

CONSIDERATION OF *MA'ĀLĀT* IN THE DETERMINATION OF ISLAMIC RULINGS ON CRISPR-Cas9 TECHNOLOGY

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ABSTRACT

CRISPR-Cas9 technology signifies a groundbreaking advancement in human genome editing, providing substantial therapeutic benefits while presenting intricate ethical, biological, and intergenerational risks. In modern Islamic jurisprudence (*fiqh*), it is essential to assess potential outcomes, as Shariah rulings must be meticulously aligned with the core principles of legal certainty (*yaqīn*) and the prevention of harm (*dar' al-mafāsīd*). Rather than serving as a passive balancing exercise of competing benefits and detriments, this study positions the principle of *al-ma'ālāt* (consideration of legal outcomes) as an active legal filter and screening mechanism within juristic deliberations. Employing a qualitative textual methodology, the manuscript delineates

a systematic analytical procedure that assesses empirical clinical outcomes, differentiates non-heritable somatic cell modifications from inheritable germline alterations, and comprehensively evaluates prospective therapeutic advantages (*maṣlaḥah*) against both immediate and long-term genetic risks (*mafsadah*). Guided by the traditional legal maxim “*dar’ al-mafsadah muqaddam ‘ala jalb al-maṣlaḥah*” (rejecting harm takes precedence over pursuing benefit), this framework incorporates an iterative feedback mechanism involving jurisprudence specialists and scientific experts to continually reevaluate emerging empirical data, off-target mutations, and unresolved clinical risks before making legal determinations. Ultimately, the study proposes that operationalizing *al-ma’ālāt* as an active screening mechanism through collective *ijtihād* (*ijtihād jamā’ī*) yields a dynamic, forward-looking model of legal governance, enabling Islamic jurisprudence to provide structured, principled guidance for emerging biotechnological innovations while safeguarding the higher objectives of Shariah (*maqāṣid al-sharī’ah*).

Keywords: *CRISPR-Cas9, human genome editing, fiqh al-ma’ālāt, active legal filter, maqāṣid al-sharī’ah, collective ijtiḥād*

INTRODUCTION

Recently, human gene therapy utilizing CRISPR-Cas9 technology for the treatment of sickle cell disease and β -thalassemia received approval from the Medicines and Healthcare products Regulatory Agency (MHRA), United Kingdom¹ and the Food and Drug Administration (FDA), United States in late 2023.² This milestone

¹ Katie Hunt, “CRISPR Treatment Has Been Greenlit in UK in Global First. Here’s Who It Could Help,” *CNN Health*, 16 November 2023, <https://edition.cnn.com/2023/11/16/health/uk-casgevy-approval-crispr-gene-editing-sickle-cell-scni/index.html>.

² U.S. Food and Drug Administration, “FDA Approves First Gene Therapies to Treat Patients with Sickle Cell Disease,” December 8, 2023, <https://www.fda.gov/news-events/press-announcements/fda-approves-first-gene-therapies-treat-patients-sickle-cell-disease>.

underscores the promising potential of CRISPR-Cas9 as a viable gene therapy approach. The approval granted by these two regulatory agencies has had a significant impact on public health policies and serves as a global reference for the regulation and oversight of CRISPR-based technologies. One potential implication is improved access of gene therapy for chronic conditions such as sickle cell disease and β -thalassemia. This development provides compelling evidence of the therapeutic benefits of gene editing, demonstrating its high potential to treat or mitigate the effects of genetic disorders. Furthermore, this approval marks a crucial step toward advancing safe, high-quality, and effective treatment options while harnessing cutting-edge medical technologies to enhance public health outcomes.

The clinical results for the treatment of sickle cell disease and β -thalassemia have demonstrated the high efficacy of the CRISPR-Cas9 gene editing therapy application, CASGEVY (exagamglogene autotemcel)³ developed by Vertex Pharmaceuticals and CRISPR Therapeutics. This progress has given considerable hope to patients who have long suffered from these diseases. CRISPR-Cas9 gene editing therapy uses the patient's own hematopoietic stem cells modified ex vivo and then transplanted back into the patient. According to the data obtained regarding the efficacy and safety of using CASGEVY in the treatment of sickle cell disease, it has been evaluated in an ongoing trial in adolescent and adult patients who have a history of at least two severe vaso-occlusive crises (VOCs) that recurred within two years prior to screening. Meanwhile, efficacy was assessed after patients remained free from severe VOCs for 12 consecutive months during the two-year follow-up.⁴

According to the FDA, clinical trials for sickle cell disease have been conducted on a cohort of 44 patients, of whom 31 have reached the required evaluation period. Of these, 29 patients representing a success rate of 93.5% achieved the primary clinical outcome by exhibiting no severe vaso-occlusive crises (VOCs) during the designated assessment period. Meanwhile, clinical trial data reviewed by the MHRA by the MHRA recorded a total of 45 patients undergoing treatment, with 29 patients reaching the stage for analysis. Notably, 28 patients, accounting for 97% of those evaluated, demonstrated a high level of therapeutic efficacy.

³ Sheridan M. Hoy, "Exagamglogene Autotemcel: First Approval," *Molecular Diagnosis & Therapy* 28 (2024): 136-137.

⁴ D. V. Parums, "Editorial: First Regulatory Approvals for CRISPR-Cas9 Therapeutic Gene Editing for Sickle Cell Disease and Transfusion-Dependent β -Thalassemia," *Medical Science Monitor* 30 (2024): e944204, <https://doi.org/10.12659/MSM.944204>.

A clinical trial investigating the efficacy of CASGEVY for the treatment of β -thalassemia enrolled 52 patients aged between 12 and 35 years. Of these, only 35 patients had completed the trial within a sufficient timeframe for analysis. The results demonstrated that 32 patients representing 91.4% of the analysed cohort successfully achieved transfusion independence, requiring no red blood cell transfusions for a minimum period of 12 months following treatment.⁵ Each patient underwent continuous evaluation and monitoring to assess both safety and efficacy as part of the long-term follow-up trial, CLIMB-131,⁶ after receiving CASGEVY in one of the earlier trial phases: CLIMB-111, CLIMB-121, CLIMB-141, or CLIMB-151. The final results regarding the safety and efficacy of CASGEVY are anticipated to be published in August 2026.⁷

Among the commonly reported adverse effects of CASGEVY are headaches, fever, febrile neutropenia (fever accompanied by an abnormally low neutrophil count), thrombocytopenia (low platelet levels), nausea, vomiting, pruritus (itching), oral ulcers, as well as abdominal and musculoskeletal pain.⁸ These adverse effects constitute critical safety information that every patient must be made aware of prior to treatment. Furthermore, they represent inherent risks associated with a pivotal and highly critical stage of the CASGEVY treatment process, known as the myeloablative conditioning regimen, which precedes both hematopoietic stem cell transplantation (HSCT) and CASGEVY infusion.

This stage necessitates stringent medical monitoring and comprehensive clinical support to mitigate potential side effects. Additionally, adverse effects may arise during CD34+ hematopoietic stem and progenitor cell (HSPC) mobilization, followed by apheresis, a procedure performed to isolate CD34+ cells for CASGEVY

⁵ Vertex Pharmaceuticals, *CASGEVY Package Insert*. Accessed July 14, 2024. https://pi.vrtx.com/files/uspi_exagamglogene_autotemcel.pdf.

⁶ ClinicalTrials.gov, "A Long-Term Follow-Up Study in Participants Who Received CTX001," July 13, 2024, <https://clinicaltrials.gov/study/NCT04208529>.

⁷ F. Greco, M. Cosentino, and F. Marino, "The Italian Breakthrough in CRISPR Trials for Rare Diseases: A Focus on Beta-Thalassemia and Sickle Cell Disease Treatment." *Frontiers in Medicine* 11 (2024): Article 1356578, <https://doi.org/10.3389/fmed.2024.1356578>.

⁸ Eli Y. Adashi, Philip A. Gruppuso, and I. Glenn Cohen, "CRISPR Therapy of Sickle Cell Disease: The Dawning of the Gene Editing Era." *The American Journal of Medicine* 137, no. 5 (2024): 390-392, <https://doi.org/10.1016/j.amjmed.2023.12.018>.

product manufacturing.⁹ The occurrence of side effects throughout treatment requires continuous monitoring to ensure patient safety and therapeutic efficacy.¹⁰ These precautionary measures are implemented to uphold the long-term safety and therapeutic efficacy of CASGEVY.

In the context of this study, although CASGEVY has been approved and remains restricted to specific diseases, it nonetheless provides an initial insight into the application of this technology. This serves as a reference in evaluating various considerations related to the process of Islamic rulings (*fiqh*) regarding the use of CRISPR-Cas9 technology through the framework of *al-ma'ālāt*. Among the key aspects that require thorough examination are the balance between benefits and harms (*maṣlahah* and *mafsadah*), the underlying intent (*niyyah*) behind the utilization of this technology, as well as its social, ethical, and Shariah governance implications. This study examines whether the implications of the technology align with Shariah standards and correspond with the overarching objectives of *maqāṣid al-sharī'ah*.¹¹

Discussions concerning fatwas and specific Islamic rulings (*fiqh*) regarding the application of CRISPR-Cas9 technology in humans remain limited, as much of the research is still in the clinical trial phase. Only a few scholarly conferences have issued general resolutions,¹² and existing academic studies primarily explore the

⁹ European Medicines Agency, *CASGEVY: EPAR - Product Information*. Accessed July 14, 2024, https://www.ema.europa.eu/en/documents/product-information/casgev-y-epar-product-information_en.pdf.

¹⁰ Arthur L. Caplan, Brendan Parent, Michael Shen, and Carolyn Plunkett, "No Time to Waste-The Ethical Challenges Created by CRISPR," *EMBO Reports* 16, no. 11 (2015): 1421-26, <https://doi.org/10.15252/embr.201541337>.

¹¹ Paizah Hj Ismail, "Penyelesaian Masalah Pertentangan antara Nas Berasaskan Prinsip Maqasid al-Syari'ah," *Jurnal Fiqh* 11 (2014): 75-96, <https://doi.org/10.22452/fiqh.vol11no1.4>.

¹² International Islamic Fiqh Academy, "Human Genome and Future Bioengineering: Review of IIFA Resolutions, Their Practical Results, Updates and Challenges." August 20, 2024, <https://iifa-aifi.org/en/33158.html>.

subject through the lenses of *maqāṣid al-sharī'ah* and *maṣlaḥah*,¹³ *qawa'id fihiyya*,¹⁴ or Islamic ethics.¹⁵

However, further discussions from the perspective of *fiqh al- ma'ālāt*, despite its significance in the determination of Islamic rulings have yet to be comprehensively explored. Therefore, this study analyses the necessity of considering the consequential implications (*ma'ālāt*) of an action in determining the *fiqh* ruling on the permissibility and ethical application of CRISPR-Cas9 technology. This analysis will contribute to assessing the Shariah-compliance of human gene-editing technology while also playing a crucial role in ensuring that its application aligns with contemporary *maṣlaḥah* and offers a more pragmatic approach in Islamic jurisprudence (*fiqh*).¹⁶

CRISPR-Cas9 in Genome Editing

Genome editing is currently the most rapidly advancing technology in genome modification and has been widely applied in gene therapy.¹⁷ This technology not only facilitates the correction of genetic defects but also enables the modification and alteration of an organism's DNA by cutting, repairing, or replacing specific DNA segments. Among the leading genome-editing techniques, CRISPR-Cas9 stands out as the most widely adopted system due to its cost efficiency, high efficacy, and remarkable precision in targeting specific genes.

¹³ Noor Munirah Isa, "Human Germline Gene Editing from Maslahah Perspective: The Case of the World's First Gene Edited Babies," *Journal of Bioethical Inquiry* 18, no. 2 (2021): 349-355, <https://doi.org/10.1007/s11673-021-10101-7>.

¹⁴ N. Alsomali, and G. Hussein, "CRISPR-Cas9 and He Jiankui's Case: An Islamic Bioethics Review Using Maqasid al-Shari'a and Qawaid Fighiyya," *Asian Bioethics Review* 13, no. 2 (2021): 149-165, <https://doi.org/10.1007/s41649-021-00167-1>.

¹⁵ Mohammaddin Abdul Niri, Mohd Hafiz Mohd Saadon, Mohd Saiful Anwar Mohd Nawawi, and Mohd Hafiz Jamaludin, "Integrasi Model DIKW (Data-Information-Knowledge-Wisdom) dalam Ilmu Falak Berasaskan Kerangka Sains Islam," *Afkar: Jurnal Akidah dan Pemikiran Islam* 24, no. 2 (2022): 99-142, <https://doi.org/10.22452/afkar.vol24no2.3>.

¹⁶ Muhammad Shahrul Ifwat Ishak, "The Principle of Considering Ma'alat in Islamic Rules: Do Ends Justify Means?" *International Journal of Islamic Thought* 14 (2018): 52-59, <https://doi.org/10.24035/ijit.14.2018.005>;

¹⁷ M. Tyumentseva, A. Tyumentsev, and V. Akimkin, "CRISPR/Cas9 Landscape: Current State and Future Perspectives," *International Journal of Molecular Sciences* 24, no. 22 (2023): 16077, <https://doi.org/10.3390/ijms242216077>.

CRISPR-Cas9 originates from the innate immune system of microorganisms, functioning as an adaptive immune mechanism to recognize and eliminate unwanted viral or foreign genetic elements. The adoption of CRISPR-Cas9 as a genome-editing tool has become a scientific breakthrough, leading to its widespread integration in human, plant, and animal genome modification. As the field of therapeutic research enters a revolutionary phase, CRISPR-Cas9 is regarded as one of the most promising genome-editing technologies, offering significant therapeutic potential for treating various genetic disorders.¹⁸

Nevertheless, despite the potential of this technology, ethical, safety, and efficacy concerns have sparked significant debates in Islamic jurisprudence (*fiqh*) regarding its alignment with Shariah principles. A central issue is whether genome modification, particularly the ability of CRISPR-Cas9 to edit and repair human cells, constitutes an act of altering Allah's creation (*taghyīr khalq Allāh*), which may fall under prohibited (*ḥaram*) interventions. Any genetic modifications performed using this technology must undergo thorough scrutiny from both internal and external perspectives, necessitating a clear and well-founded justification in determining its Islamic ruling status (*ḥukm shar'iy*).¹⁹ Additionally, the evaluation of the benefits (*maṣlahah*) and harms (*mafsadah*) of this technology must be approached through a shari'ah lens, ensuring that such considerations are not merely dictated by human reasoning or desires. Furthermore, one of the most crucial aspects in determining the Islamic ruling (*fiqh*) on CRISPR-Cas9 is the assessment of consequential implications (*ma'ālāt*) arising from its application. This issue serves as a key focus of discussion in the present study.

The Concept of *Ma'ālāt* in the Determination of Islamic Ruling

From a linguistic perspective, *al-ma'ālāt* carries several meanings namely, return (*raja'a*), to come back (*'ada*), reform and repent, outcome,²⁰ result, ending, and others. Meanwhile, classical *uṣūl* scholars did not provide a singular technical definition. However, there are several definitions by modern scholars. Among them

¹⁸ G. Sharma, A. R. Sharma, M. Bhattacharya, S. S. Lee, and C. Chakraborty, "CRISPR-Cas9: A Preclinical and Clinical Perspective for the Treatment of Human Diseases," *Molecular Therapy* 29, no. 2 (2021): 571-586. <https://doi.org/10.1016/j.ymthe.2020.09.028>.

¹⁹ Nik Wafa' Nik Mohd Rosdi, "Pengeditan Genom Manusia melalui Aplikasi Teknologi CRISPR-Cas9 Menurut Perspektif Hukum Islam Semasa," (Master's thesis, Department of Fiqh and Usul, Academy of Islamic Studies, University of Malaya, 2024), 147-50.

²⁰ Ahmad ibn Fāris ibn Zakariyyā al-Qazwīnī al-Rāzī, *Mu'jam Maqāyīs al-Lughah*, ed. 'Abd al-Salām Muḥammad Hārūn (Bayrūt: Dār al-Fikr, 1979), 1:159-162.

is the effect or result arising from something or the end it returns. Second, the effect or consequence of an act whether it returns to a good state or otherwise. Third, the consequences or effects of an act whether good or bad, or whether the act is done intentionally or otherwise.²¹

Al-Shāṭibī, a pioneer of *fiqh al-ma'ālāt*, believed that, believes that the implications of every act must be considered in determining the law. This is because a *mujtahid* cannot evaluate an act of a *mukallaḥ* unless after seeing the effect of the act.²² Bringing *maṣlahah* or rejecting the *mafsadah* of a matter is required by Shariah. However, the implications of the act are likely to be contrary to the demands of Shariah. This matter needs to be considered between *maṣlahah* and *mafsadah*, whether the level of both is the same or one of them is greater. Likewise, if there is a clash between *mafsadah* and *maṣlahah* or *maṣlahah* and *maṣlahah*, as well as other related aspects. Therefore, every *ma'āl* for an act needs to be carefully examined whether it gives implications that bring *maṣlahah* or *mafsadah*, even if it is different from the original purpose of the act. Sole focus on the implementation or the true purpose is not recommended, and the research must be considered during the comprehensive and thorough process of legal investigation.

Scholars or muftis exercise *ijtihad* in determining rulings by considering every relevant aspect including the law on actions, current or future effects, good or bad and also the effects of not doing it whether long-term or otherwise. This is because there is a probability of happening in the beginning based on Shariah then there will be harm whether small or big after going through a period, a certain period of time or from the point of view of the frequency of occurrence. It is important to apply the principles of *fiqh al-ma'ālāt* so that the determination of the law is in line with the ways and purposes of the Islamic ruling. However, it can be rather difficult and challenging for a *mujtahid* to practice *fiqh al-ma'ālāt*. The context of the current reality that often changes with a variety of consequences and effects is the main factor for the need for collaboration through collective *ijtihad*. The openness of cooperation

²¹ Hussein Suleiman, "Fiqh al-Maalat: An Analysis of Its Origin, Subsidiary and Application," *Malaysian Journal of Syariah and Law* 10, no. 2 (2022): 27-29, <https://doi.org/10.33102/mjssl.vol10no2.368>; Abdulsalam Hamood Ghalib Al-Ansi, "تأصيل اعتبار المآلات في الفقه الإسلامي: دراسة تحليلية وتطبيقات معاصرة" (Ta'sil I'tibar al-Ma'alat fi al-Fiqh al-Islami: Dirasah Tahliliyyah wa Tatbiqat Mu'asirah)," *Journal of Islamic Sciences* 2, no. 1 (2025): 209-210, <https://doi.org/10.62810/jis.v2i1.186>.

²² al-Shāṭibī, *al-Muwāfaqāt*, ed. A. 'U. Mashhūr, vol. 5 (al-Qāhirah: Dār 'Affān, 1997), 177.

and interaction between Islamic scholars and professionals in other related fields is a noble approach to overcome these challenges.²³

The practice and application of *fiqh al-ma'ālāt* is not limited to a certain place, time or era. In addition, it functions as a guideline in understanding and adapting to changes that occur and contemporary problems that arise in society, especially matters related to Islamic ruling, morals and ethics. The flexibility of the application of *al-ma'ālāt* in the determination of Islamic ruling helps to realize the benefits and purposes of Shariah in addition to being guided by other instruments of Islamic ruling in an orderly and proper discipline. This is important in order to avoid its reckless use or *pseudo-maqāṣid* approach that has gone astray.²⁴

Shariah Evidence Concerning *al-Ma'ālāt*

The discourse on *al-ma'ālāt* is extensive, with numerous Shariah evidences embedded within its conceptual framework, emphasizing the consideration of implications from the perspectives of *maṣlaḥah* (benefit) and *mafsadah* (harm). This principle is reflected in divine injunctions that highlight the importance of deliberating the consequences of an action before undertaking it. Moreover, *al-ma'ālāt* is highly relevant in addressing conflicts and social interactions, as it serves as a guiding principle in decision-making. The wisdom behind the Shariah rulings that incorporate *al-ma'ālāt* extends beyond prudent judgment and careful deliberation, it also safeguards society at large from potential adverse consequences.

أَلَمْ يَرَوْا كَمْ أَهْلَكْنَا مِنْ قَبْلِهِمْ مِنْ قَرْنٍ مَكَّنَّهُمْ فِي الْأَرْضِ مَا لَمْ
تُمْكِنْ لَكُمْ وَأَرْسَلْنَا السَّمَاءَ عَلَيْهِمْ مِدْرَارًا وَجَعَلْنَا الْأَنْهَارَ تَجْرِي مِنْ
تَحْتِهِمْ فَأَهْلَكْنَاهُمْ بِذُنُوبِهِمْ وَأَنْشَأْنَا مِنْ بَعْدِهِمْ قَرْنًا آخَرِينَ ۝

²³ Muhammad Shahrul Ifwat Ishak, "The Principle of Considering Ma'alat in Islamic Rules: Do Ends Justify Means?"

²⁴ Muhamad Sayuti Mansor dan Mohd Anuar Ramli, "Pendekatan Pseudo-Maqasid dalam Aliran Hukum Islam Semasa." dalam *Maqasid al-Shari'ah: Aplikasi dalam Aspek Sosial dan Perundangan*, ed. Rahimin Affandi Abdul Rahim, Mohd Anuar Ramli & Shahidra Abdul Khalil (Kuala Lumpur: Department of Fiqh and Usul, Academy of Islamic Studies, Universiti Malaya, 2016) 221-44.

“And do not insult those they invoke other than Allah, lest they insult Allah in enmity without knowledge. Thus, We have made pleasing to every community their deeds. Then to their Lord is their return, and He will inform them about what they used to do.”

(Surah al-An‘ām, 6: 108)

In surah al-An‘ām, verse 108, the *wajh al-dilālah* (aspect of indication) highlights that insulting or mocking idols was not originally prohibited until it provoked complaints and threats from the polytheists. The implication of that act is as narrated from Ibnu ‘Abbas regarding the reason for the revelation of this verse, then Allah revealed a prohibition for the act of insulting and criticizing the worship of infidels.²⁵ Acts of condemning one another will cause enmity and insult to Allah and the Messenger. As such, this prohibition order is permanent and aims to prevent greater harm than good. Maintaining the purity of Islam and universal harmony for humans is a vital aspect that needs to be preserved.

قَالَ يٰٓأَيُّهَا لَا تَقْصُصْ رُءْيَاكَ عَلَىٰ إِخْوَتِكَ فَيَكِيدُوا لَكَ كَيْدًا إِنَّ الشَّيْ
طَٰنَ لِلْإِنسَانِ عَدُوٌّ مُّبِينٌ

“He (the father) said: “O my son! Do not relate your dream to your brothers, lest they devise some scheme against you. Surely! Shaitan (Satan) is an open enemy of humankind”.

(Surah Yūsuf, 12: 5)

Another divine decree in surah Yūsuf, verse 5, is Prophet Ya‘qub’s prohibition upon his son, Prophet Yusuf (AS), from disclosing his dream to his brothers. The possibility of malevolent intentions from his other sons towards Prophet Yusuf raised Prophet Ya‘qub’s concerns. This prohibition was meant to prevent jealousy and envy from arising among his children due to the dream’s interpretation, which carried profound significance as a sign of honour and divine favour bestowed upon Prophet Yusuf by Allah (SWT). Prophet Ya‘qub’s wisdom is reflected in his prudent judgment and careful risk assessment regarding the disclosure of the dream, as he was fully aware of his sons’ dispositions toward Prophet Yusuf. Therefore, in this context, the prohibition served as a precautionary measure to avert potential harm.

²⁵ ‘Imād al-Dīn Abū al-Fidā’ Ismā‘īl ibn ‘Umar ibn Kathīr, *Tafsīr al-Qur‘ān al-‘Azīm*, ed. M. H. Shamsuddin, vol. 3 (Bayrūt: Dār al-Kutub al-‘Ilmiyyah, 1998), 282.

Meanwhile, the practical application of *i'tibār al-ma'āl* can be observed in a hadith narrated by Abu Hurairah (RA)²⁶ which recounts the incident of a Bedouin man urinating in the mosque. However, the Prophet (SAW) instructed his companions to refrain from intervening until the man had completed his act. If the companions had interrupted him, it could have led to greater harm. Imam al-Nawawī, in his commentary on this hadith, highlights the principle of preventing a greater harm by tolerating a lesser harm. Scholars have identified two key benefits derived from the Prophet's instruction "*da'uhu*" (leave him be) in this context.²⁷

First, had the Prophet (SAW) prevented the man from urinating, it could have caused harm or distress to the individual, while the impurity had already been established. Thus, allowing him to finish was deemed the lesser harm in comparison to the potential distress. Second, the impurity was initially confined to a specific area. Had the man been forcibly stopped, the impurity could have spread to other areas of the mosque, including his own clothing, thereby complicating the cleaning process. In this context, the Prophet's wisdom in managing the situation reflects the principle of choosing the lesser harm (*akhaḥ al-ḍararayn*) to prevent a more significant inconvenience.

Numerous other evidences (*dalīl*) can be derived from the *ijtihād* of the Companions (*ṣaḥābah*), the Tabi'īn, the scholars of the four Sunni schools of thought (*madhāhib*), as well as from rational proofs (*'aqlī* arguments), all of which serve as a basis for the application and practicality of *i'tibār al-ma'āl* in Islamic ruling determinations.²⁸ The implementation of *i'tibār al-ma'āl* has become an essential consideration in addressing contemporary issues, particularly in the fields of technology and medicine, as it plays a crucial role in actualizing the *maqāṣid al-sharī'ah* and aligning with the principle of *maṣlaḥah* in the context of modern realities.

The Need to Consider *al-Ma'ālāt* in the Determination of Contemporary Islamic Ruling

²⁶ Muḥammad ibn Ismā'īl al-Bukhārī, *Ṣaḥīḥ al-Bukhārī*, vol. 1 (Bayrūt: Dār al-Fikr, 1994), 54, "Kitāb al-Wuḍū", Bāb Ṣabb al-Mā' 'alā al-Bawl fī al-Masjid," ḥadīth no. 217.

²⁷ Abū Zakariyyā Muḥyī al-Dīn Yaḥyā bin Sharaf al-Nawawī, *al-Minhāj Sharḥ Ṣaḥīḥ Muslim bin al-Ḥajjāj*, vol. 3 (Bayrūt: Dār Iḥyā' al-Turāth al-'Arabī, 1972), 191.

²⁸ 'Umar Jiddiyyah, *Aṣl I'tibār al-Ma'āl bayna al-Nazariyyah wa al-Taṭbīq* (Bayrūt: Ibn Ḥazm, 2010), 77-122.

Advancements in various fields, particularly in science and medical technology, are progressing rapidly. Issues involving Islamic ruling are also increasingly dynamic and complex, requiring thorough and comprehensive research. The consideration of *al-ma'ālāt* in legal discussions involving contemporary issues is one of the critical elements in helping to evaluate the implications or consequences of an action or law issued whether in a long period of time or otherwise. Based on the principle of *al-ma'ālāt*, every aspect is evaluated that can influence the stability and well-being of people, especially Muslims. Vigilance in issuing laws is one of the things that needs to be taken in addition to taking the path of confidence and consideration between *maṣlahah* and *mafsadah*.

Expectations or possibilities from the results of the implementation of an action must be considered because it is not possible that at the beginning of an intention and implementation that is based on Shariah can cause harm after a certain period has passed. The harm, whether small or large, should not be taken lightly. Al-Māwardī thinks that if an action does not achieve its original purpose within the implementation period, then the action can be cancelled.²⁹ Al-Shāṭibī also held that if an action permitted by Shariah carries a risk of *mafsadah*, then it needs to be considered because the risk is not in line with the purpose of Shariah.³⁰

The discussion of contemporary issues such as issues related to CRISPR-Cas9 technology needs to be thoroughly and comprehensively examined by Islamic scholars and related professionals. This helps Islamic scholars adopt *takyīf fiqhī*, which is to adapt the latest issues with the discussion of related issues that have been discussed by previous *fiqh* scholars.³¹ Next, Islamic scholars conduct legal discussions through legal instruments in addition to applying consideration of *maqāṣid al-sharī'ah* and *al-ma'ālāt* (Figure 1). Therefore, it can be seen that the position of consideration of *al-ma'ālāt* in the process of determining the law is so important to obtain a balance in the practice of law in the current reality.

²⁹ Abū al-Ḥasan 'Alī bin Muḥammad bin Ḥabīb al-Baṣrī al-Māwardī, *al-Ḥāwī al-Kabīr fī Fiqh Madhhab al-Imām al-Shāfi'ī wa huwa Sharḥ Mukhtaṣar al-Muzanī*, vol. 6 (Bayrūt: Dār al-Kutub al-'Ilmiyyah, 1999), 282.

³⁰ Abū Ishāq Ibrāhīm ibn Mūsā al-Shāṭibī, *Al-Muwāfaqāt*, ed. Abū 'Ubaydah Mashhūr, vol. 5 (al-Qāhirah: Dār Ibn 'Affān, 1997), 177-78.

³¹ Nik Wafa' Nik Mohd Rosdi, "Pengeditan Genom Manusia melalui Aplikasi Teknologi CRISPR-Cas9 Menurut Perspektif Hukum Islam."

The need to adapt to changes in an increasingly complex era with new issues is important. This is so that the stipulation of the law that is taken is relevant and appropriate to the local *maṣlaḥah* in addition to being able to avoid or minimize harm through the principle of *al-ma'ālāt*. The application of *al-ma'ālāt* principles, such as in Islamic banking and financial issues that have new instruments, need to be analysed in detail to maintain the integrity of Islamic finance as well as the economic stability of Muslims. Likewise, in environmental issues involving climate change and global warming. Every progress, development and use of natural resources needs to be evaluated for long-term implications so that the lives of future generations and the environment can be preserved.

Meanwhile, in the issue of medicine and human health it is very important to take consideration through the principle of *al-ma'ālāt*. For example, in the controversial vaccination issue. The evaluation between great benefits and small risks needs to be considered when taking vaccinations, especially when the world is hit by the COVID-19 pandemic. Islamic scholars do their best to evaluate and consider through discussion with those who are experts in related fields. Next, in the issue of fundamental rights and the repeal or enactment of laws, it is also necessary to assess the economic, social and political effects in order to avoid any injustice, oppression and the like that are far from the principles of Shariah.

The integration of the *ijtihād* process in the determination of the law with the selection of the appropriate methodology of Islamic rulings in addition to the correct scientific discipline can illustrate the comprehensiveness of the Islamic Shariah in fulfilling the interests and desires of people in various circumstances. It is not only based on reason and human ability alone in determining human benefits and *mafsadah*, rather, reference must be made to the arguments of Shariah compiled by previous scholars. The principle of *al-ma'ālāt* is not built by itself without the approach of other *fiqh* methods, such as *sad al-dharā'ī*, *al-ḥiyal*, *al-istiḥsān*, and *murā'āt al-khilāf*.³² Therefore, the implementation of the principle of *al-ma'ālāt* in the determination of contemporary Islamic ruling provides a more comprehensive approach with the application of various sciences, including *fiqh* and *usul*, as well as *maqāṣid al-sharī'ah*.

³² Walīd bin 'Alī bin 'Abd Allāh al-Husayn, *I'tibār Ma'ālāt al-Af'āl wa Atharuhā al-Fiqhī* (Riyāḍ: Dār al-Tadmuriyyah, 2009), 175-188.

The Implementation of *al-Ma'ālāt* Considerations in the Determination of Contemporary Islamic Ruling of Editing the Human Genome Through CRISPR-Cas9 Technology

Far from serving merely as a passive balancing exercise of potential benefits and harms, the principle of *al-ma'ālāt* (consideration of legal outcomes) functions as an active legal screening mechanism within Islamic jurisprudence (*fiqh*). By necessitating *mujtahidūn* (qualified jurists) to systematically assess the empirical and anticipated consequences of emerging biotechnologies prior to issuing a *ḥukm shar'ī* (Shariah ruling), *al-ma'ālāt* employs a structured three-stage framework of legal reasoning in the context of CRISPR-Cas9 genome editing.³³

First, the process commences with the identification of scientific consequences, whereby the technology is evaluated through an empirical risk classification that differentiates somatic cell gene editing from germline genome modification.³⁴ Somatic gene editing involves non-heritable genetic alterations confined to individual patients and thus presents comparatively manageable clinical risk profiles. Conversely, germline genome editing modifies embryonic DNA and introduces inheritable genetic modifications that entail significant scientific uncertainties, including off-target double-stranded DNA breaks, unpredictable repair mutations resulting from non-homologous end joining (NHEJ), and irreversible intergenerational effects.³⁵

Second, these scientifically identified outcomes are subjected to an axiological assessment grounded in the *maqāṣid al-sharī'ah* (higher objectives of Islamic law), through which prospective therapeutic benefits (*maṣlaḥah*) are systematically weighed against potential genetic harms (*mafsadah*).³⁶ Guided by the legal maxim

³³ Fazli Dayan, "CRISPR Cas-9 Genome Editing and Islam: A Religious Perspective," *Bangladesh Journal of Medical Science* 18, no. 1 (2019): 7-13; Abdul Halim Ibrahim, Noor Naemah Abdul Rahman, Shaikh Mohd Saifuddeen, and Madiha Baharuddin, "Maqasid al-Shariah Based Islamic Bioethics: A Comprehensive Approach," *Journal of Bioethical Inquiry* 16, no. 3 (2019): 335-337.

³⁴ G. Sharma et al., "CRISPR-Cas9: A Preclinical and Clinical Perspective for the Treatment of Human Diseases," 571-572.

³⁵ Dayan, "CRISPR Cas-9 Genome Editing and Islam: A Religious Perspective," 12; G. Sharma et al., "CRISPR-Cas9: A Preclinical and Clinical Perspective for the Treatment of Human Diseases," 572, 582-583.

³⁶ Ibrahim et al., "Maqasid al-Shariah Based Islamic Bioethics: A Comprehensive Approach," 336-338; Aasim I. Padela, "Using the Maqāṣid al-Sharī'ah to Furnish an

dar' al-mafسادah muqaddam 'alā jalb al-maṣlahah (repelling harm takes precedence over procuring benefits), therapeutic somatic gene editing for severe monogenic disorders advances the essential objective (*daruriyyah*) of preserving human life (*hiḥẓ al-naḥs*), one of the essential necessities (*al-ḍarūriyyāt*). Conversely, unrestricted germline modification engenders a predominant harm (*maḥṣadah rājiḥah*) by jeopardizing the preservation of lineage (*hiḥẓ al-nasab*) and introducing enduring genetic instability that extends beyond the treated individual.³⁷

Third, the normative conclusions derived from this ethical assessment are translated into practical Shariah rulings through collective ijtihad (*ijtihād jamā'ī*) and institutional fatwa deliberation.³⁸ Multidisciplinary bodies comprising Islamic jurists, geneticists, and bioethicists employ contextual analysis (*murā'āt al-wāqi'*) alongside established governance frameworks to formulate regulatory fatwas that permit therapeutic somatic gene editing under stringent clinical oversight while prohibiting germline genome modification and non-therapeutic genetic enhancement because of their disproportionate legal and ethical risks.³⁹

Figure 1 below illustrates the conceptual flow of the role of *al-ma'ālāt* in the process of determining Islamic ruling. Before *al-ma'ālāt* can be properly applied in the formulation of Islamic rulings, it is essential to first establish the epistemic basis for knowing and evaluating such implications. One of the methods emphasized by

Islamic Bioethics: Conceptual and Practical Issues,” *Journal of Bioethical Inquiry* 16, no. 3 (2019): 347-49.

³⁷ Dayan, “CRISPR Cas-9 Genome Editing and Islam: A Religious Perspective,” 12; Ibrahim et al., “Maqasid al-Shariah Based Islamic Bioethics: A Comprehensive Approach,” 336-338; Padela, “Using the Maqāṣid al-Sharī'ah to Furnish an Islamic Bioethics: Conceptual and Practical Issues,” 349-350.

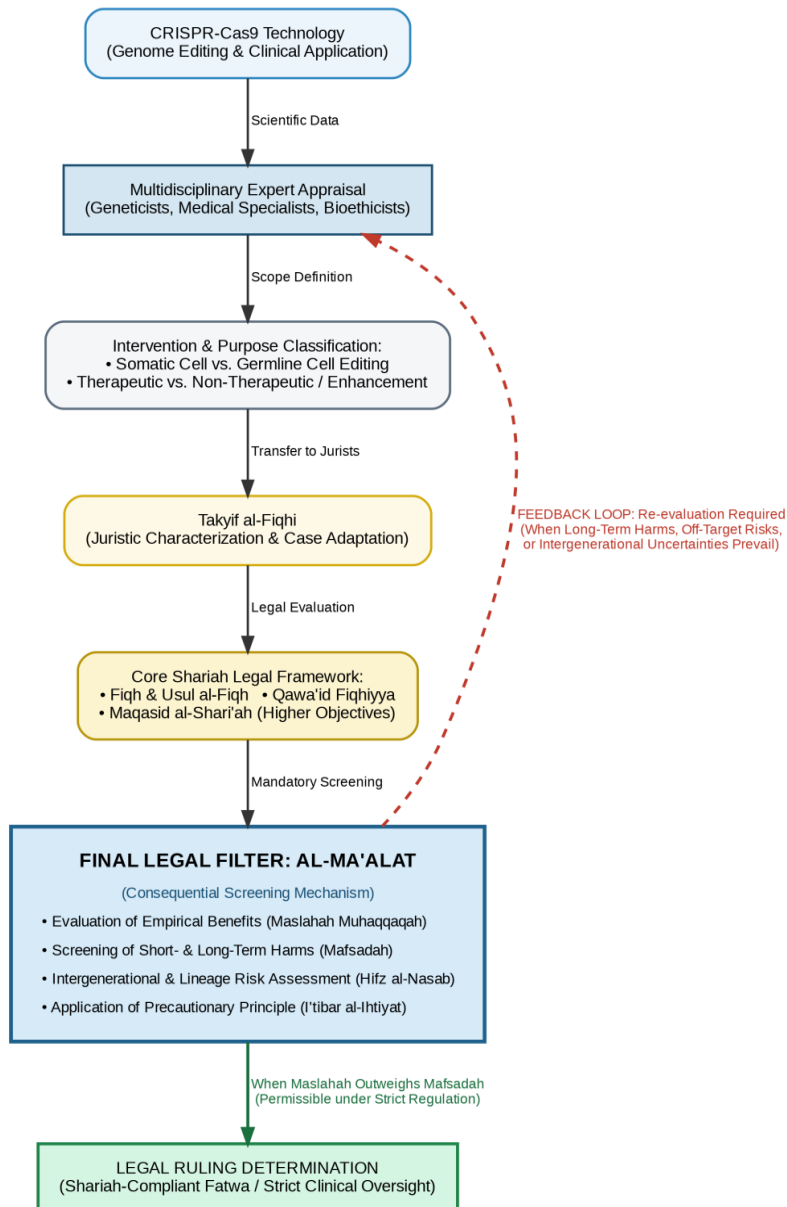
³⁸ Hazem Mathker S. Alotaibi, Wamadeva Balachandran, and Ziad Hunaiti, “Ethical Integration of AI in Healthcare Project Management: Islamic and Cultural Perspectives,” *AI* 6, no. 12 (2025): 2-8, <https://doi.org/10.3390/ai6120307>; Abdul Manan Ismail, and Ahmad Syukran Baharuddin, “Parameter Pengeluaran Fatwa dalam Kerangka Maqasid Syariah: Fatwa Parameters in Light of the Maqasid Syariah,” *Malaysian Journal of Syariah and Law* 13, no. 3 (2025), 720; E. Susilo, B. Santoso, and Y. E. Ambarwati, “Transformation of Contemporary Fiqh Through a Collective Ijtihad Approach in Resolving Lineage Issues Arising from Egg Freezing,” *MILRev: Metro Islamic Law Review* 4, no. 2 (2025): 728, 733-34.

³⁹ Alotaibi et al., “Ethical Integration of AI in Healthcare Project Management: Islamic and Cultural Perspectives,” 4 & 10-11; Ismail & Baharuddin, “Parameter Pengeluaran Fatwa dalam Kerangka Maqasid Syariah: Fatwa Parameters in Light of the Maqasid Syariah,” 720-724; Susilo et al., “Transformation of Contemporary Fiqh Through a Collective Ijtihad Approach in Resolving Lineage Issues Arising from Egg Freezing,” 747-750.

classical and contemporary scholars is through observation, experimentation, and empirical research (*al-tajribah*).⁴⁰ In this context, the involvement of specialists in relevant fields, particularly in genetic and biomedical sciences, becomes crucial, as their expertise and experience offer authoritative insight into the technical mechanisms and outcomes of CRISPR-Cas9 technology. As previously discussed, this technology has undergone various phases of experimentation, regulated under established protocols and bioethical standards. Therefore, the examination of research questions, expert briefings, and interdisciplinary roundtable discussions involving Islamic scholars are fundamental prerequisites to a sound and comprehensive *fiqh* deliberation.

⁴⁰ ‘Abd al-Raḥmān bin Mu‘ammar al-Sanūsī, *I’tibār al-Ma’ālāt wa Murā’āt Natā’ij al-Taṣarruḥāt: Dirāsah Muqāranah fī Uṣūl al-Fiqh wa Maqāṣid al-Sharī‘ah* (al-Dammām: Dār Ibn al-Jawzī, 2003), 145-156.

Figure 1: Conceptual Flow of *al-Ma'ālāt* in the Process of Determining Islamic Rulings



Source: Author's compilation.

Among the essential elements to be scrutinized in this discussion include the source of the genetic material used, the methods employed in the gene-editing process, the classification of the specific genetic intervention, whether it involves interventions deemed impermissible or acceptable from a Shariah perspective and whether the resulting effects are confined to the individual alone or inherited across generations. This distinction is pivotal, as CRISPR-Cas9 can be applied either in somatic cells or in germline cells. Edits made in somatic cells affect only the treated individual, whereas modifications in germline cells may be passed on to offspring, raising further legal, ethical, and theological concerns. Accordingly, each stage of the research must be clearly understood and thoroughly presented within an interdisciplinary forum that enables juristic reasoning (*ijtihād*) informed by both empirical data and Shariah principles.

In addition, the aspect of intention or purpose behind the use of this technology plays a significant role, determining whether its application is therapeutic or non-therapeutic in nature. Therapeutic use refers to medical purposes, such as gene therapy, while non-therapeutic use pertains to applications in research or enhancements aimed at improving specific traits, such as intelligence, physical strength, and other characteristics. The context in which the technology is employed must be clearly defined, as the intended purpose directly influences the determination of Islamic rulings.

Furthermore, understanding *al-ma'ālāt* derived from research advancements must be continuously updated. This is essential because new data is regularly acquired, reflecting scientists' ongoing efforts to reduce or control side effects and risks associated with the application of this technology on humans. Thus, the information and data presented by experts in the relevant fields, based on various studies conducted, are discussed by Islamic scholars as the next step before any Shariah deliberation regarding the ruling is undertaken.

Such interdisciplinary discussions are also evident in numerous international conferences addressing contemporary issues. One example is the Majma' al-Fiqh al-Islami Conference, which took place from 4th to 6th November 2019 in Dubai, United Arab Emirates,⁴¹ where various contemporary issues, including the issue of CRISPR technology, were discussed. The conference reached a resolution, issuing several general conditions that need to be met as a preliminary guide to maximize the

⁴¹ International Islamic Fiqh Academy, "Human Genome and Future Bioengineering: Review of IIFA Resolutions, Their Practical Results, Updates and Challenges."

benefits (*maṣlahah*) while mitigating the harms (*mafsadah*) of using this technology. Among these conditions, confirmation of safety and efficacy by relevant medical experts is required. Additionally, the technology is allowed only for therapeutic purposes, such as preventing or treating genetics disorders. Its use for cosmetic purposes is absolutely prohibited. Furthermore, the implementation of stringent regulatory procedures to protect the dignity and honour of patients is emphasized. These measures aim to prevent the misuse of the technology.

The resolution of the conference serves as a reference for this study by establishing conditions or initial guidelines, with several key emphases as outlined above. Accordingly, in the context of this study, the following aspects must be implemented based on the concept of *al-ma'ālāt* in the determination of Islamic rulings:

First, consideration should be given to the potential positive and negative implications arising from the use of CRISPR technology. Every application carries implications, whether beneficial or harmful, for humans, animals, or the environment. This technology has been tested across various organisms, including plants, animals, and humans. Numerous studies have been conducted, and it has been widely applied in different fields of research and industry. In medicine, it has been used in clinical trials to treat specific diseases, such as sickle cell disease and β -thalassemia.

Based on a literature review, CRISPR-Cas9 technology shows high potential in treating genetic diseases, infectious diseases, cancer,⁴² or other serious diseases that are challenging to cure. This offers new hope to patients and caregivers, having borne substantial treatment costs, time burdens, and efforts. In addition to its use in gene therapy and cancer treatment, it also has the potential for use in treating neurodegenerative disorders,⁴³ such as Huntington's disease, Alzheimer's, and Parkinson's disease, where current treatments still lack effective results. Ongoing research is being conducted for the treatment of eye diseases that cause blindness or rare eye-related conditions.⁴⁴ CRISPR-mediated treatments can repair defective

⁴² S. Rafii, E. Tashkandi, N. Bukhari, and H. O. al-Shamsi, "Current Status of CRISPR/Cas9 Application in Clinical Cancer Research: Opportunities and Challenges," *Cancers* 14, no. 4 (2022): 947, <https://doi.org/10.3390/cancers14040947>.

⁴³ Haibin Jiang, Mengyan Tang, Zidi Xu, et al., "CRISPR/Cas9 System and Its Applications in Nervous System Diseases," *Genes & Diseases* 11, no. 2 (2024): 675-686, <https://doi.org/10.1016/j.gendis.2023.03.017>.

⁴⁴ Mass General Brigham Communications, "Gene Editing Improves Vision in Some People with Inherited Blindness," Harvard Medical School, 6 May 2024,

genes, potentially restoring or enhancing vision. These studies offer great hope for the development of treatments for various diseases.

However, the potential negative implications of its use must also be taken into account. Among the primary technical risks is the possibility of off-target genome editing, despite the precision with which genome editing is performed, making it advantageous over other techniques. Off-target editing may unintentionally cause genomic changes or unwanted mutations. This leads to complications that affect the safety and effectiveness of the treatment. Similarly, the risk of genetic mosaicism causes the results of genome editing to be heterogeneous and inconsistent,⁴⁵ complicating the evaluation of effectiveness in preclinical or clinical trials. According to Sharma and Giri, it may also expose individuals to serious side effects, such as cancer, if the editing process inadvertently activates an oncogene.⁴⁶ There are many other technical or scientific risks associated with the limitations of CRISPR-Cas9,⁴⁷ involving safety and efficacy issues that present challenges in developing gene therapy techniques and treatments.

Despite the great potential of CRISPR-Cas9 technology, many associated risks have been identified and are being addressed by relevant stakeholders. Multiple recent strategies and interventions are being rigorously pursued to mitigate adverse implications while maximizing the considerable benefits of this genome-editing platform. The protocols, regulations, and duration of each research phase, prior to public approval are instituted under stringent supervision and deserve to be accorded a degree of confidence. The involvement of trustworthy domain experts, alongside the imposition of rigorous regulations, guidelines, and oversight, collectively meet the regulatory criteria that align with Shariah permissibility.

<https://hms.harvard.edu/news/gene-editing-improves-vision-some-people-inherited-blindness>, accessed on 25 August 2024.

⁴⁵ M. Mehravar, A. Shirazi, M. Nazari, and M. Banan, "Mosaicism in CRISPR/Cas9-Mediated Genome Editing, *Developmental Biology* 445, no. 2 (2019): 156-162, <https://doi.org/10.1016/j.ydbio.2018.10.008>.

⁴⁶ A. K. Sharma, and A. K. Giri, "Engineering CRISPR/Cas9 Therapeutics for Cancer Precision Medicine," *Frontiers in Genetics* 15 (2024): 1309175, <https://doi.org/10.3389/fgene.2024.1309175>.

⁴⁷ Tianxiang Li, Y. Yang, H. Qi, W. Cui, L. Zhang, X. Fu, X. He, M. Liu, P. F. Li, and T. Yu, "CRISPR/Cas9 Therapeutics: Progress and Prospects," *Signal Transduction and Targeted Therapy* 8, no. 36 (2023), <https://doi.org/10.1038/s41392-023-01309-7>.

Second, some identified implications are specific and measurable, although most existing studies remain preliminary. This is primarily due to the fact that most existing studies on the potential negative and positive outcomes of CRISPR applications are still in preliminary stages. Adverse effects such as off-target mutations or mosaicism remain inherent risks, often triggered by multifactorial influences during genome editing. However, such risks are not uniformly encountered across all studies, as they depend on variables such as research design, enhanced CRISPR-Cas9 techniques, and the type of targeted gene. Therefore, every theoretical possibility must be subjected to detailed and systematic analysis, whereby any legal ruling (*hukm*) derived is grounded in robust evidence (*dalīl*) and firmly situated within the classical balance between *maṣlaḥah* (public interest) and *mafsadah* (harm).

Third, from the standpoint of weighing *maṣlaḥah* against *mafsadah*, the advent of CRISPR-Cas9 represents a breakthrough in the medical sciences, particularly for the treatment of diseases that were previously deemed untreatable. Numerous studies have shown that CRISPR-Cas9 stands out as a superior genome-editing technique due to its precision, efficiency, specificity, and cost-effectiveness when compared to other methods. Its realization as a tool for gene therapy or therapeutic application may constitute a significant public interest (*maṣlaḥah muḥaqqaqah*) in safeguarding human life (*ḥifẓ al-Nafs*). Expanding therapeutic options enhances patients' ability to access care that suits their needs, confidence, and capacities. The multifaceted benefits of CRISPR-Cas9 span beyond medical and scientific domains, extending to a wide array of sectors offering pragmatic solutions to global challenges.

Nonetheless, while the envisioned benefits are indeed significant, actualizing them is fraught with challenges and limitations that must be overcome. Not all perceived benefits warrant immediate adoption, as each potential harm (*mafsadah*) must be prudently considered. Harmful effects compromising patient safety and treatment efficacy are not to be taken lightly. Risks such as those previously highlighted must be meticulously scrutinized and their probabilities assessed to determine whether they are speculative (*ẓannī*) or near-certain (*qaṭ'ī*). This also includes evaluating the frequency and duration of adverse reactions associated with CRISPR-Cas9 applications. Potential *al-ma'ālāt* should be assessed through interdisciplinary expertise to ensure alignment with the *maqāṣid al-sharī'ah* (objectives of Islamic law) and scriptural principles.

Fourth, the social and ethical dimensions require critical evaluation due to their far-reaching implications. Ethical and social concerns, especially regarding human germline editing, are widely debated at the international level. Discourse surrounding

CRISPR-Cas9 genome editing often centres on somatic versus germline applications. Although efforts are ongoing to minimize the risks inherent in somatic genome editing, this application is generally regarded, both theoretically and practically, as safer and more ethically acceptable than germline interventions. Germline editing, by contrast, poses substantial long-term risks⁴⁸ and impacts subsequent generations due to its involvement with reproductive cells.⁴⁹ In contrast, somatic editing is confined to the individual patient. As such, regulatory vigilance and ethical compliance must be consistently enforced by authoritative bodies.

The rapid pace of technological advancement often outstrips existing ethical guidelines and legal frameworks. A stark example is the controversial gene-editing experiment on human embryos conducted by Chinese scientist He Jiankui, which not only triggered international condemnation but also heightened public anxiety regarding unchecked scientific intervention in human reproduction. The ensuing public discourse indirectly reinforced the ensuing public discourse reinforced concerns regarding the ethics and governance of human germline editing. From the perspective of Islamic bioethics, He's experiment neither adheres to the principles of *maṣlahah*, *ḍarurah* (necessity), nor aligns with the *maqāṣid al-sharī'ah*.⁵⁰ The ethical basis of his experiment diverges sharply from that of Islamic ethics, which demands a comprehensive, Shariah-based framework that encompasses not just the preservation of life and lineage, but also moral accountability.

The potential misuse of such powerful technology has become a focal point of international debate. While many countries outright prohibit germline editing, others permit it under strict and limited conditions. Central to these concerns is the use of embryos as experimental subjects. Furthermore, possibilities of abuse, such as

⁴⁸ Elizabeth Cooke, "CRISPR Gene Editing on Human Embryos May Have Dangerous Consequences, Says New Study," Clinical Trials Arena, 29 June 2023, <https://www.clinicaltrialsarena.com/news/crispr-gene-editing-on-human-embryos-may-have-dangerous-consequences-says-new-study/>, accessed on 2 September 2024.

⁴⁹ Nada Kubikova, Marga Esbert, Shiny Titus, et al., "Deficiency of DNA Double-Strand Break Repair in Human Preimplantation Embryos Revealed by CRISPR-Cas9," *Human Reproduction* 38, Supplement 1 (2023): dead093.089, <https://doi.org/10.1093/humrep/dead093.089>.

⁵⁰ Noor Munirah Isa, "Human Germline Gene Editing from Maslahah Perspective: The Case of the World's First Gene Edited Babies."

the creation of designer babies,⁵¹ superhumans,⁵² enhancement of human biological traits, or development of biological weapons⁵³ pose grave threats to societal balance, international security, and human dignity. Without stringent regulatory oversight, such technologies could lead to unethical and irresponsible practices that contravene both ethical norms and human values.⁵⁴

In conclusion, the application of the principle of *al-ma'ālāt* (consideration of consequences) in deriving legal rulings pertaining to CRISPR-Cas9 technology requires the involvement of qualified experts across various disciplines. Multidisciplinary scientific findings from the basic and applied sciences, statistical analysis, preclinical and clinical trials, to ethics, law, regulatory governance, and biosafety monitoring must all be synthesized. Each domain contributes uniquely to the comprehensive understanding of CRISPR as both a therapeutic and genome-editing tool. The integration of diverse epistemological frameworks in deriving legal rulings is imperative, not only to ensure justice and ethical integrity, but also to guarantee Shariah compliance in line with its higher objectives.

CONCLUSION

The application of the principle of *al-ma'ālāt* (consideration of future consequences) in legal determinations plays a vital role in realizing the objectives of Islamic law (*maqāsid al-sharī'ah*), upholding justice, and preventing harm (*darar*). However, issuing a definitive legal ruling whether permissibility (*halāl*) or prohibition (*haram*)

⁵¹ Heidi Ledford, "Why CRISPR Babies Are Still Too Risky: Embryo Studies Highlight Challenges," *Nature* 615, no. 7953 (2023): 568-569, <https://doi.org/10.1038/d41586-023-00756-0>.

⁵² Ken Dilanian, and Courtney Kube, "China Has Done Human Testing to Create Biologically Enhanced Super Soldiers, Says Top U.S. Official," *NBC News*, 3 December 2020, <https://www.nbcnews.com/politics/national-security/china-has-done-human-testing-create-biologically-enhanced-super-soldiers-n1249914>; S. Ben Ouaghran-Gormley, "From CRISPR Babies to Super Soldiers: Challenges and Security Threats Posed by CRISPR," *The Nonproliferation Review* 27, no. 4-6 (2020): 367-387, <https://doi.org/10.1080/10736700.2020.1880712>.

⁵³ R. M. West, and G. K. Gronvall, "CRISPR Cautions: Biosecurity Implications of Gene Editing," *Perspectives in Biology and Medicine* 63, no. 1 (2020): 73-92, <https://doi.org/10.1353/pbm.2020.0006>.

⁵⁴ K. Doxzen, and J. Halpern, "Focusing on Human Rights: A Framework for CRISPR Germline Genome Editing Ethics and Regulation," *Perspectives in Biology and Medicine* 63, no. 1 (2020): 44-53, <https://doi.org/10.1353/pbm.2020.0003>.

based solely on consequential considerations is far from straightforward. Numerous dimensions must be assessed, particularly in relation to emerging technologies such as genome editing, which has only recently been granted approval for use in gene therapy.

Continuous scholarly review and the updating of relevant research are indispensable, given that legal and ethical assessments must often be conducted on a case-by-case basis. Hence, the process of evaluating and issuing legal rulings concerning human genome editing via CRISPR-Cas9 technology necessitates an appropriate duration of scrutiny until each risk, implication, safety consideration, and therapeutic efficacy is sufficiently verified and understood. These elements are critical prerequisites in safeguarding human well-being and ensuring the preservation of public interest (*maṣlaḥah*).

Accordingly, the application of *al-ma'ālāt* in legal reasoning offers principled guidance rooted in *maqāṣid al-sharī'ah*, while also accounting for the balancing of benefits and harms, interdisciplinary insights from relevant scientific and ethical fields, and the invocation of the principle of *al-iḥtiyāt* (precaution or legal vigilance). In this way, it becomes possible to responsibly harness the benefits of CRISPR-Cas9 technology while avoiding any misuse or deviation from sound medical ethics and the higher aims of Shariah.

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REFERENCES

- Adashi, Eli Y., Philip A. Gruppuso, and I. Glenn Cohen. "CRISPR Therapy of Sickle Cell Disease: The Dawning of the Gene Editing Era." *The American Journal of Medicine* 137, no. 5 (2024): 390-392. <https://doi.org/10.1016/j.amjmed.2023.12.018>.

- Al-Ansi, Abdulsalam Hamood Ghalib. “تأصيل اعتبار المآلات في الفقه الإسلامي: دراسة تحليلية وتطبيقات معاصرة [Ta'sil I'tibar al-Ma'alat fi al-Fiqh al-Islami: Dirasah Tahliliyyah wa Tatbiqat Mu'asirah].” *Journal of Islamic Sciences* 2, no. 1 (2025): 205-229. <https://doi.org/10.62810/jis.v2i1.186>.
- Al-Ḥusayn, Walīd bin ‘Alī bin ‘Abd Allāh. *I’tibār Ma’ālāt al-Af’āl wa Atharuhā al-Fiqhī*. 2nd ed. Riyadh: Dār al-Tadmuriyyah, 2009.
- Al-Māwardī, Abū al-Ḥasan ‘Alī ibn Muḥammad ibn Ḥabīb. *Al-Ḥawī al-Kabīr fī Fiqh Madhhab al-Imām al-Shāfi’ī wa Huwa Sharḥ Mukhtaṣar al-Muzanī*. Edited by ‘Alī Muḥammad Mu’awwaḍ and ‘Ādil Aḥmad ‘Abd al-Mawjūd. Vol. 6. Bayrūt: Dār al-Kutub al-‘Ilmiyyah, 1999.
- Al-Nawawī, Abū Zakariyyā Muḥyī al-Dīn Yahyā ibn Sharaf. *Al-Minhāj Sharḥ Ṣaḥīḥ Muslim ibn al-Ḥajjāj*. Vol. 3. Bayrūt: Dār Iḥyā’ al-Turāth al-‘Arabī, 1972.
- Alotaibi, Hazem Mathker S., Wamadeva Balachandran, and Ziad Hunaiti. “Ethical Integration of AI in Healthcare Project Management: Islamic and Cultural Perspectives.” *AI* 6, no. 12 (2025): 307. <https://doi.org/10.3390/ai6120307>.
- Al-Sanūsī, Abd al-Raḥmān ibn Mu‘ammar. *I’tibār al-Ma’ālāt wa Murā’āt Natā’ij al-Taṣarrufāt: Dirāsah Muqāranah fī Uṣūl al-Fiqh wa Maqāṣid al-Sharī‘ah*. al-Dammām: Dār Ibn al-Jawzī, 2003.
- Al-Shāṭibī, Abū Ishāq Ibrāhīm ibn Mūsā. *Al-Muwāfaqāt*. Edited by Abū ‘Ubaydah Mashhūr. Vol. 5. al-Qāhirah: Dār Ibn ‘Affān, 1997.
- Alsomali, N., and G. Hussein. “CRISPR-Cas9 and He Jiankui's Case: An Islamic Bioethics Review Using Maqasid al-Shari'a and Qawaid Fighiyya.” *Asian Bioethics Review* 13, no. 2 (2021): 149-165. <https://doi.org/10.1007/s41649-021-00167-1>.
- Ben Ouaghram-Gormley, S. “From CRISPR Babies to Super Soldiers: Challenges and Security Threats Posed by CRISPR.” *The Nonproliferation Review* 27, no. 4-6 (2020): 367-387. <https://doi.org/10.1080/10736700.2020.1880712>.
- ClinicalTrials.gov. “A Long-Term Follow-Up Study in Participants Who Received CTX001.” July 13, 2024. <https://clinicaltrials.gov/study/NCT04208529>.

- Cooke, Elizabeth. "CRISPR Gene Editing on Human Embryos May Have Dangerous Consequences, Says New Study." *ClinicalTrials Arena*, June 2023. Accessed September 2, 2024. <https://www.clinicaltrialsarena.com/news/crispr-gene-editing-on-human-embryos-may-have-dangerous-consequences-says-new-study/>.
- Dayan, Fazli. "CRISPR Cas-9 Genome Editing and Islam: A Religious Perspective." *Bangladesh Journal of Medical Science* 18, no. 1 (2019): 7-13. <https://doi.org/10.3329/bjms.v18i1.39540>.
- Dilanian, Ken and Courtney Kube. "China Has Done Human Testing to Create Biologically Enhanced Super Soldiers." *NBC News*, December 5, 2020. <https://www.nbcnews.com/politics/national-security/china-has-done-human-testing-create-biologically-enhanced-super-soldiers-n1249914>.
- Doxzen, K., and J. Halpern. "Focusing on Human Rights: A Framework for CRISPR Germline Genome Editing Ethics and Regulation." *Perspectives in Biology and Medicine* 63, no. 1 (2020): 44-53. <https://doi.org/10.1353/pbm.2020.0003>.
- European Medicines Agency. *CASGEVY: EPAR - Product Information*. Accessed July 14, 2024. https://www.ema.europa.eu/en/documents/product-information/casgev-y-epar-product-information_en.pdf.
- Food and Drug Administration. "FDA Approves First Gene Therapies to Treat Patients with Sickle Cell Disease." December 8, 2023. <https://www.fda.gov/news-events/press-announcements/fda-approves-first-gene-therapies-treat-patients-sickle-cell-disease>.
- Food and Drug Administration. "FDA Roundup: January 16, 2024." January 16, 2024. <https://www.fda.gov/news-events/press-announcements/fda-roundup-january-16-2024>.
- Greco, F., M. Cosentino, and F. Marino. "The Italian Breakthrough in CRISPR Trials for Rare Diseases: A Focus on Beta-Thalassemia and Sickle Cell Disease Treatment." *Frontiers in Medicine* 11 (2024): 1356578. <https://doi.org/10.3389/fmed.2024.1356578>.
- Hoy, Sheridan M. "Exagamglogene Autotemcel: First Approval." *Molecular Diagnosis & Therapy* 28, no. 2 (2024): 133-139. <https://doi.org/10.1007/s40291-024-00696-z>.

- Hunt, Katie. "CRISPR Treatment Has Been Greenlit in UK in Global First. Here's Who It Could Help." *CNN Health*, November 16, 2023. Accessed February 22, 2024. <https://edition.cnn.com/2023/11/16/health/uk-casgevy-approval-crispr-gene-editing-sickle-cell-scen/index.html>.
- Ibn Fāris, Aḥmad ibn Fāris ibn Zakariyyā al-Qazwīnī al-Rāzī. *Mu'jam Maqāyīs al-Lughah*. Edited by 'Abd al-Salām Muḥammad Hārūn. 6 vols. Bayrūt: Dār al-Fikr, 1979.
- Ibn Kathīr, Imād al-Dīn Abū al-Fidā' Ismā'īl ibn 'Umar. *Tafsīr al-Qur'ān al-'Azīm*. Edited by M. H. Shamsuddin. Vol. 3. Bayrūt: Dār al-Kutub al-'Ilmiyyah, 1998.
- Ibrahim, Abdul Halim, Noor Naemah Abdul Rahman, Shaikh Mohd Saifuddeen Shaikh Mohd Salleh, and Madiha Baharuddin. "Maqasid al-Shariah Based Islamic Bioethics: A Comprehensive Approach." *Journal of Bioethical Inquiry* 16, no. 3 (2019): 333-345. <https://doi.org/10.1007/s11673-019-09902-8>
- International Islamic Fiqh Academy. "Human Genome and Future Bioengineering: Review of IIFA Resolutions, Their Practical Results, Updates and Challenges." 20 November 2019. Accessed August 20, 2024. <https://iifa-aifi.org/en/33158.html>.
- Isa, Noor Munirah. "Human Germline Gene Editing from Maslahah Perspective: The Case of the World's First Gene Edited Babies." *Journal of Bioethical Inquiry* 18, no. 2 (2021): 349-355. <https://doi.org/10.1007/s11673-021-10101-7>.
- Ishak, Muhammad Shahrul Ifwat. "The Principle of Considering Ma'alat in Islamic Rules: Do Ends Justify Means?" *International Journal of Islamic Thought* 14 (2018): 52-59. <https://doi.org/10.24035/ijit.14.2018.005>.
- Ismail, Abdul Manan, and Ahmad Syukran Baharuddin. "Parameter Pengeluaran Fatwa dalam Kerangka Maqasid Syariah: Fatwa Parameters in Light of the Maqasid Syariah." *Malaysian Journal of Syariah and Law* 13, no. 3 (2025): 714-731. <https://doi.org/10.33102/mjisl.vol13no3.1244>.
- Ismail, Paizah Hj. "Penyelesaian Masalah Pertentangan antara Nas Berasaskan Prinsip Maqasid al-Syari'ah." *Jurnal Fiqh* 11 (2014): 75-96. <https://doi.org/10.22452/fiqh.vol11no1.4>.

- Jiang, Haibin, Mengyan Tang, Zidi Xu, et al. "CRISPR/Cas9 System and Its Applications in Nervous System Diseases." *Genes & Diseases* 11/2 (2024): 675-686. <https://doi.org/10.1016/j.gendis.2023.03.017>
- Jiddiyyah, 'Umar. *Aṣl I'tibār al-Ma'āl bayna al-Naẓariyyah wa al-Taṭbīq*. Bayrūt: Dār Ibn Ḥazm, 2010.
- Kubikova, Nada, Marga Esbert, Shiny Titus, et al. 'O-075 Deficiency of DNA Double-Strand Break Repair in Human Preimplantation Embryos Revealed by CRISPR-Cas9.' *Human Reproduction* 38, suppl. 1 (2023): dead093.089. <https://doi.org/10.1093/humrep/dead093.089>
- Ledford, Heidi. "Why CRISPR Babies Are Still Too Risky-Embryo Studies Highlight Challenges." *Nature* 615, no. 7953 (2023): 568-569. <https://doi.org/10.1038/d41586-023-00756-0>
- Li, Tianxiang, Y. Yang, H. Qi, W. Cui, L. Zhang, X. Fu, X. He, M. Liu, P. F. Li, and T. Yu. "CRISPR/Cas9 Therapeutics: Progress and Prospects." *Signal Transduction and Targeted Therapy* 8 (2023): 36. <https://doi.org/10.1038/s41392-023-01309-7>
- Mansor, Muhamad Sayuti, and Mohd Anuar Ramli. "Pendekatan Pseudo-Maqasid dalam Aliran Hukum Islam Semasa." In *Maqasid al-Shari'ah: Aplikasi dalam Aspek Sosial dan Perundangan*, ed. Rahimin Affandi Abdul Rahim, Mohd Anuar Ramli, and Shahidra Abdul Khalil, 221-244. Kuala Lumpur: Department of Fiqh and Usul, Academy of Islamic Studies, University of Malaya, 2016.
- Mass General Brigham Communications. "Gene Editing Improves Vision in Some People with Inherited Blindness." *Harvard Medical School*, May 6, 2024.

Accessed August 25, 2024. <https://hms.harvard.edu/news/gene-editing-improves-vision-some-people-inherited-blindness>.

Mehravar, M., A. Shirazi, M. Nazari, and M. Banan. "Mosaicism in CRISPR/Cas9-Mediated Genome Editing." *Developmental Biology* 445, no. 2 (2019): 156–162. <https://doi.org/10.1016/j.ydbio.2018.10.008>.

Muhammad ibn Ismā'īl al-Bukhārī, *Ṣaḥīḥ al-Bukhārī*, vol. 1 (Bayrūt: Dār al-Fikr, 1994), 54, "Kitāb al-Wuḍū', Bāb Ṣabb al-Mā' 'alā al-Bawl fī al-Masjid," ḥadīth no. 217

Nik Mohd Rosdi, Nik Wafa' Nik. *Pengeditan Genom Manusia melalui Aplikasi Teknologi CRISPR-Cas9 Menurut Perspektif Hukum Islam Semasa*. Master's thesis, Department of Fiqh and Usul, Academy of Islamic Studies, University of Malaya, 2024.

Niri, Mohammaddin Abdul, Mohd Hafiz Mohd Saadon, Mohd Saiful Anwar Mohd Nawawi, and Mohd Hafiz Jamaludin. "Integrasi Model DIKW (Data-Information-Knowledge-Wisdom) dalam Ilmu Falak Berasaskan Kerangka Sains Islam." *Afkar: Jurnal Akidah dan Pemikiran Islam* 24, no. 2 (2022): 99-142. <https://doi.org/10.22452/afkar.vol24no2.3>.

Padela, Aasim I. "Using the Maqāṣid al-Sharī'ah to Furnish an Islamic Bioethics: Conceptual and Practical Issues." *Journal of Bioethical Inquiry* 16, no. 3 (2019): 347-352. <https://doi.org/10.1007/s11673-019-09940-2>.

Parums, D. V. "Editorial: First Regulatory Approvals for CRISPR-Cas9 Therapeutic Gene Editing for Sickle Cell Disease and Transfusion-Dependent β -Thalassemia." *Medical Science Monitor* 30 (2024): e944204. <https://doi.org/10.12659/MSM.944204>.

Rafii, S., E. Tashkandi, N. Bukhari, and H. O. Al-Shamsi. "Current Status of CRISPR/Cas9 Application in Clinical Cancer Research: Opportunities and

- Challenges.” *Cancers* 14, no. 4 (2022): 947. <https://doi.org/10.3390/cancers14040947>.
- Sharma, A. K., and A. K. Giri. “Engineering CRISPR/Cas9 Therapeutics for Cancer Precision Medicine.” *Frontiers in Genetics* 15 (2024): 1309175. <https://doi.org/10.3389/fgene.2024.1309175>.
- Sharma, G., A. R. Sharma, M. Bhattacharya, S. S. Lee, and C. Chakraborty. “CRISPR-Cas9: A Preclinical and Clinical Perspective for the Treatment of Human Diseases.” *Molecular Therapy* 29, no. 2 (2021): 571-586. <https://doi.org/10.1016/j.ymthe.2020.09.028>.
- Suleiman, Hussein. “Fiqh al-Maalat: An Analysis of Its Origin, Subsidiary and Application.” *Malaysian Journal of Syariah and Law* 10, no. 2 (2022): 26-37. <https://doi.org/10.33102/mjssl.vol10no2.368>.
- Susilo, E., B. Santoso, and Y. E. Ambarwati. “Transformation of Contemporary Fiqh Through a Collective Ijtihad Approach in Resolving Lineage Issues Arising from Egg Freezing.” *MILRev: Metro Islamic Law Review* 4, no. 2 (2025): 728–760. <https://doi.org/10.32332/milrev.v4i2.10403>.
- Tyumentseva, M., A. Tyumentsev, and V. Akimkin. “CRISPR/Cas9 Landscape: Current State and Future Perspectives.” *International Journal of Molecular Sciences* 24, no. 22 (2023): 16077. <https://doi.org/10.3390/ijms242216077>.
- Vertex Pharmaceuticals. *CASGEVY Package Insert*. Accessed July 14, 2024. https://pi.vrtx.com/files/uspi_exagamglogene_autotemcel.pdf.
- West, R. M., and G. K. Gronvall. “CRISPR Cautions: Biosecurity Implications of Gene Editing.” *Perspectives in Biology and Medicine* 63, no. 1 (2020): 73-92. <https://doi.org/10.1353/pbm.2020.0006>.