,000 leprosy and general patients.



Photo: The Leprosy Mission

## Report

### Prof. Dr. Indra Napit

*Senior Orthopedic and Reconstructive Surgeon, Anandaban Hospital*

While advanced techniques exist for leprosy ulcer care, they are often costly and may not offer significant advantages over standard methods. Autologous blood products like L-PRF, therefore, provide a cost-effective alternative.

Unlike standard techniques requiring daily dressing changes, L-PRF dressing is repeated weekly, reducing costs and simplifying care. Numerous scientific studies support its effectiveness in wound healing, with applications in diabetes, venous ulcers, and dentistry.

Anandaban Hospital, a tertiary leprosy care center in Nepal, adopted the L-PRF technique for ulcer management in December 2017, following the establishment of the L-PRF facility at the Hospital and the donation of two L-PRF setups (centrifuge machine and instruments) from the Punyaarjan Foundation.

## HEALING FROM WITHIN

With training provided by the Foundation, the use of L-PRF in leprosy foot ulcers has achieved remarkable results, benefiting over 800 patients and their families. With this success, Anandaban Hospital has received positive responses from fellow countries in The Leprosy Mission (TLM).

Countering the societal stigma and ostracization faced by leprosy patients presents a formidable challenge. Deep-rooted beliefs attributing the disease to divine punishment perpetuate the prejudice, leading to situations where even medical professionals hesitate to provide care. Nepal's legal framework further compounds the issue, allowing for marital dissolution on grounds of leprosy.

“Despite these challenges, the advent of L-PRF offers a potent tool in combating not just the disease but also the stigma associated with it.”

The Hospital has become a training center for L-PRF and has conducted successful wound-care management programs both nationally and internationally. Additionally, the hospital has completed a randomized controlled trial to evaluate the effectiveness of L-PRF, with results forthcoming.



[a] Punyaarjan Foundation with the Anandaban Hospital Team (2018). [b] During a live chronic wound treatment demonstration, Dr. Sushil Koirala dresses a leprosy plantar ulcer with L-PRF at Anandaban Hospital (2018).

### 6.1.3 Anandaban Hospital - Patan Clinic

The Patan Clinic is a town-branch of the Anandaban Hospital, Lele. It was established to make the health services provided by Anandaban Hospital more accessible to locals in Patan and nearby communities.



**[a]** Anandaban Hospital - Patan Clinic. **[b]** Signing of MOU between Punyaarjan Foundation and Anandaban Hospital - Patan Clinic followed by centrifuge donation to the Hospital, represented by Dr. Indra Napit (2018). **[c]** A nurse at Anandaban Hospital, Patan Clinic, prepares to draw blood from a wounded patient to prepare L-PRF clots.

### 6.1.4 Sushma Koirala Memorial Hospital

The Sushma Koirala Memorial Hospital is a healthcare center specialized to dispense burn and reconstructive surgery treatment. Established in 1997, the SKM Hospital is a joint project of Interplast Germany Foundation, Sushma Koirala Memorial Trust and Social Welfare Council.



[a] Sushma Koirala Memorial Hospital, Sankhu. [b] Signing of MOU between Punyaarjan Foundation and Bayalpata Hospital, followed by centrifuge donation to the Hospital, represented by Dr. Jaswan Shakya, in the presence of Ex-Deputy Prime Minister, Sujata Koirala (2018). [c] Dr. Sushil Koirala presents the L-PRF technique to the medical team at the Sushma Koirala Memorial Hospital (2018).

### 6.1.5 Karnali Academy of Health Science

Karnali Academy of Health Sciences (KAHS), established in 2011, aims to enable access to quality healthcare services and education for the people of remote areas at an affordable cost. KAHS has achieved this by establishing a health institute at Jumla and KAHS district to produce skilled health professionals to deliver quality health care services and conduct health research.



[a] Karnali Academy of Health Science, Jumla. [b] Signing of MOU between Punyaarjan Foundation and Karnali Academy of Health Science, followed by centrifuge donation by Dr. Shankar Man Rai and Dr. KD Joshi, on behalf of Punyaarjan Foundation, to Dr. Suryaman Mayangbo, representing the Academy (2018). [c] Dr. Ishwar Lohani hands over the Punyaarjan Wound Healing Clinic token to Dr. Suryaman Mayangbo (2018).

### 6.1.6 Burn & Plastic Surgery Department, National Academy of Medical Sciences (NAMS), Bir Hospital

Bir Hospital, the oldest hospital of Nepal, established in 1889, is one of the busiest in Nepal. The separate Burns and Plastic surgery unit was established in the year 1998, with 10 beds including intensive care services in Bir hospital. The unit provides treatment for burns and plastic surgery services free of cost.



**[a]** Bir Hospital, Kathmandu. **[b]** Signing of MOU between Punyaarjan Foundation and NAMS, Bir Hospital, represented by Dr. Peeyush Dahal (2018). **[c]** Punyaarjan Foundation donates a centrifuge to NAMS (2018). **[d]** The general ward at Bir Hospital.

### 6.1.7 Lalgadh Leprosy Hospital

One of Nepal's busiest leprosy hospitals, Lalgadh Leprosy Hospital and Services Center has an annual patient-flow of over 1,100 new leprosy patients. Managed by the Nepal Leprosy Trust (NLT), the Hospital has over 12,000 total leprosy consultations per year, and over 110,000 outpatient consultations.



## Report

### Dr. Krishna Tamang

*Deputy Medical Director, Nepal Leprosy Trust, Lalgadh Leprosy Hospital*

The Leukocyte and Platelet-rich Fibrin (L-PRF) treatment at Lalgadh Leprosy Hospital and Services Centre (LLHSC) in collaboration with the Punyaarjan Foundation aims to improve ulcer healing in leprosy patients. Initiated on March 1, 2022, the wound healing service has seen encouraging results, suggesting the potential for transforming leprosy treatment approaches.

LLHSC, managed by the Nepal Leprosy Trust (NLT) in the Dhanusha district of Madhesh Province, Nepal, is situated in an area with a high prevalence of leprosy cases. The facility plays a crucial role in the National Leprosy Control Program, treating a significant portion of new cases reported nationally. Notably, 59% of LLHSC admissions are related to leprosy-related ulcers, making it an ideal location for the L-PRF treatment to take root.

Punyaarjan Foundation's partnership with LLHSC involved comprehensive training for medical staff and the donation of an intra-spin machine crucial for L-PRF clot production. Overseeing the process, I provided regular updates to the Foundation.

## HEALING FROM WITHIN

“The success of L-PRF underscores the potential for innovative approaches in leprosy treatment, offering hope for better management of this persistent health issue.”

Of the patients with foot ulcers we have treated, 65% experienced complete ulcer healing. The treatment’s success indicates significant progress in ulcer healing rates, contributing to enhanced patient recovery and improved quality of life.

In conclusion, the L-PRF at LLHSC has demonstrated promising results in improving ulcer healing rates among leprosy patients. This success underscores the potential for innovative approaches in leprosy treatment, offering hope for better management of this persistent health issue.



**[a]** Signing of MOU between Punyaarjan Foundation and Lalgadh Leprosy Hospital, represented by Dr. Krishna Tamang (2022). **[b]** Presentation of the L-PRF procedure by Punyaarjan Foundation to the Lalgadh Hospital team (2022). **[c]** Live demonstration of the treatment of a patient’s leprosy ulcer. **[d]** Punyaarjan Foundation with the Lalgadh Leprosy Hospital surgical team after dressing a patient’s foot ulcer with LPRF (2022).

### 6.1.8 Bayalpata Hospital

Bayalpata hospital, located in Achham, delivers low-cost, high-quality care to more than 100,000 patients a year from all over Achham and its six surrounding districts. The hospital is managed by Nyaya Health Nepal (NHN).



Photo: Monika Deupala, Nepali Times

## Report

### Dr. Mandeep Pathak

*Orthopedic surgeon, Bayalpata Hospital*

Nyaya Health Nepal (NHN) is a non-governmental organization established in 2008, providing integrated healthcare in Achham District, far-western Nepal. Operating in two municipalities and four rural municipalities, NHN manages Bayalpata Hospital in Sanfegagar Municipality in partnership with Sudurpaschim Province and local governments. They utilize a network of Community Health Workers (CHWs) interconnected through an Electronic Health Record (EHR) system.

NHN's community healthcare strategy prioritizes efficient services, focusing on women, children, and individuals with infectious and chronic conditions, all provided without charging fees at the point of service delivery.

In this context, the integration of L-PRF technology has significantly enhanced our practice, particularly in the realm of chronic wound management. The simplicity of the device's operation and the quality of the resulting L-PRF clot have proven invaluable for hospitals like ours, where our aim is to deliver dignified, quality healthcare without imposing substantial financial burdens on patients.

“The device's ease of use and the high-quality L-PRF clot it produces are invaluable for hospitals like ours, committed to providing quality healthcare without imposing financial burdens on patients.”

Across a broad spectrum of cases, ranging from persistent non-healing ulcers to acute wounds resulting from open fractures, NHN has consistently observed impressive outcomes with L-PRF therapy.

Through the adoption of innovative medical solutions such as L-PRF technology, NHN remains steadfast in its dedication to excellence, ensuring that even in settings with limited resources, patients receive the utmost standard of care. This commitment not only promotes healthier communities but also promises brighter futures for all individuals under our care.



Signing of MOU between Punyaarjan Foundation and Bayalpata Hospital, followed by centrifuge donation to the Hospital, represented by Srijana Devkota Adhikari, Deputy Communications Director of Nyaya Health Nepal (NHN), in the presence of Kunda Dixit, Chairperson of NHN, and Dr. Bhaskar Raj Pant, Treasurer of NHN. (2022).

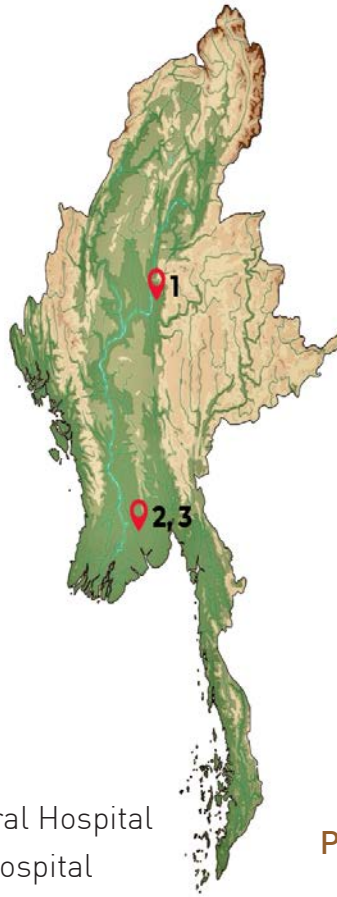
### 6.1.9 Hospice Nepal

Hospice Nepal is the first Palliative Care Centre established in Nepal that cares for patients suffering from life-threatening illness, particularly cancer when curative treatment options run out. It is a non profit charity organization registered with the Government of Nepal.



Signing of MOU between Punyaarjan Foundation and Hospice Nepal, followed by centrifuge donation to the Hospital, represented by Om Rajbhandary, Founder and President, in the presence of Dr. Rajesh Gongal, Founding President and Member (2022).

6.2 Clinics in Myanmar



- 1 Yenanthar Leprosy Hospital
- 2 Department of Dermatology, Yangon General Hospital
- 3 Orthopedic Department, Yangon General Hospital

**Punyaarjan Wound Healing Clinics in Myanmar**

Clinic	Location	Date of Establishment	Target Wounds
Yenanthar Leprosy Hospital	Mandalay, Myanmar	25th February, 2019	Leprosy Ulcers, Complex Wounds
Department of Dermatology, Yangon General Hospital	Yangon, Myanmar	25th February, 2019	Chronic Skin Wounds
Orthopedic Department, Yangon General Hospital	Yangon, Myanmar	10th March, 2019	Open Fracture Wounds, Deep Bone Ulcers, Chronic Wounds

### 6.2.1 Yenanthar Leprosy Hospital

The Leprosy Hospital of Mandalay, in Yenanthar Village, Mandalay, Myanmar, was founded in 1990. The hospital, managed by a medical superintendent, consultant surgeon, two assistant surgeons and matrons, sisters, and nurses, has one male and one female patient wards, with outpatient wards open for patients and their families from leper village. Most of the patients seek treatment for leprosy and other skin diseases such as eczema, and dermatitis.



**[a]** On behalf of the Yenanthar Leprosy Hospital, Prof. Dr. Myat Nyan accepts a centrifuge for L-PRF preparation from the Punyaarjan Foundation (2019). **[b]** On behalf of the Yenanthar Leprosy Hospital, Prof. Dr. Myat Nyan accepts a centrifuge for L-PRF preparation from the Punyaarjan Foundation (2019). **[c]** The general ward at Yenanthar Leprosy Hospital, Mandalay, Myanmar, where the Punyaarjan Foundation inaugurated a wound clinic, where Dr. Sithu Wan continued to use the L-PRF treatment on leprosy patients.

## 6.2.2 Yangon General Hospital

Yangon General Hospital is a prominent public hospital in Yangon, Myanmar. The 2,000-bed hospital consists of seven medical wards, three surgical wards, two trauma and orthopedic wards, and 28 specialist departments for inpatient care. Punyaarjan Foundation has established two clinics at the Hospital: at the Dermatology and Orthopedic Departments.



**Dr. Nay Aung**

**Report**

*Chronic Wound Healing Project, Myanmar Chapter, Punyaarjan Foundation*

In 2019, the Punyaarjan Foundation embarked on a mission from Nepal to Myanmar, aiming to provide crucial assistance to chronically wounded patients in dire need of support.

The Myanmar chapter began following my introduction to Dr. Sushil Koirala, renowned for his expertise in teaching Minimally Invasive Cosmetic Dentistry (MiCD). However, his lesser-known work through the Punyaarjan Foundation with the L-PRF technology truly captured my attention. Witnessing firsthand the impact of this technology at a hospital in Kathmandu was both surprising and inspiring.

Collaborative efforts then got off the ground with the guidance of Associate Prof. Dr. Myat Nyan, a respected mentor in Myanmar. Engagements with key figures in dermatology and orthopedic

departments, including Prof. Khine Khine Zaw and Prof. Dr. Myint Thaug, resulted in enthusiastic support for the adoption of the L-PRF technology.

On February 23, 2019, Punyaarjan Foundation conducted educational sessions on L-PRF usage at Yangon General Hospital and donated L-PRF machines to both Yangon and Mandalay in the presence of the honorable Nepali Ambassador to Myanmar, Mr. Bhim K Udas.

Following the introduction of L-PRF technology, subsequent research by an MSc candidate provided empirical evidence of its remarkable efficacy in diabetic wound healing. This reinforced the notion that L-PRF represents a valuable intervention for addressing challenging complications associated with diabetic ulcers, potentially averting the need for amputation.

“L-PRF represents a valuable intervention for addressing challenging complications associated with diabetic ulcers, potentially averting the need for amputation.”

We continued the dissemination of knowledge with a presentation at the Myanmar Wound Care Society Summit in September 2019. As a member of the Punyaarjan Foundation, I am honored to contribute to this impactful project, dedicated to spreading awareness and providing assistance to those in need.



**[a]** Rector Dr. Yiyi Myint, of the Yangon General Hospital receives an L-PRF centrifuge from the Punyaarjan Foundation for the hospital’s Dermatology Department (2019). **[b]** Dr. Sushil Koirala presents about the use of L-PRF in leprosy wounds.



[c] Dr. Sushil Koirala giving a live L-PRF demonstration to the Department of Dermatology, Yangon General Hospital (2019). [d] Prof. Khin Maung Myint, head of the Yangon General Hospital Orthopedic Department and president of the Myanmar Orthopedic Society, receives an L-PRF centrifuge from the Punyaarjan Foundation.



[e] Dr. Sushil Koirala in conversation with Prof. Dr. Myint Thaug, President of the Myanmar Wound Care Society, and Chief of the Orthopedic and Trauma Department, Yangon General Hospital [f] The honorable Nepali Ambassador to Myanmar, Mr. Bhim K Udas, thanks the Punyaarjan Foundation for bringing the L-PRF treatment to Myanmar.

Educating, Enlightening, Embracing.

## 7

## Awareness, Presentations & Congresses

Scientific congresses and presentations have played a crucial role in advancing Natural-Guided Regeneration Therapy with L-PRF by fostering knowledge exchange, awareness, and networking among experts, researchers, and medical practitioners worldwide. The Punyaarjan Foundation has actively participated in and organized numerous events with local and national stakeholders to create awareness on the use of N-GRT for treating oral and extra-oral wounds across Nepal. However, three international-level events emerged as pivotal platforms for elevating the project's visibility and impact. These events showcased keynote addresses, workshops, and presentations, facilitating the exchange of insights and fostering interdisciplinary dialogue.

### **7.1 Asian Congress of Tissue Regeneration in Medicine & Oral Implantology**

16 - 18 March 2018, Nepal

Under the Punyaarjan Chronic Wound Healing Project, and in collaboration with the Asian College of Oral Implantology & Tissue Regeneration, Public Health Concern Trust Nepal, National Dental Hospital, and Nepal Oral Implantology Association, the Punyaarjan Foundation organized a 3 day-long congress on Tissue Regeneration in Medicine and Oral Implantology in Nepal, with speakers from 11 countries.

The Congress speakers included Prof. Dr. Nelson R. Pinto (Chile), Prof. Dott. Paolo G. Morselli (Italy), Dr. Robert Horowitz (USA), Dr. Myat Nyan (Myanmar), Dr. Chakra Raj Pandey (Nepal), Dr. Nicea Baptista Pardo (Brazil), Dr. Jinhwan Kim (Korea), Dr. Rajapas Panichuttra (Thailand), Dr. Mostaque Sattar (Bangladesh), Dr. Ashis Kakar (India), Dr. Lanka Mahesh (India) and Dr. Sandeep Singh (India). These renowned speakers, each an expert in the application of tissue regeneration in their field, voluntarily participated as Punyaarjan Knowledge Philanthropists, selflessly sharing their knowledge for the benefit of the profession and humanity.

The conference moderators included Prof. Dr. Keshav D Joshi, Prof. Dr. Shaili Pradhan, Prof. Dr. Binod Acharya, Prof. Dr. Sarita Joshi, Prof. Dr. Suraj B Mathema and Prof. Dr. Surendra M Shrestha.

Two workshops were also conducted during the three days. The pre-congress workshop on Advanced Techniques in Tissue Regeneration & Bone Management was moderated by Prof. Dr. Myat Nyan (Myanmar), with speakers Dr. Robert Horowitz (USA) and Prof. Dr. Nelson R Pinto (Chile). Likewise, the post-congress workshop on Implant Occlusion & Prosthetic Design was moderated by Dr. Jinhwan Kim (Korea), with speakers Dr. Rajapas Panichuttra (Thailand), Dr. Vikas Aggarwal (India), and Dr. Sushil Koirala (Nepal).





[a]



[b]



[c]



[d]



[e]

[a] Dr. Shankar Man Rai, Congress Co-chairman, welcomes speakers and participants. [b] Dr. Anarkali Piya, Conference Coordinator, explains the conference details to all guests. [c] Dr. Paolo G Morselli (Italy), one of the 12 Congress Speakers, presents 'Autologous Fat Transplantation: Clinical applications using Lull pgm System' [d] Dr. Nicea B Pardo (Brazil) presents 'Plasma Rich Platelets ( PRP) Orofacial Rejuvenation' [e] Senior orthopedic surgeon Dr. Chakra R Pandey (Nepal) presents 'Plasma Rich Growth Factors Innovation and Its Application on Orthopedic Tissue Regeneration'.

# HEALING FROM WITHIN



[f] The Punyaarjan Foundation donates one hundred thousand rupees to the Disabled Service Association during the Congress. [g] Dr. Robert Horowitz (USA) presents during the pre-congress workshop.

## 7.2 Second European Meeting on Enhanced Natural Healing in Dentistry

7-9 September, 2018, Belgium

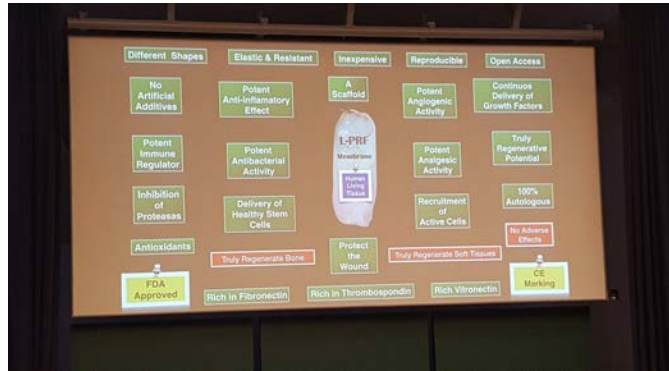
The Catholic University of Leuven invited the Punyaarjan Foundation to the 2nd European Meeting on Enhanced Natural Healing in Dentistry in September 2018. This allowed the Foundation to showcase the achievements of its Chronic Wound Healing Project, especially in treating chronic extraoral wounds with L-PRF, like Leprosy plantar ulcers. Dr. Sushil Koirala, on behalf of the Foundation, presented Nepal's rapid acceptance of and success with the L-PRF technology.

This event marked a milestone in advocating for the widespread adoption of this affordable wound-healing technology. Special thanks to the Congress Committee, specifically Prof. Dr. Marc Quiryne and Prof. Dr. Nelson Pinto for organizing the successful event, attended by over 450 participants from 40 countries.



Catholic University of Leuven, Belgium, where the ENHD Congress was conducted.

# HEALING FROM WITHIN



[a]

[a] After his presentation, Dr. Sushil Koirala, on behalf of the Punyaarjan Foundation, presents a token of love to Prof. Dr. Marc Quiryne, chair of the meeting, in the presence of Dr. Yelka Zamora, Dr. Nelson Pinto and Dr. Enrico Rescigno.

### 7.3 First Myanmar Wound Care Society Summit

6-7 September 2019, Myanmar

On behalf of the Punyaarjan Chronic Wound Healing Project, Myanmar Chapter, Dr. Nay Aung presented 'Natural Guided Regeneration in Wound Healing' during the First Myanmar Wound Care Society Summit. This opportunity allowed the Punyaarjan Foundation to further advocate for the widespread adoption of the N-GRT with L-PRF wound-healing technology in Myanmar.

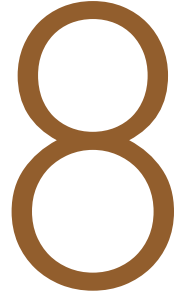


[a] Prof. Dr. Myint Thaug, President of the Myanmar Wound Care Society, presents a token to Dr. Nay Aung after his presentation at the Summit.

“

“L-PRF offers a potent tool in combating not just Leprosy but also the stigma associated with it.”

”



# New Avenue: N-GRT with L-PRF for Leprosy Ulcers

## 8.1 Hansen's Disease (Leprosy)

Leprosy, also known as Hansen's disease, has left its mark throughout human history and is extensively documented in the texts of ancient civilizations. This debilitating condition is caused by the bacteria *Mycobacterium leprae* or *Mycobacterium lepromatosis*.<sup>1, 2</sup> While the precise mechanisms of transmission remain elusive, prevailing understanding suggests that close and prolonged exposure to airborne droplets, often from infected individuals, plays a significant role.<sup>1, 3</sup>

The initial signs of leprosy typically manifest as hypopigmented patches of skin with reduced sensation. Without timely diagnosis and intervention, the disease can relentlessly progress, causing irreversible damage to the peripheral nervous system, as well as the soft tissues of the nose, throat, and eyes. Compounded by a diminished ability to perceive pain in extremities, individuals affected by leprosy are prone to accidental injuries, which, due to their painlessness, may go unnoticed and untreated, leading to infection and subsequent tissue loss, particularly in areas like the fingers and toes.<sup>1</sup>

Primarily afflicting populations in resource-scarce regions, leprosy is intricately entwined with health disparities and economic deprivation.<sup>4</sup> Statistics from 2019 underscore the global scale of this issue, with 202,185 new cases reported worldwide. The burden of leprosy is disproportionately borne by specific nations; a staggering 80% of cases are concentrated in just three countries: India (57%), Brazil (14%), and Indonesia (9%).<sup>5</sup>

### 8.2 The Global Burden of Leprosy

Classified as a Neglected Tropical Disease (NTD), leprosy remains prevalent across over 120 nations and stands as one of six maladies identified by the World Health Organization (WHO) as a significant concern in developing regions while being rare in Western contexts. Annually, over 200,000 new cases are documented globally, with the South East Asia region alone contributing 59.2% of these cases.<sup>6</sup> As per WHO's 2019 data, Brazil, India, and Indonesia each reported over 10,000 new cases, with an additional 13 countries (Bangladesh, Democratic Republic of the Congo, Ethiopia, Madagascar, Mozambique, Myanmar, Nepal, Nigeria, Philippines, Somalia, South Sudan, Sri Lanka, and the United Republic of Tanzania) registering between 1,000 to 10,000 cases. Furthermore, 45 nations recorded no instances of leprosy, while 99 reported fewer than 1,000 new cases.

India, in particular, grapples with the significant burden of leprosy, accounting for more than half of the world's new diagnoses.<sup>7</sup>

### 8.3 The Impact on the Quality of Life of Patients and their Family Members

The dysfunction of peripheral nerves resulting in skin anesthesia is one of the salient clinical manifestations of leprosy, which further leads to ulceration and disability.<sup>8</sup> Plantar ulcers are one of the commonest complications of leprosy leading to Grade 2 disability (G2D) and occur in about 10% to 20% of patients, the current G2D rate stands at 1.7 per million populations, with India accounting for 39.8% of cases.<sup>9,10</sup> Plantar ulcers are typically painless and increase in size without healing for weeks to months. On treatment, an acute ulcer may heal but, sometimes, the ulcer can recur and persist as a chronic ulcer.<sup>11-13</sup>

Leprosy, estimated to account for approximately 21,100 disability-adjusted life years (DALYs), results in long-term consequences beyond physical deformity, including stigmatization and discrimination, significantly impacting mental health.<sup>14,15</sup> Particularly prevalent in Low-and Middle-Income Countries, it remains one of the oldest and most neglected diseases contributing

to stigma and discrimination<sup>16</sup>. Rooted in visible impairments, the disease fosters psychosocial issues like exclusion from family, community, and work.<sup>17,18</sup> The WHO's Global Leprosy Program acknowledges the need to combat discrimination and promote inclusion.<sup>19</sup>

Leprosy and other NTDs with lifelong stigmatizing effects are linked to poor mental health.<sup>20</sup> The visible impairments, stigma, and discrimination predispose individuals affected by leprosy to mental health challenges, particularly in developing countries where mental health is often stigmatized.<sup>21,22</sup>

Various studies have highlighted significantly lower Quality of Life (QoL) among leprosy patients compared to healthy controls. Studies in Brazil, India, and Bangladesh revealed marked decreases in physical and psychological QoL domains.<sup>22-25</sup>

Chronic consequences of leprosy, including negative impacts on social participation and mental health, are often overlooked due to data scarcity and lack of standardized collection methods.<sup>26-28</sup> Understanding the full disease course is crucial, as leprosy's impact extends beyond physical impairments to social participation and emotional well-being.<sup>29</sup>

Research has shown that leprosy follows both biomedical and social trajectories, leading to emotional reactions, negative behaviors, and societal barriers, contributing to unemployment and social integration difficulties.<sup>29-30</sup> Additionally, the psychological and societal consequences of leprosy, particularly in relation to disability and stigma, have been extensively studied.<sup>31,32</sup>

The impact of leprosy not only affects patients but also their families and communities, impacting their self-esteem and overall well-being.<sup>33-38</sup> Despite increasing efforts in rehabilitation, individuals affected by leprosy continue to face poor quality of life and stigma.<sup>31,39,40</sup> A study in Nepal highlighted higher levels of depressive symptoms and lower self-esteem and health-related quality of life among adolescents with leprosy-affected parents.<sup>41</sup>

#### **8.4 Leprosy & Poverty**

Leprosy and poverty form a vicious cycle marked by inequality, poor education, and stigma, with numerous studies affirming the strong link between the two.<sup>42-54</sup> Evidence from Bangladesh indicates that leprosy-affected households often face poor nutrition due to limited food expenditure, increasing the risk of leprosy transmission.<sup>55</sup> Additionally, individuals affected by leprosy may face stigma not only for their impairments but also for their inability to contribute

financially.<sup>33</sup> The high incidence of leprosy among the economically productive age group results in significant long-term financial loss.<sup>50</sup> Thus, the economic burden of leprosy may be greater than previously perceived.

### **8.5 Leprosy Induced Plantar Ulcer**

Leprosy-induced plantar ulcers are neurotrophic lesions located in the plantar region that result from repeated injuries. They affect various regions of the foot to different degrees of depth and severity and may necessitate the amputation of the toes or feet.<sup>19,59</sup> The main reason for foot ulcer formation in leprosy is the loss of protective sensitivity or total anesthesia in the region of the posterior tibial nerve, associated with the paralysis of the intrinsic musculature, toe claw, the loss of normal padding under the metatarsal head and volume of intrinsic muscles, anhidrosis, foot drop, and alteration in bone architecture, which cause exaggerated pressure under the metatarsal head and calcaneus to support and distribute the body weight.<sup>57, 58</sup> Furthermore, weight bearing and physical activity are often adversely associated with healing rates of plantar ulcers but resting to prevent or heal an ulcer is impractical for many affected people who need to work to earn a living. People afflicted with recurrent ulcers suffer severe consequences in terms of loss of function, poor income, stigma, and often, severe mental distress.<sup>57,59</sup>

### **8.6 Treating Leprosy Induced Planter Ulcer with L-PRF**

Leprosy ulcers have a notorious reputation for their slow healing process, often resulting in prolonged hospital stays. This extended duration of treatment carries significant implications not only for patients but also for their families and healthcare facilities alike. Presently, various topical treatments are employed, ranging from traditional methods like zinc tape and wax therapy to more advanced techniques such as platelet-rich plasma gel.<sup>64,65</sup> However, the outcomes of these interventions remain uncertain, with conflicting results reported in the literature.<sup>64</sup>

A promising advancement in treatment, known as Leukocyte and Platelet-Rich Fibrin (L-PRF), represents a "second generation" approach with considerable potential. While formal research evidence is still inconclusive, preliminary findings from a longitudinal study in Chile have shown promise, demonstrating reductions in wound size and even closure of chronic ulcers. Additionally, a trial investigating L-PRF in neuropathic diabetic ulcers has reported positive results, although the analysis was not conducted with an intention-to-treat approach.<sup>10,66</sup>

The growing body of evidence supporting the efficacy of L-PRF in wound healing, along with its reported success in managing ulcers, has led to its exploration in individuals with trophic ulcers associated with leprosy.<sup>60,70</sup> As research in this area continues to expand, L-PRF holds significant promise as a potential therapeutic option for addressing the challenging issue of slow-healing ulcers in leprosy patients.

### **8.7 N-GRT with L-PRF for Leprosy in Nepal**

Since 2009, Nepal has successfully maintained the elimination of leprosy as a public health concern. However, 17 districts and 3 provinces, comprising 41% (10, 907, 128) of the population, still grapple with the disease, and around 3200 diagnoses surface annually. The presence of pediatric cases and grade-2 disabilities (G2D) suggests ongoing transmission and delayed diagnosis, underscoring the importance of proactive and timely case identification.<sup>71</sup>

To manage this national burden, there are three specialized leprosy hospitals in Nepal: Anandaban Hospital in Lele, Green Pastures Hospitals in Pokhara, and Lalgadh Leprosy Hospital in Dhanusa. Among them, Anandaban and Lalgadh have been using L-PRF for leprosy ulcers with good healing outcomes.

The Anandaban Hospital has played an invaluable role in propagating and researching the use of L-PRF for the treatment of leprosy ulcers in Nepal. Carried out at the hospital, a year-long randomized controlled trial involving 30 adults has measured the healing rates and wound-closure periods of leprosy ulcers treated with L-PRF.<sup>72-74</sup>

The study aimed to assess the efficacy of using L-PRF locally to treat ulcers resulting from leprosy. It compared the outcomes of patients treated with local L-PRF application against those receiving standard care. The results revealed that patients treated with L-PRF experienced notable reductions in ulcer size and faster healing rates compared to those receiving standard care alone. Moreover, participants in the L-PRF group reported lower levels of pain and improved quality of life. Collaborating with Lalgadh Leprosy Hospital, the Anandaban Hospital has become a national and international hub for the transfer of patients with foot ulcers for L-PRF trials.

Lalgadh Leprosy Hospital stands as one of the world's most active leprosy hospitals, witnessing an annual influx of over 1,100 new leprosy patients and conducting more than 12,000 consultations dedicated to leprosy alone. Its nearly 100 inpatient beds and robust Community Outreach program,

involving 120 Self-Help Groups, position the hospital as a leader in leprosy care across Nepal's Province-2, serving a populace of 6.01 million and attending to 45% of the country's new leprosy cases, and making it an ideal location for the L-PRF treatment.<sup>75</sup> Because the hospital lies near the Indo-Nepal border, it has also been treating large numbers of Leprosy patients from India.

Although leprosy can be cured, many patients in Nepal tend to conceal initial symptoms due to the cultural stigma attached to the illness, believing it to be a consequence of misdeeds done in one's former life.<sup>76</sup> Consequently, delays in seeking treatment occur, resulting in the emergence of intricate ulcers that necessitate extended hospitalization periods. Technologies like L-PRF significantly reduce treatment duration, easing bed occupancy and conserving hospital resources. Hospitals like Lalgadh and Anandaban, dedicated to serving leprosy patients, have thus found substantial benefits in employing L-PRF within their treatment protocols.



IN GIVING, YOU RECEIVE.

## 9

## Moving Forward

L-PRF is unlike a vaccine or a medicinal drug. It doesn't need hi-tech labs, expert training or costly pharmaceutical ingredients. In fact, even a nurse in a remote Nepali healthpost can prepare it; all she needs is the right centrifuge and blood from the patient. And at just about \$2 per dressing, it can cure the most stubborn of wounds in weeks. It is this low cost, autologous, and simple nature of L-PRF that makes it life-changing.

Every successful healthcare technology stands on four pillars: safety, reliability, affordability, and simplicity. But even with all these features, some technologies fall by the wayside; they simply do not gain acceptance.

A number of factors may come into play to cause this. It may be that the technology is not well communicated to or understood by the public, spurring hesitancy in its adoption. It is possible that healthcare professionals find change cumbersome and resent the technology altogether. But in the case of N-GRT with L-PRF, it is the fact that this technology threatens to disrupt revenue streams in hospitals because it frees up beds quickly and prevents hospitals from maintaining high occupancy rates. Additionally, the procedure conserves consumables such as dressing materials, which burdens commercial stakeholders because their supplies are not used up. There are no chemicals involved for pharmaceutical companies to make money off of.



Further, doctors are often hesitant to carry out the procedure because it is simple; they view it as less prestigious compared to complex hours-long surgeries.

Only when profitability and ego are out of the picture can compassion truly shine. The purity in this kind of compassionate innovation is perceptible. We have seen it in the smiles stretched across patient's faces as they finally walk on their own, their foot ulcers now healed completely. The same beaming faces light up hospital wards as children once destined for amputation now retain their limbs.

This N-GRT story stands as evidence of how egoless, compassion-driven professional friendship can drive change. Similar intimate collaborations need to be sought between researchers who pioneer new technologies, medical professionals who execute them, and policymakers and officials who regulate them. After all, such a healthy, productive dynamic is the holy grail of ethical innovation.

In the past seven years, a total of 12 clinics have been set up across two countries; countless hours have been spent training doctors and spreading the word; congresses and workshops have been organized to improve the global acceptance of L-PRF for treating extra oral wounds. But as much as Punyaarjan has achieved with this project, we are only just getting started.



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## Chapter 8

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