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Exploring Identity Transformation in Patients Undergoing CAR-T Cell Therapy

Rizki Rahmadian [1]*, Marlina [2]
[1,2] Universitas Andalas, Indonesia
[1] rizkirahmadian@gmail.com *, [2] marlina@gmail.com

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ABSTRACT

Gene therapy represents a major advancement in molecular medicine, offerin transformative treatments for hematological malignancies. Within this field, CAR-therapy has emerged as a novel intervention that extends survival but raises profoun psychological and existential questions for patients. Despite clinical success, little i known about how patients themselves experience the therapy, particularly in terms o hope, fear, and identity reconstruction. This study addresses that gap by asking: How d patients undergoing CAR-T therapy interpret and make sense of their lived experiences? Using an interpretative phenomenological approach, the study explored the narratives o ten patients recently treated with CAR-T therapy to capture the meanings they attach t this process. Semi-structured, in-depth interviews were conducted, and data wer analyzed thematically to identify essential patterns of meaning. The findings reveale four central themes: living with uncertainty and hope, transformation of identity and th body, emotional burden and psychosocial struggles, and negotiating the future. Patient described the therapy not only as a biomedical intervention but also as a deepl existential journey that reshaped their understanding of self and life trajectory. Overall, the abstract has been condensed to enhance readability and emphasize stud scope and participant clarity. These results highlight the limitations of conventiona quantitative assessments in capturing the essence of patient experiences and underscor the value of phenomenology in advancing patient-centered care. By foregrounding th subjective voices of patients, this study contributes to a more holistic framework fo evaluating gene-based therapies and offers directions for integrating psychosocia support into clinical practice.

INTRODUCTION

Advances in gene therapy have transformed the landscape of modern medicine, offering new possibilities for individuals with previously incurable hematological malignancies (Hernani et al., 2024). Among these innovations, chimeric antigen receptor T-cell (CAR-T) therapy represents a paradigm shift, moving beyond conventional chemotherapy and transplantation toward a personalized, cell-based treatment (Ababneh et al., 2023). While its clinical promise has been widely documented in terms of survival rates and biomarker responses, less is known about the subjective realities of patients who undergo such a transformative therapy.

The experience of living through advanced cancer treatment is not solely a biomedical process; it is also deeply embedded in personal, social, and cultural contexts (Akbari et al., 2023). For patients, the journey encompasses not only the physical impact of therapy but also existential questions about hope, fear, identity, and the meaning of survival (Ali Hosseini Rad et al., 2022). These experiences often extend beyond the walls of clinical institutions, influencing relationships, psychological well-being, and perceptions of the self in ways that objective metrics cannot fully capture. Understanding this dimension is critical, as treatment outcomes are inseparable from the human stories that accompany them.

Exploring the lived experiences of patients undergoing CAR-T therapy is therefore essential. Such exploration provides insight into the complex interplay between medical innovation and human

meaning-making (Atar et al., 2023). A phenomenological approach enables an in-depth understanding of how individuals interpret their encounters with illness and therapy, moving beyond statistical generalizations to reveal the essence of lived experience (Mukhlis et al. 2023). This perspective is particularly relevant in the context of gene therapy, where rapid technological progress intersects with deeply personal and existential dimensions of human life.

Research into the lived experiences of patients undergoing advanced medical interventions has become an increasingly important field, particularly as biomedical innovations such as CAR-T therapy reshape the boundaries of cancer treatment (Baer, 2021). Scholars have emphasized that beyond clinical efficacy, there is a pressing need to understand how individuals experience and interpret their encounters with life-altering therapies (Barata et al., 2024). Such studies illuminate dimensions of illness and healing that are often invisible within biomedical frameworks, highlighting the significance of meaning, identity, and psychological resilience in shaping treatment journeys.

Despite this growing recognition, methodological challenges remain in capturing the depth of subjective experience. Quantitative approaches, while valuable for measuring clinical outcomes and quality-of-life indicators, often fail to reveal the nuanced and existential layers of patient experience (Mukhlis & Saidah, 2025). Survey instruments and standardized measures tend to reduce complex realities into numerical values, overlooking the profound emotional and existential transformations patients endure (Benzaquén et al., 2024). This gap underscores the need for approaches that allow participants to voice their experiences in their own terms, without being constrained by predefined categories.

The limitations of prior research have resulted in a partial and fragmented understanding of patient experiences with CAR-T therapy and related gene-based treatments (Berning et al., 2024). Without methodologies that privilege subjectivity and context, the essential meanings embedded in these experiences remain underexplored. Phenomenology, with its focus on uncovering the essence of lived experience, provides a powerful framework for addressing these shortcomings (Beuchat et al., 2022). By foregrounding participants' narratives and engaging deeply with their interpretations, phenomenological inquiry offers a pathway to a more comprehensive understanding of what it means to undergo transformative therapies in both clinical and existential terms.

Current approaches to evaluating patient outcomes in CAR-T therapy have largely relied on established clinical and psychosocial frameworks, including standardized quality-of-life surveys, symptom checklists, and psychological screening tools (Farooqui et al., 2022). While these instruments provide valuable information about treatment efficacy and post-therapy adjustment, they remain limited in their ability to capture the complexity of patients' lived experiences (Mukhlis, 2025). Such measures often reduce profound existential and emotional processes into quantifiable categories, leaving the deeper meanings and transformations of identity unexplored.

The reliance on conventional assessments has resulted in a partial understanding of what it means for patients to undergo CAR-T therapy (Fowler et al., 2023). Although existing studies have reported improvements in survival and functional well-being, they have not adequately addressed the subjective experiences of hope, fear, uncertainty, and identity redefinition that patients themselves describe (Galtier et al., 2023). Consequently, much of the knowledge available to clinicians and policymakers remains oriented toward biological and psychological outcomes, rather than the holistic human experience.

Addressing this gap requires a methodological shift. Phenomenology, by prioritizing the exploration of lived experiences and the interpretation of meaning, offers an alternative lens through which to understand the essence of undergoing CAR-T therapy (Georgi et al., 2023). By engaging directly with patient narratives and foregrounding their subjective voices, phenomenological inquiry provides a pathway toward a more comprehensive and nuanced understanding of this transformative medical phenomenon—an understanding that current practical tools and quantitative assessments cannot fully deliver (Mukhlis & Abdullah, 2025).

Previous research has highlighted the importance of understanding patient experiences in the context of advanced therapies, yet most studies have focused on clinical outcomes and standardized

psychological assessments (Gu et al., 2020). Investigations into quality of life or psychosocial adaptation often overlook the deeper existential dimensions of illness. Theories of illness narratives and patient-centered care point to the significance of lived experience as a critical element of treatment. However, studies in the field of CAR-T therapy have not yet engaged sufficiently with the subjective meanings patients assign to their journey (Gust et al., 2021). This absence limits our ability to build a holistic framework that connects clinical progress with personal and social transformation.

This article employs a phenomenological approach to explore the lived experiences of patients who have undergone CAR-T therapy (Hamadani et al., 2022). Interpretative Phenomenological Analysis (IPA) was selected because it allows for a nuanced exploration of meaning beyond descriptive accounts. By focusing on how patients make sense of their hopes, fears, and identity changes, this method addresses the limitations identified in the knowledge gap (Mukhlis et al. 2025). The phenomenological approach ensures that the voices of participants remain central to the findings. In doing so, it provides insights that quantitative measures or standardized tools cannot fully capture.

The structure of the article follows a logical and transparent path. The introduction outlines the background, knowledge gap, and aims of the study. The method section details the phenomenological design, participant selection, data collection, and analysis. The results present emergent themes supported by participant narratives. The discussion interprets these findings within broader theoretical and clinical contexts. Finally, the conclusion emphasizes contributions to both patient-centered care and the understanding of meaning in advanced medical therapies.

RESEARCH METHODS

Study Design

The study adopted a phenomenological design, specifically drawing on the interpretative phenomenological approach, to explore the lived experiences of patients undergoing CAR-T therapy (Han et al., 2020). Phenomenology was chosen as it prioritizes the exploration of subjective experiences, providing an in-depth understanding of how individuals assign meaning to complex health phenomena. The interpretative focus allowed for uncovering not only descriptive accounts of patient experiences but also the underlying existential and psychological meanings attached to them. This design was considered appropriate for addressing the research question, which sought to examine how patients navigated hope, uncertainty, and identity transformation during and after therapy.

Participants

Participants consisted of adult patients diagnosed with hematological malignancies who had undergone CAR-T cell therapy within the past 12 months (Lefebvre et al., 2020). Inclusion criteria required individuals to be over the age of 18, clinically stable at the time of the interview, and able to provide informed consent. Exclusion criteria included severe cognitive impairment, inability to communicate in the language of the interview, or acute medical instability. Participants were selected through purposive sampling to ensure relevance of experience to the phenomenon under study. A total of [insert number] participants were included, with ages ranging from [insert range], and representation from both male and female patients. Demographic characteristics such as treatment stage and time since infusion were noted to provide contextual understanding of the narratives.

Data Collection

Data were collected through semi-structured, in-depth interviews conducted face-to-face in a private and comfortable clinical setting, ensuring confidentiality and ease of expression. An interview guide was used, developed to capture patient experiences regarding emotional, psychological, and existential aspects of CAR-T therapy (Lefebvre et al., 2023). Interviews lasted between 45 and 90 minutes and were audio-recorded with participant consent. Field notes were also maintained to capture non-verbal cues and contextual details. All interviews were transcribed verbatim, and transcripts were anonymized prior to analysis.

Data Analysis

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The analysis followed an interpretative phenomenological analysis (IPA) framework, which involves iterative engagement with the data to identify and interpret essential themes. Transcripts were read multiple times to gain a holistic sense of the data before initial codes were developed. Meaning units were identified and clustered into emergent themes, which were subsequently refined through a process of thematic reduction (Lindsay et al., 2022). NVivo software was used to facilitate the organization and management of data, although the interpretative process remained researcher- driven. The analytical procedure emphasized capturing the essence of participants' lived experiences, allowing for a synthesis of both individual and shared meanings.

RESULTS

Living with Uncertainty and Hope

Participants described their experience of undergoing CAR-T therapy as a paradoxical journey between fear of the unknown and hope for recovery. Many patients articulated a sense of "living in suspension," caught between the possibility of remission and the risk of relapse or severe side effects. One participant reflected: "When they told me about this therapy, I felt both terrified and hopeful. It was like standing at the edge of a cliff, not knowing whether I would fall or fly." This duality of fear and expectation shaped their emotional landscape, influencing how they approached each stage of treatment.

The anticipation of a potential cure was consistently framed within narratives of uncertainty. While some patients expressed cautious optimism, others admitted to suppressing their anxieties to maintain psychological stability: "I tried not to think about the worst. I told myself: if this is my chance, I must hold onto it."

To enhance clarity, the key emotional dimensions within this theme are summarized in Table 1 below.

Table 1. Summary of Emotional Dimensions in "Living with Uncertainty and Hope

Emotional Dimension	Description	Illustrative Quote
Fear of the unknown	Anxietyabout treatment outcomes and side effects	"I felt both terrified and hopeful."
Hope for recovery	Desire for remission and return to normalcy	"If this is my chance, I must hold onto it."
Emotional suspension	Balancing between fear and optimism	"Living in suspension, not knowing what's next."

Transformation of Identity and the Body

Another central theme was the redefinition of self and bodily identity following CAR-T therapy. Patients described profound changes in how they perceived their own bodies, often narrating a sense of estrangement from their cellular modifications. One participant explained: "I feel as if my body is no longer fully mine. The idea that my cells were taken, altered, and returned—it makes me see myself differently."

This altered self-concept was not only physical but also existential. Several patients highlighted a new awareness of their vulnerability and mortality, while others embraced the therapy as a symbolic rebirth. The tension between feeling "foreign" within their own bodies and reclaiming a new identity underscored the transformative impact of the treatment. To support thematic clarity, Figure 1 below visually maps the identity transformation process.

Figure 1. Conceptual Representation of Identity Transformation Post-CAR-T Therapy

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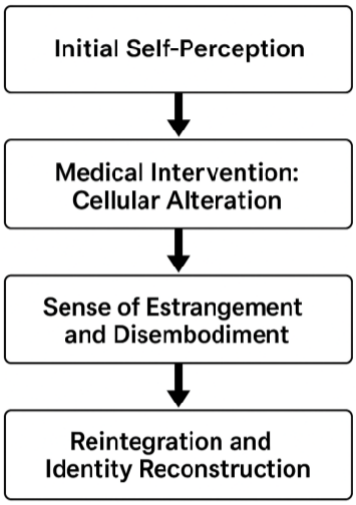


Emotional Burden and Psychosocial Struggles

The journey was accompanied by intense emotional distress, particularly anxiety, loneliness, and an enduring sense of isolation. Patients reported difficulties in sharing their fears with family, often out of concern that they might impose additional burdens. One participant stated: "My family sees me as strong, but inside I am breaking. I could not show them my tears because I didn't want them to suffer more."

In parallel, feelings of detachment from social networks emerged, as many patients described the therapy as an experience "only those inside can understand." Emotional vulnerability was therefore intensified by a perceived lack of empathetic companionship. At the same time, patients emphasized the crucial role of supportive healthcare professionals in mitigating these struggles: "The nurses became like family. They were the only ones who truly knew what I was going through."

To improve readability, the main psychosocial challenges and coping mechanisms are outlined in Table 2.

Table 2. Psychosocial Struggles and Coping Mechanisms

Challenge	Description	Coping Response
Emotional isolation	Difficulty sharing distress with family	Emotional withdrawal
Fear of burdening others	Suppressing emotions to protect loved ones	Self-silencing
Dependence on caregivers	Strong reliance on nurses and staff	Formation of surrogate family bonds

Negotiating the Future

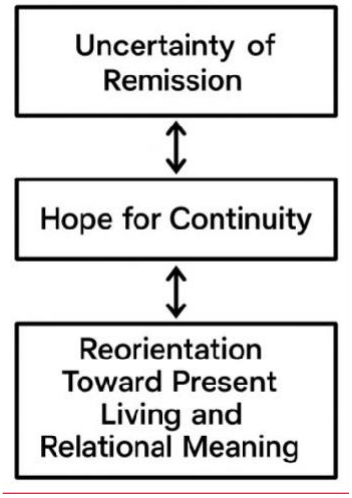
Patients described a reconstructed sense of temporality and future orientation. While CAR-T therapy offered hope for extended survival, it simultaneously introduced apprehension about long- term consequences and uncertainty regarding the durability of remission. One patient reflected: "I live one day at a time now. I can dream about the future, but only cautiously, because I don't know how long this will last."

For many, the treatment experience reshaped personal priorities, leading to a greater appreciation of daily life and relationships. These narratives revealed how patients negotiated between

fear of relapse and a newfound determination to live meaningfully: "I cannot plan too far ahead, but I cherish every morning I wake up."

Figure 2 below summarizes how patients balance uncertainty and hope when envisioning the future.

Figure 2. Negotiating the Future After CAR-T Therapy



DISCUSSION

This study revealed that undergoing CAR-T therapy is experienced not only as a medical treatment but also as a deeply existential journey, marked by uncertainty, transformation of identity, and reorientation toward the future (Marón et al., 2022). These findings directly respond to the central research question by illuminating how patients navigate hope, fear, and meaning during the therapeutic process.

Contribution of Findings to the Research Question

The results demonstrate that CAR-T therapy is understood by patients as a liminal state between survival and vulnerability (Paul et al., 2021). The themes of "living with uncertainty and hope," "transformation of identity and the body," and "emotional burden and psychosocial struggles" highlight how the therapy is perceived as both a potential cure and a source of existential disruption. These insights address the research question by showing that patient experiences cannot be fully captured through clinical indicators alone (Mukhlis, Janwari, et al., 2023). Instead, meaning emerges from the ways individuals reconstruct their sense of self and renegotiate their place in the world. By uncovering these interpretive processes, the study contributes unique knowledge about the subjective dimensions of gene therapy that remain invisible in conventional clinical frameworks.

Relationship to Previous Literature and Theory

The findings resonate with earlier work emphasizing the psychological and existential impact of advanced cancer therapies (Qi et al., 2022). Consistent with Qualls & Salles (2021), this study underscores the psychosocial dimensions of gene therapy but advances the discussion by revealing how identity and bodily self-perception are redefined in the aftermath of cellular modification. The theme of estrangement from one's own body aligns with Heideggerian notions of "being-in-the- world," where illness alters the horizon of lived experience (Mukhlis, 2025a). At the same time, the emphasis on hope and future orientation complements literature on patient resilience, suggesting that meaning-making is central to adaptation in contexts of medical uncertainty. Thus, this research extends existing theoretical and empirical work by offering a phenomenological account of how patients embody and interpret CAR-T therapy as a transformative experience.

Implications of the Findings

The findings carry significant implications for both clinical practice and the broader understanding of patient-centered care in the context of advanced gene therapies. By uncovering how

patients experience CAR-T therapy as a process of uncertainty, identity transformation, and emotional burden, the study emphasizes the need for healthcare systems to integrate psychosocial and existential support alongside medical interventions (Reinert et al., 2022). These insights highlight that treatment success cannot be measured solely by clinical remission or survival statistics but must also account for the lived realities of patients (Mukhlis, Arifin, Ridwan, Zulbaidah, et al., 2025). Culturally, the findings suggest that experiences of hope, fear, and self-redefinition are shaped by wider social expectations of illness and recovery, reinforcing the importance of tailoring interventions to the sociocultural contexts in which patients live (Teipel et al., 2022). On a professional level, the study offers guidance for clinicians, nurses, and psycho-oncology practitioners seeking to provide care that honors the subjective voice of patients while supporting their holistic well-being.

Limitations of the Study

This research is not without limitations. The sample was context-specific, focusing on patients with hematological malignancies who had recently undergone CAR-T therapy, which may limit the transferability of findings to other populations or therapeutic contexts (Shadman et al., 2024). As is typical in phenomenological inquiry, the depth of analysis came at the expense of breadth, meaning that the findings reflect the richness of a small number of participants rather than generalized trends. Additionally, reliance on retrospective accounts may have been influenced by memory and interpretation over time (Mukhlis, Maryam, et al., 2023). These limitations, however, are consistent with the phenomenological aim of exploring meaning rather than producing universal claims (Stenson et al., 2023). They also underscore the need for future studies to examine diverse populations and longitudinal experiences to further enrich understanding of the phenomenon.

Prospective Directions for Future Research

The results of this study open new pathways for future research. Longitudinal phenomenological studies could trace how experiences of identity and uncertainty evolve beyond the immediate post-treatment period, offering insight into long-term adaptation to CAR-T therapy (Sidana et al., 2022). Comparative studies across cultural or healthcare settings may reveal how different social frameworks shape the interpretation of gene-based treatments. Furthermore, interdisciplinary approaches that integrate phenomenology with psychology, sociology, and bioethics could expand understanding of the existential and moral dimensions of living with genetically modified cells (Mukhlis et al., 2024). Such research would not only advance theoretical debates but also inform clinical guidelines and policy development aimed at delivering holistic, patient-centered care in the era of advanced molecular medicine.

CONCLUSION

This study explored the lived experiences of patients undergoing CAR-T therapy, focusing on how they navigated uncertainty, identity transformation, and emotional struggles throughout their treatment journey. The findings revealed that patients perceived the therapy not only as a medical intervention but also as an existential process that reshaped their sense of self and future. By highlighting dimensions of hope, fear, and meaning-making, the study addressed gaps in previous research that relied heavily on clinical or quantitative measures. These results demonstrate the value of phenomenology in uncovering patient perspectives that are often overlooked in biomedical discourse. The insights provide a foundation for integrating psychosocial support into patient-centered care models for advanced gene therapies.

However, this study is not without limitations. The sample size was relatively small and limited to patients within a single clinical context, which may constrain the generalizability of the findings. Moreover, the cross-sectional design captures experiences at one point in time and may not fully reflect the evolving nature of patient adaptation following CAR-T therapy. Future research employing longitudinal or multi-site designs could provide deeper insights into how these experiences transform over time and across diverse cultural settings.

From a practical standpoint, the findings highlight the importance of integrating structured psychosocial interventions, such as counseling or peer support programs, into CAR-T treatment

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protocols. Healthcare providers should also receive training to recognize and respond to patients' existential concerns, ensuring that emotional and identity-related dimensions are addressed alongside biomedical care. In summary, while this study enriches understanding of the human dimensions of CAR-T therapy, its conclusions should be interpreted within these methodological boundaries and applied as a basis for more holistic, psychologically informed clinical practices.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

REFERENCES

Ababneh, H. S., Yee, A. J., Raje, N. S., Martin, S., Frigault, M. J., Ng, A. K., & Patel, C. G. (2023). Radiation therapy as a bridging and salvage strategy in patients with relapsed or refractory multiple myeloma undergoing BCMA-targeted CAR T-cell therapy. *Radiotherapy and Oncology*, *189*. Scopus. https://doi.org/10.1016/j.radonc.2023.109933

Akbari, B., Soltantoyeh, T., Shahosseini, Z., Yarandi, F., Hadjat, J., & Mirzaei, H. R. (2023). The inhibitory receptors PD1, Tim3, and A2aR are highly expressed during mesoCAR T cell manufacturing in advanced human epithelial ovarian cancer. *Cancer Cell International*, *23*(1). Scopus. https://doi.org/10.1186/s12935-023-02948-0

Ali Hosseini Rad, S. M. A. H., Halpin, J. C., Tawinwung, S., Suppipat, K., Hirankarn, N., & McLellan, A. D. (2022). MicroRNA-mediated metabolic reprogramming of chimeric antigen receptor T cells. *Immunology and Cell Biology*, *100*(6), 424–439. Scopus. https://doi.org/10.1111/imcb.12551

Atar, O., Ram, R., Avivi, I., Amit, O., Vitkon, R., Luttwak, E., Bar-On, Y., & Gidron, Y. (2023). Vagal Nerve Activity Predicts Prognosis in Diffused Large B-Cell Lymphoma and Multiple Myeloma. *Journal of Clinical Medicine*, *12*(3). Scopus. https://doi.org/10.3390/jcm12030908

Baer, B. (2021). Car t-cell therapy updates in nursing management. *Clinical Journal of Oncology Nursing*, *25*(3), 255–258. Scopus. https://doi.org/10.1188/21.CJON.255-258

Barata, A., Dhawale, T., Newcomb, R. A., Amonoo, H. L., Nelson, A. M., Yang, D., Karpinski, K., Holmbeck, K., Farnam, E., & Frigault, M. (2024). Quality of Life and Prognostic Awareness in Caregivers of Patients Receiving Chimeric Antigen Receptor T Cell Therapy. *Transplantation and Cellular Therapy*, *30*(4), 452-452.e11. Scopus. https://doi.org/10.1016/j.jtct.2024.01.063

Benzaquén, A., Giménez, E., Iacoboni, G., Guerreiro, M., Hernani, R., Albert, E., Carpio, C., Balaguer-Roselló, A., Pérez, A., & S de la Asunción, C. (2024). Torque Teno Virus plasma DNA load: A novel prognostic biomarker in CAR-T therapy. *Bone Marrow Transplantation*, *59*(1), 93–100. Scopus. https://doi.org/10.1038/s41409-023-02114-0

Berning, P., Fekom, M., Ngoya, M., Goldstone, A. H., Dreger, P., Montoto, S., Finel, H., Shumilov, E., Chevallier, P., & Blaise, D. (2024). Hematopoietic stem cell transplantation for DLBCL: a report from the European Society for Blood and Marrow Transplantation on more than 40,000 patients over 32 years. *Blood Cancer Journal*, *14*(1). Scopus. https://doi.org/10.1038/s41408-024-01085-9

Beuchat, I., Danish, H. H., Rubin, D. B., Jacobson, C., Robertson, M., Vaitkevicius, H., & Lee, J. W. (2022). EEG findings in CAR T-cell-associated neurotoxicity: Clinical and radiological correlations. *Neuro-Oncology*, *24*(2), 313–325. Scopus. https://doi.org/10.1093/neuonc/noab174

Farooqui, N., Sy-Go, J. P. T., Miao, J., Mehta, R., Vaughan, L. E., Bennani, N. N., Wang, Y., Bansal, R., Hathcock, M. A., & Hayman, S. R. (2022). Incidence and Risk Factors for Acute Kidney

`

Injury After Chimeric Antigen Receptor T-Cell Therapy. *Mayo Clinic Proceedings*, *97*(7), 1294–1304. Scopus. https://doi.org/10.1016/j.mayocp.2022.05.018

Fowler, N. H., Dickinson, M., Ghosh, M., Chen, A. I., Andreadis, C., Tiwari, R., Masood, A., Ramos, R., Jousseaume, E., & Thièblemont, C. (2023). Assessment of Healthcare Resource Utilization and Hospitalization Costs in Patients With Relapsed or Refractory Follicular Lymphoma Undergoing CAR-T Cell Therapy With Tisagenlecleucel: Results From the ELARA Study. *Transplantation and Cellular Therapy*, *29*(1), 60-60.e4. Scopus. https://doi.org/10.1016/j.jtct.2022.09.022

Galtier, J., Vercellino, L., Chartier, L., Olivier, P., Tabouret-Viaud, C., Mesguich, C., Blasi, R. D., Durand, A., Raffy, L., & Gros, F.-X. (2023). Positron emission tomography-imaging assessment for guiding strategy in patients with relapsed/refractory large B-cell lymphoma receiving CAR T cells. *Haematologica*, *108*(1), 171–180. Scopus. https://doi.org/10.3324/haematol.2021.280550

Georgi, T. W., Kurch, L., Franke, G.-N., Jentzsch, M., Schwind, S., Perez-Fernandez, C., Petermann, N., Merz, M., Metzeler, K., & Borte, G. (2023). Prognostic value of baseline and early response FDG-PET/CT in patients with refractory and relapsed aggressive B-cell lymphoma undergoing CAR-T cell therapy. *Journal of Cancer Research and Clinical Oncology*, *149*(9), 6131–6138. Scopus. https://doi.org/10.1007/s00432-023-04587-4

Gu, R., Liu, F., Zou, D., Xu, Y., Lu, Y., Liu, B., Liu, W., Chen, X., Liu, K., & Guo, Y. (2020). Efficacy and safety of CD19 CAR T constructed with a new anti-CD19 chimeric antigen receptor in relapsed or refractory acute lymphoblastic leukemia. *Journal of Hematology and Oncology*, *13*(1). Scopus. https://doi.org/10.1186/s13045-020-00953-8

Gust, J., Annesley, C. E., Gardner, R. A., & Bozarth, X. (2021). EEG Correlates of Delirium in Children and Young Adults with CD19-Directed CAR T Cell Treatment-Related Neurotoxicity. *Journal of Clinical Neurophysiology*, *38*(2), 135–142. Scopus. https://doi.org/10.1097/WNP.0000000000000669

Hamadani, M., Gopal, A. K., Pasquini, M., Kim, S., Qiu, X., Ahmed, S., Lazaryan, A., Bhatt, V., Daly, A., & Lulla, P. (2022). Allogeneic transplant and CAR-T therapy after autologous transplant failure in DLBCL: A noncomparative cohort analysis. *Blood Advances*, *6*(2), 486–494. Scopus. https://doi.org/10.1182/bloodadvances.2021005788

Han, L., Zhou, J., Zhou, K., Zhu, X., Zhao, L., Fang, B., Yin, Q., Wei, X., Zhou, H., & Li, L. (2020). Safety and efficacy of CAR-T cell targeting BCMA in patients with multiple myeloma coinfected with chronic hepatitis B virus. *Journal for ImmunoTherapy of Cancer*, *8*(2). Scopus. https://doi.org/10.1136/jitc-2020-000927

Hernani, R., Aiko, M., Victorio, R., Benzaquén, A., Pérez, A., Piñana, J. L., Hernández-Boluda, J. C., Amat, P., Pastor-Galán, I., & Remigia, M. J. (2024). EEG before chimeric antigen receptor T-cell therapy and early after onset of immune effector cell-associated neurotoxicity syndrome. *Clinical Neurophysiology*, *163*, 132–142. Scopus. https://doi.org/10.1016/j.clinph.2024.04.014

Lefebvre, B., Kang, Y., Smith, A. M., Frey, N. V., Carver, J. R., & Scherrer-Crosbie, M. (2020). Cardiovascular Effects of CAR T Cell Therapy: A Retrospective Study. *JACC: CardioOncology*, *2*(2), 193–203. Scopus. https://doi.org/10.1016/j.jaccao.2020.04.012

Lefebvre, B., Kang, Y., Vakilpour, A., Onoue, T., Frey, N. V., Brahmbhatt, P., Huang, B., Oladuja, K., Koropeckyj-Cox, D., & Wiredu, C. (2023). Incidence of MACE in Patients Treated With CAR-T Cell Therapy: A Prospective Study. *JACC: CardioOncology*, *5*(6), 747–754. Scopus. https://doi.org/10.1016/j.jaccao.2023.07.009

Lindsay, J., Krantz, E. M., Morris, J., Sweet, A., Tverdek, F., Joshi, A., Yeh, R., Hill, J. A., Greenwood, M., & Chen, S. C.-A. (2022). Voriconazole in Hematopoietic Stem Cell Transplantation and Cellular Therapies: Real-World Usage and Therapeutic Level Attainment at a Major

`

Transplantation Center. *Transplantation and Cellular Therapy*, *28*(8), 511-511.e10. Scopus. https://doi.org/10.1016/j.jtct.2022.05.030

Marón, G. M., Hijano, D. R., Epperly, R., Su, Y., Tang, L., Hayden, R. T., Naik, S., Karol, S. E., Gottschalk, S., & Triplett, B. M. (2022). Infectious Complications in Pediatric, Adolescent and Young Adult Patients Undergoing CD19-CAR T Cell Therapy. *Frontiers in Oncology*, *12*. Scopus. https://doi.org/10.3389/fonc.2022.845540

Mukhlis, L. (2025a). A Phenomenological Study of Personal Spiritual Experiences in Navigating Religious Pluralism within Interfaith Communities. *Irfana: Journal of Religious Studies*, *1*(6), 212–220.

Mukhlis, L. (2025b). Spiritual Grounds for Economic Growth: A Qualitative Exploration of Rural Indonesian Women's Transformative Journeys Through Mosque-Led Empowerment Programs. *Servina: Jurnal Pengabdian Kepada Masyarakat*, *1*(8), 289–298.

Mukhlis, L., & Abdullah, M. N. (2025). *Hukum Keluarga Islam di Indonesia* (1st ed.). Mukhlisina Revolution Center.

Mukhlis, L., Arifin, T., Ridwan, A. H., & Zulbaidah. (2024). Integrating Artificial Intelligenceand Maqāṣid al-Syarī'ah: Revolutionizing Indonesia's Sharia Online Trading System. *Computer Fraud and Security*, *2024*(11), 301–309. https://doi.org/10.52710/cfs.238

Mukhlis, L., Arifin, T., Ridwan, A. H., & Zulbaidah. (2025). Reorientation of Sharia Stock Regulations: Integrating Taṣarrufāt al-Rasūl and Maqāṣid al-Sharī'ah for Justice and Sustainability. *Journal of Information Systems Engineering and Management*, *10*(10s), 58–66. https://doi.org/10.52783/jisem.v10i10s.1341

Mukhlis, L., Arifin, T., Ridwan, A. H., Zulbaidah, Rosadi, A., & Solehudin, E. (2025). Reformulation of Islamic Stock Law: The Application of Taṣarrufāt al-Rasūl and Maqāṣid al-Syarī'ahto Develop a Dynamic and Sustainable Islamic Capital Market in Indonesia. *Journal of Posthumanism*, *5*(3), 1–13. https://doi.org/10.63332/joph.v5i3.913

Mukhlis, L., Janwari, Y., & Syafe`i, R. (2023). INDONESIA STOCK EXCHANGE: THEORETICAL AND PHILOSOPHICAL ANALYSIS OF MUDHARABAH AND MUSYARAKAH CONTRACTS. *Yurisprudentia: Jurnal Hukum Ekonomi*, *9*(2), 243–264. https://doi.org/10.24952/yurisprudentia.v9i2.8466

Mukhlis, L., Maryam, S., & Sormin, S. A. (2023). Model Pembelajaran Living History Berbasis PjBL Untuk Meningkatkan Keterampilan Histografi Mahasiswa. *Jurnal Educatio FKIP UNMA*, *9*(4), 1800–1809. https://doi.org/10.31949/educatio.v9i4.5595

Mukhlis, L., & Saidah, Y. (2025). Dynamics of Nature-Based learning in Developing Children's Motoricic Skills: Teacher and Parent Perspectives. *HUMANISMA: Journal of Gender Studies*, *9*(1), 64–79. http://dx.doi.org/10.30983/humanisme.v4i2.9366

Mukhlis, L., Suradi, Janwari, Y., & Syafe`i, R. (2023). Sosialisasi Saham Syariah sebagai Instrumen Pengembangan Ekonomi Masyarakat di Badan Kontak Majelis Taklim (BKMT) Kabupaten Mandailing Natal. *Jurnal Pengabdian Multidisiplin*, *3*(2), 2–9. https://doi.org/10.51214/japamul.v3i2.604

Paul, F., Vicente, C., Courbon, C., Moreau, A.-S., Picard, M., Pochon, C., Stérin, A., Tudesq, J.-J., Yakoub-Agha, M., & Bay, J.-O. (2021). Prevention and management of infections in patients undergoing CAR T-cell therapy: Recommendations of the Francophone Society of Bone Marrow Transplantation and Cellular Therapy (SFGM-TC). *Bulletin Du Cancer*, *108*(12), S90–S97. Scopus. https://doi.org/10.1016/j.bulcan.2021.11.001

Qi, J., Lv, X., Chen, J., Wang, H., Chu, T., Tang, Y., Pan, T., Zhou, M., Cai, C., & Ren, Y. (2022). TNF-α increases the risk of bleeding in patients after CAR T-cell therapy: A bleeding model based on a real-world study of Chinese CAR T Working Party. *Hematological Oncology*, *40*(1), 63–71. Scopus. https://doi.org/10.1002/hon.2931

.

Qualls, D., & Salles, G. (2021). Optimizing CAR T cell therapy in lymphoma. *Hematological Oncology*, *39*(S1), 104–112. Scopus. https://doi.org/10.1002/hon.2844

Reinert, C. P., Perl, R. M., Faul, C., Lengerke, C., Nikolaou, K., Dittmann, H., Bethge, W. A., & Horger, M. (2022). Value of CT-Textural Features and Volume-Based PET Parameters in Comparison to Serologic Markers for Response Prediction in Patients with Diffuse Large B-Cell Lymphoma Undergoing CD19-CAR-T Cell Therapy. *Journal of Clinical Medicine*, *11*(6). Scopus. https://doi.org/10.3390/jcm11061522

Shadman, M., Ahn, K. W., Kaur, M., Lekakis, L., Beitinjaneh, A., Iqbal, M., Ahmed, N., Hill, B., Hossain, N. M., & Riedell, P. (2024). Autologous transplant vs. CAR-T therapy in patients with DLBCL treated while in complete remission. *Blood Cancer Journal*, *14*(1). Scopus. https://doi.org/10.1038/s41408-024-01084-w

Sidana, S., Dueck, A. C., Thanarajasingam, G., Griffin, J. M., Thompson, C., Durani, U., Burtis, M., Warsame, R., Paludo, J., & Gertz, M. A. (2022). Longitudinal Patient Reported Outcomes with CAR-T Cell Therapy Versus Autologous and Allogeneic Stem Cell Transplant: PROs with CAR-T therapy versus Stem Cell Transplant. *Transplantation and Cellular Therapy*, *28*(8), 473–482. Scopus. https://doi.org/10.1016/j.jtct.2022.05.004

Stenson, C. L., Vidrine, J., Dewhurst, F., Osborne, W., Menne, T., & Stocker, R. (2023). A qualitative service evaluation of patient and caregiver experiences of CAR-T therapy: Recommendations for service development and implications for palliative care teams. *Palliative Medicine*, *37*(2), 215–220. Scopus. https://doi.org/10.1177/02692163221138880

Teipel, R., Kroschinsky, F., Krämer, M., Kretschmann, T., Egger-Heidrich, K., Krüger, T., Ruhnke, L., Herold, S., Stasik, S., & Sockel, K. (2022). Prevalence and variation of CHIP in patients with aggressive lymphomas undergoing CD19-directed CAR T-cell treatment. *Blood Advances*, *6*(6), 1941–1946. Scopus. https://doi.org/10.1182/bloodadvances.2021005747