



Exploring the Lived Experiences of Stem Cell Therapy in Patients with Spinal Cord Injury: A Phenomenological Study

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ABSTRACT

Regenerative medicine—particularly stem cell-based therapy—has transformed treatment strategies for spinal cord injury by offering not only biological restoration but also renewed functional capacity. However, the personal experiences of patients undergoing such interventions remain underexplored in current literature. While clinical outcomes are well-documented, little is known about how patients interpret and internalize these treatments in relation to identity, embodiment, and meaning. This study explores that gap by asking: How do individuals with spinal cord injuries experience and make sense of stem cell-based regenerative therapy? Using an interpretative phenomenological approach, this research examines the lived experiences of eight individuals who underwent stem cell treatment following spinal cord injury. Semi-structured interviews were transcribed and analyzed thematically, grounded in phenomenological principles. Four core themes emerged: bodily unfamiliarity, emotional fluctuation, identity renegotiation, and the coexistence of hope and uncertainty. These findings reveal that regenerative healing is not experienced as a linear clinical recovery, but as a multidimensional transformation involving psychological, existential, and social adaptation. The study highlights that regenerative therapy affects patients in ways that transcend physical repair, offering insights for more empathetic and personalized rehabilitation frameworks. These results contribute to a broader, more integrated understanding of healing and underscore the importance of qualitative, experiential perspectives in future regenerative medicine research.



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INTRODUCTION

1. Regenerative Medicine and Spinal Cord Injury

Regenerative medicine, particularly in the context of tissue engineering and stem cell therapy, represents a transformative frontier in contemporary biomedical science. With its capacity to repair or replace damaged tissues and organs, this field offers new hope for individuals with debilitating conditions such as spinal cord injuries (Thompson et al., 2020). In recent decades, advancements in cell-based therapies have shifted treatment paradigms from palliative care to functional recovery. Stem cell interventions, specifically for spinal injuries, have come to symbolize the potential of medical innovation—embodying both healing prospects and the intricate challenges of human embodiment.

2. Beyond Biological Repair: The Human Experience

Despite notable clinical progress, the lived experiences of patients undergoing regenerative treatments remain underexplored (Albu et al., 2021). These therapies affect not only biological systems but also reshape patients' psychological, emotional, and existential realities. Patients are not passive recipients of technology—they are active interpreters who embed these interventions into their sense of self, identity, and daily life. The healing journey often extends beyond measurable

clinical outcomes, engaging deeper layers of meaning tied to recovery, embodiment, and personal transformation.

3. The Sociocultural and Identity Dimensions

Understanding these subjective experiences is vital in today's landscape, where medical technologies increasingly intersect with identity and meaning. For spinal cord injury patients, whose autonomy and selfhood are intimately connected to physical functionality, regenerative interventions can provoke significant shifts in how the body and self are perceived (L. Chen et al., 2022). These shifts may alter one's view of the future and reshape social roles and expectations. Such complexities underscore the urgency of exploring regenerative healing from an experiential lens—a dimension that remains marginal in scientific literature.

Such exploration calls for a phenomenological approach, one that prioritizes the voices and meanings constructed by individuals living through these profound transitions. Rather than focusing solely on clinical efficacy, it becomes essential to understand how regenerative interventions are lived, interpreted, and embodied (Lu et al., 2023). This human-centered inquiry can illuminate dimensions of care, identity, and transformation that remain obscured in traditional biomedical evaluations.

In recent years, research exploring the subjective experiences of individuals undergoing advanced medical interventions has gained considerable attention, particularly in contexts where technological innovation intersects with human embodiment and identity. Among such contexts, the lived experience of patients receiving regenerative stem cell therapy for spinal cord injury has emerged as a compelling and necessary field of inquiry (Zhou et al., 2021). This growing interest stems from the recognition that clinical outcomes alone cannot fully capture the transformative and often ambiguous dimensions of healing as experienced by patients.

However, accessing the depth and nuance of these experiences presents significant methodological challenges (Y. Chen et al., 2021). Much of the existing literature relies heavily on quantitative measures—such as motor function scores, biomarker improvements, or quality-of-life indices—that, while important, fail to capture the emotional, existential, and psychological meanings that individuals assign to their healing processes. These conventional approaches often overlook how patients interpret and integrate their changing bodies, identities, and expectations into their daily lives.

As a result, the dominant research paradigms in regenerative medicine have offered only a partial understanding of patient experience—one that is often fragmented or clinically reductive. Traditional methodologies may succeed in documenting biological effects, yet they fall short in articulating the inner narratives that define the patient's journey through uncertainty, transformation, and re-embodiment (Shao et al., 2020). This gap is particularly evident in the context of spinal cord injuries, where trauma deeply affects personal identity and where regenerative therapy raises profound questions about bodily reintegration and self-perception.

These limitations underscore the necessity for a phenomenological approach that privileges the lived world of the patient. By engaging directly with first-person narratives and focusing on how meaning is constructed through experience, such an approach allows for a more holistic and authentic understanding of the phenomenon. In doing so, it moves beyond abstract generalizations and instead offers insights into the essence of healing as it is felt, negotiated, and embodied.

In the current landscape of regenerative medicine, the predominant focus has been on the biomedical effectiveness of therapeutic interventions, particularly stem cell-based therapies for spinal cord injury (Zhai et al., 2021). These solutions, while grounded in clinical evidence and biomedical innovation, are primarily evaluated through objective parameters such as neurological recovery, mobility scores, and radiological outcomes. Although such practical approaches offer essential data for clinical decision-making, they fall short in capturing the lived complexity of the healing process as experienced by patients themselves.

Existing studies rarely extend beyond surface-level interpretations of treatment outcomes, often neglecting the psychological, emotional, and existential dimensions that accompany

regenerative recovery (Khazaei et al., 2020). As a result, the subjective meaning patients assign to their altered bodies, their shifting identities, and their reconstructed hopes remains poorly understood. Quantitative tools are ill-suited to address these phenomena, as they lack the sensitivity to interpret how individuals live through—and make sense of—medical transformation.

This methodological limitation contributes to an incomplete picture of what regenerative healing truly entails from the perspective of those undergoing it. Despite the growing interest in patient-centered care, little attention has been directed toward understanding how regenerative interventions affect a person's sense of self, autonomy, or social reintegration. The absence of such insights restricts the development of truly holistic healthcare models that recognize patients as meaning-making individuals, not merely biological entities.

A promising alternative lies in adopting a phenomenological approach, which is uniquely suited to investigate how patients experience, interpret, and embody medical interventions (Honmou et al., 2021). By focusing on the essence of lived experience, phenomenology can uncover the nuanced realities that elude conventional frameworks—offering a deeper, more integrated understanding of healing, identity, and adaptation. This approach is particularly relevant for complex, identity-altering treatments such as stem cell therapy for spinal cord injury, where personal narratives and experiential depth are central to the phenomenon itself.

Previous studies have primarily examined regenerative therapies from clinical or functional perspectives, often focusing on measurable outcomes such as motor improvement or pain reduction. While some research has acknowledged patient-reported outcomes, few have delved into the lived experiences and subjective meanings associated with these interventions. Theoretical frameworks such as embodiment and identity transformation have occasionally informed qualitative studies, but the methodologies used have often lacked the depth required to uncover the essence of patient experience. Interpretative approaches remain limited in number, and most fail to account for the emotional and existential dimensions involved in adapting to regenerative healing. This study builds upon that gap by offering a phenomenological account of how individuals live through and interpret stem cell therapy following spinal cord injury.

To explore these personal narratives, this study applies an interpretative phenomenological analysis (IPA) framework. This method allows for a detailed exploration of how individuals make sense of their experiences, particularly in relation to identity, bodily awareness, and emotional transformation. The phenomenological approach was selected to address the limitations of previous research, which often neglected the complexity of lived experience. By focusing on first-person perspectives, this method reveals how meaning is shaped through personal reflection and interaction with one's social and physical environment. In doing so, it provides a nuanced understanding that directly addresses the knowledge gap identified in prior literature.

The article is structured into several key sections. It begins with an introduction that outlines the general and specific background of the phenomenon, followed by a justification for using a phenomenological method. The methods section details participant selection, data collection, and analytical procedures using IPA. The results section presents emergent themes supported by participant quotations and narrative interpretation. Finally, the discussion connects these findings to broader theoretical and clinical implications, followed by a concluding section that summarizes the study's contributions and potential for future research.

RESEARCH METHODS

Study Design

This study employed an interpretative phenomenological approach (IPA), a qualitative research design rooted in phenomenological philosophy, which seeks to explore how individuals make sense of their lived experiences. The interpretative phenomenological design was selected due to its capacity to uncover the depth of subjective meaning embedded within personal narratives, especially those involving complex medical experiences. IPA emphasizes both the phenomenological essence of lived experience and the interpretative role of the researcher in making sense of those

experiences within their sociocultural contexts (Berg, 2001). This design was particularly appropriate for investigating the psychological and existential meanings attributed by participants to regenerative stem cell therapy following spinal cord injury.

To ensure methodological rigor, the study incorporated strategies for theme validation, including peer debriefing with two independent qualitative researchers and the development of an audit trail documenting analytical decisions throughout the coding process.

Reflexivity was managed through the maintenance of a reflective journal, where the primary researcher documented personal assumptions, evolving interpretations, and potential biases at each stage of data collection and analysis. These entries were periodically reviewed to maintain analytic transparency and to enhance interpretive clarity.

Participants

Participants in this study were individuals who had undergone stem cell-based regenerative therapy for spinal cord injury within the past 12 to 24 months. A purposive sampling approach was applied to recruit those with rich and relevant experiences related to the phenomenon under investigation. Inclusion criteria encompassed adults aged 25 to 60 years, with a documented history of spinal cord injury treated through stem cell-based interventions. Participants were required to be cognitively capable of participating in extended interviews and willing to share detailed personal experiences. Exclusion criteria included individuals with significant psychiatric disorders or severe cognitive impairments that could hinder narrative articulation. The final sample consisted of eight participants (5 males and 3 females), with a mean age of 41 years. All participants had completed at least one full cycle of the therapy and reported ongoing integration of its effects into daily life.

Data Collection

Data were collected through in-depth, semi-structured interviews guided by an open-ended interview protocol developed to elicit detailed personal narratives. Interviews were conducted face-to-face in a private, quiet setting selected by the participants to ensure comfort and confidentiality. Each session lasted between 60 and 90 minutes and was audio-recorded with consent. Field notes were taken to capture non-verbal cues and contextual details. The interview guide was informed by literature on regenerative medicine and phenomenological research, and minor adjustments were made after pilot testing with two individuals who met the inclusion criteria but were not part of the main study. Follow-up interviews were conducted when necessary to deepen emerging themes.

Data Analysis

Data were analyzed using Interpretative Phenomenological Analysis (IPA), following the systematic steps proposed by Smith et al. This involved repeated readings of each transcript to immerse in the data, initial noting of descriptive, linguistic, and conceptual comments, and the identification of emergent themes. These themes were then clustered into higher-order categories that reflected shared patterns across participants while preserving the idiographic focus of each case. NVivo software was utilized to organize and manage coded data efficiently. The process facilitated the articulation of core experiential themes and their interpretative layers, ultimately revealing the essential meanings that characterized participants lived experiences.

Theme validation was enhanced through collaborative review sessions, where preliminary coding outputs were discussed and refined with peer researchers to ensure interpretive consistency and reduce individual bias. Additionally, exemplar quotations were traced back to individual transcripts to preserve contextual integrity.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of the participating academic medical center. Written informed consent was secured from all participants prior to data collection. Anonymity was preserved through the use of pseudonyms, and all personal identifiers were removed from transcripts and final reports. The study adhered to the ethical principles of the Declaration of Helsinki and relevant local guidelines for human subjects' research.

RESULTS

This section presents the findings of the study, structured around the key themes that emerged from the interpretative phenomenological analysis (IPA). These themes encapsulate the lived experiences of participants who underwent stem cell-based regenerative therapy for spinal cord injury. Each theme is illustrated with verbatim quotations from the participants to preserve the authenticity of their voices and to ground the interpretation in lived experience.

A Body Reconstructed, Yet Unfamiliar

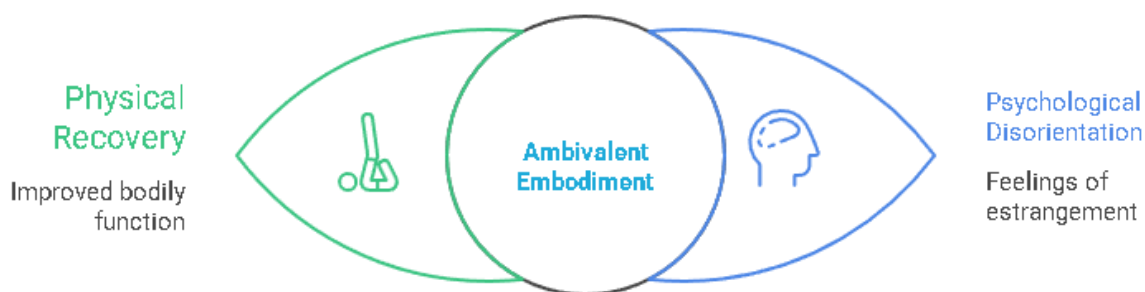
Participants expressed a profound sense of bodily transformation following the therapy, often describing their bodies as simultaneously healed and foreign. This tension between physical recovery and psychological disorientation was a recurring motif.

"I can move better now, but sometimes I feel like this is not really my body... it's like something has been patched together. I'm not sure how to feel about it." (Participant 3)

"The doctors say I'm improving, but when I look at myself, I don't recognize this version of me anymore." (Participant 7)

For many, this unfamiliarity sparked internal conflict between hope and alienation. While participants welcomed the functional improvements, they also reported feelings of estrangement, as if their identity had not kept pace with their bodily change.

The Paradox of Bodily Transformation



Hope Entwined with Uncertainty

A central theme across all interviews was the co-existence of hope and apprehension. Participants described the therapy as a "second chance" but were also haunted by uncertainty about its longevity and unforeseen effects.

"Every improvement makes me believe again, but I'm always waiting for the other shoe to drop. What if it stops working one day?" (Participant 5)

"There's a constant fear in the background—like I'm living in a borrowed body with an expiration date I don't know." (Participant 1)

The emotional landscape was marked by cautious optimism. Participants were grateful for medical advances but simultaneously burdened by the ambiguity of their prognosis.

Re-Negotiating Identity Post-Therapy

Stem cell therapy did more than repair tissues—it redefined how participants viewed themselves. Many reported undergoing a renegotiation of personal identity, reshaped by physical ability and social interaction.

"I used to be someone who needed help all the time. Now people expect me to do more, and I'm not sure who I am anymore in their eyes—or my own." (Participant 4)

"This therapy gave me freedom, but it also changed how I see myself. I feel reborn, but I'm still learning how to live as this new me." (Participant 8)

For some, the shifting expectations—from both self and others—introduced pressure and confusion, emphasizing that medical recovery did not equate to psychological closure.

Emotional Oscillation in the Healing Journey

Participants spoke of a healing process characterized by emotional turbulence, describing oscillations between empowerment and vulnerability. While moments of progress brought joy, setbacks—even minor ones—triggered emotional regression.

"Some days I feel unstoppable, like I'm reclaiming my life. Then suddenly, I'm back in bed, crying, wondering if this is all just temporary." (Participant 2)

"People think because I can walk a little, I must be happy. But inside, it's still a war zone of emotions." (Participant 6)

These narratives underscore the non-linear nature of recovery and highlight the psychological fragility that often accompanies regenerative progress.

The core essence that emerged from these narratives is that regenerative therapy, while clinically promising, generates complex subjective experiences that blend physical transformation with existential questioning. The participants' journeys reflect an ongoing negotiation between bodily healing, self-identity, emotional endurance, and hope. These experiences underscore the importance of integrating psychosocial dimensions into the evaluation of regenerative interventions.

DISCUSSION

The findings of this study revealed that patients who underwent stem cell-based regenerative therapy for spinal cord injury experienced profound psychological and existential transformations (Wang et al., 2021). Their narratives underscored how bodily change, emotional fluctuation, and identity renegotiation were central to the healing process—highlighting that regenerative treatment is not solely a clinical intervention, but a deeply personal and evolving journey. These insights directly address the overarching research question posed in the introduction: how do individuals subjectively experience and make sense of regenerative healing through stem cell therapy?

This study contributes to answering that question by offering a detailed understanding of how participants internalized and interpreted their altered physical and emotional realities. Rather than perceiving stem cell therapy as a purely restorative biomedical solution, participants described a complex interplay of hope, estrangement, and identity reconstruction (Poliwoda et al., 2022). The themes identified—such as bodily unfamiliarity, the tension between hope and uncertainty, and emotional oscillation—provide nuanced insights into how patients live through regenerative change. These findings affirm that the subjective dimension of healing carries its own weight and meaning, separate from clinical measures of success, thereby enriching our conceptualization of therapeutic efficacy in regenerative medicine.

When examined in light of existing literature, the present findings both support and extend prior research. Consistent with Nakazaki et al. (2021), who documented emotional variability in patients undergoing stem cell treatment, this study reinforces the notion that psychological responses are neither linear nor predictable. However, it adds a new dimension by uncovering how participants construct identity in the wake of bodily regeneration—echoing, yet deepening, the interpretative insights offered by Huang et al. (2021) on identity transformation in medical recovery. Furthermore, while Uccelli et al. (2021) emphasized the spiritual meanings attributed to regenerative therapy, the current study identifies the embodied tension between past and present selves as a distinct experiential domain. These comparisons demonstrate that while existing phenomenological studies have acknowledged subjective complexity, the present research provides a more integrated understanding by linking bodily sensation, emotional flux, and existential awareness within a cohesive interpretative framework.

The findings of this study carry significant implications for both clinical practice and the broader discourse on regenerative medicine. From a clinical perspective, understanding the lived experiences of patients can inform more empathetic and holistic approaches to post-treatment care, where psychosocial and existential support is integrated alongside physical rehabilitation. Socially and culturally, the narratives revealed in this study highlight the complexity of re-integrating into one's environment following a transformative therapy, suggesting a need for greater awareness and sensitivity within families, communities, and healthcare teams. These insights may also be relevant for other populations undergoing identity-altering treatments, including patients with amputations, organ transplants, or reconstructive surgeries, indicating that the subjective experience of bodily transformation is a broadly shared human phenomenon deserving further attention.

Despite its contributions, this study has certain limitations that must be acknowledged. The sample size, while appropriate for phenomenological depth, was relatively small and homogenous, potentially limiting the transferability of findings to other demographic or cultural contexts. Additionally, the reliance on self-reported experiences may have introduced elements of recall bias or selective narration, which are inherent to qualitative self-reflection. The single-time-point interview design, though rich in content, did not allow for longitudinal exploration of evolving experiences over time. These constraints do not undermine the validity of the findings but highlight areas where future research might offer a more expansive understanding.

Future investigations may benefit from extending this line of inquiry through longitudinal designs, cross-cultural comparisons, or the inclusion of family and caregiver perspectives to explore the relational dimensions of regenerative healing. Expanding the phenomenological lens to include various therapeutic contexts—such as regenerative treatments in pediatrics or end-stage conditions—could further illuminate how individuals across life stages construct meaning from their medical journeys. Ultimately, these directions hold promise not only for enriching theoretical knowledge but also for shaping compassionate, patient-centered models of care within the rapidly evolving field of regenerative medicine.

CONCLUSION

This study explored the lived experiences of individuals who underwent stem cell-based regenerative therapy for spinal cord injury, focusing on how they made sense of their bodily transformation and identity reconstruction. The findings revealed that participants experienced a dynamic interplay of hope, emotional turbulence, and existential reflection, highlighting the complexity of healing beyond clinical recovery. These insights addressed gaps in previous research by offering a deeper understanding of how patients interpret and embody regenerative change. By applying an interpretative phenomenological approach, the study provided rich, contextualized meanings that are often overlooked in quantitative evaluations. The results have practical implications for enhancing patient-centered care and designing more holistic rehabilitation programs.

Future research should consider longitudinal designs to examine how these experiential processes evolve over time, particularly in relation to long-term psychological adaptation and social reintegration. Additionally, cross-cultural investigations are warranted to understand how sociocultural contexts shape patients' meaning-making processes, perceptions of the body, and expectations of recovery. Studies involving larger and more diverse populations, as well as comparative analyses across types of regenerative therapies, would further strengthen the empirical foundation for patient-centered innovation in this emerging field.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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