Page 835 - 847 **DOI:** *https://doij.org/10.10000/IJLMH.119164*

INTERNATIONAL JOURNAL OF LAW MANAGEMENT & HUMANITIES

[ISSN 2581-5369]

Volume 8 | Issue 2

2025

Neurorights Legal and Ethical Considerations and Brain Data Privacy

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ABSTRACT

The swift and rapid pace at which neurotechnology is evolving has brought with it both immense opportunities never before available and its corresponding massive ethical dilemmas with regard to mental privacy and cognitive liberty. It is through neurotechnology that brain processes now can be read, recorded, and even modified. Thus, the emerging new protections called collectively "neuro-rights" are coming to be aimed at protecting individuals from possible damage coming from such illicit use. In the main, this paper is here to show how neurotechnology affects reserve autonomy and mental integrity using a framework of rights that is spelled out by the legal mind of Wesley Hohfeld, who classifies rights into claim-right, privilege, power, and immunity.

This paper highlights mental privacy, cognitive liberty, and mental integrity within the legal status of neuro-rights. For example, neuro-rights legislation in Chile, Brazil, and France has become part of each country's legal framework. However, this does not solve the problem of the lack of international comprehensive standards in this regard. Inconsistencies across jurisdictions make them gaps in enforcement, leaving the individual vulnerable to unconcerned access to the individual's neural data and intrusive neuro-technological interventions. The legal and ethical complications involved in enforcing neuro-rights call for coordination at the international level to ensure similar footing on protection.

This paper advocates for common international standards that would address ethical, legal, and social concerns surrounding neurotechnology. By including neuro-rights in existing human rights frameworks and advocating diverse collaboration across governments, ethicists, and lawyers, a strong regulatory paradigm could be built; moreover, remedies relating to the violation of neuro-rights should be explicitly stated for ensuring access to justice and redress for individuals affected by such rights violations.

With rapid advances in neurotechnologies, it is imperative to take the initiative in early prevention of any possible abuses and protection of cognitive liberties. This model also should be applicable across nations to protect neuro-rights in such a way that technology advancement can lead to collective success for mankind rather than infringing on basic rights of human worth.

***Keywords**: Neurotechnology, NeuroRights, Data Privacy, Brain Data.*

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 [ISSN 2581-5369]

I. INTRODUCTION

Neurotechnology is changing our understanding of and interactions with the human brain. It came into existence for the primary purpose of treating disorders like autism, depression, addiction, dementia, and chronic pain have been made possible by advances in "reading" and controlling brain processes. These technologies broadly understood are tools that have the capability to read, record and modify our mental activity by acting on its brain correlates.

The human brain is unlike any other organ, as it is responsible for generating all mental and cognitive functions. Consequently, the data it entails is unique in nature because they are very complex mental activities. It is information pertaining directly to activity found inside an individual's central or peripheral nervous system. A few instances of data would contain extremely personal information that potentially could be traced back to any identifiable person's condition of health and mind-functioning attributes.

Over the past ten years, scholars and policymakers have spoken increasingly about neurorights being declared fundamental human rights. Neurorights were initially put forth by researchers such as *Ienca and Andorno in 2017*[2], who held that mental privacy, cognitive liberty, psychological continuity, and personal identity ought to be secured against the background of mounting neurotechnological strategies. Chile, among other countries, has taken great steps by incorporating neurorights into its laws and has instigated a network of international organizations, including the UN and UNESCO, to discuss incorporating neurorights into the global human rights arena. In November 2020, civil actors, including the Neurorights Foundation, unveiled a neuro-rights declaration of five rights addressing personal identity, free will, mental privacy, equal access to mental augmentation, and protection from algorithmic bias. Nonetheless, such implementation faces challenges varying from the fragmentation of rights definition, difficulty in achieving enforceability, tensions between neurorights and other interests in society, and so forth.

It was initially developed to treat disorders such as autism, depression, addiction, dementia, and chronic pain. Advances in "reading" and controlling brain processes have made these treatments possible. Broadly understood, neurotechnologies are tools that can read, record, and modify mental activity by acting on its brain correlates. As investments from private companies, government bodies, and other stakeholders continue to grow, the sensitivity and volume of neural data are expected to increase. These investments are likely to enhance neurotechnology's

[2] Marcello Ienca & Roberto Andorno, *Towards New Human Rights in the Age of Neuroscience and Neurotechnology*, 13 **Life Sci. Soc'y & Pol'y** art. 5 (2017), https://doi.org/10.1186/s40504-017-0050-1.

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technical abilities, leading to higher-resolution brain imaging and the accumulation of more extensive neural datasets. Advances will accelerate further with the advent of generative artificial intelligence, making possible ever greater precision in decoding brain scans. Current implantable neurotechnologies can accurately interpret language and emotion, while wearable devices are starting to achieve similar capacities.

Neurotechnology's most-discussed ability is the potential to access and control neural data; this may imperil the very basic elements of human autonomy. For instance, *in 2014, a paraplegic man kicked off the FIFA World Cup using a robotic exoskeleton connected directly to his brain, and in 2019, researchers enabled a group of individuals to play a game similar*[3].Similarly, a study led to the research for which scientists enabled a team of participants to play the equivalent of a simple video game in 2019. Recently, just this year, a fellow could use his thoughts alone to compose a letter by controlling the pointer on his computer to type words onto a monitor thanks to a neural device. Because of these advances, which just a few years ago sounded like science fiction, the boundaries between more general social uses, including entertainment, security, and criminal justice, and medical applications are becoming increasingly blurry.

These advances present significant considerations for mental privacy, underlining the urgent need to assess and understand the privacy practices and user protection. Highlighting the pressing need to address the moral and legal issues raised by neurotechnologies which is here will be termed as Neurorights. *Neurorights can be defined as a new international legal framework for human rights specifically aimed at protecting the brain and its activity as neurotechnology advances.*[4]

Initially, this field of neuroethics and neurorights has only studied the ethical consequences of neurosciences and neurotechnologies but has now included *"neurolaw"—a discipline concerned with how legal frameworks might adapt to these emerging challenges. Central to this debate is whether existing human rights, such as the right to freedom of thought, are sufficient to protect individuals from unwanted neurotechnological interventions.*[5] This has brought forth concerns about the creation of "neurorights," or new human rights that is designed specifically to shield the mind and brain from any potential dangers associated with experimenting with neurotechnologies.

[3]BBC News, *Title of the Article*, https://www.bbc.com/news/science-environment-27812218 (June 12, 2014).
[4]What Are Neurorights and Why Are They Vital in the Face of Advances in Neuroscience?, Iberdrola, https://www.iberdrola.com/innovation/neurorights (last visited Jan. 26, 2025).
[5]Supra Note 2

A complex interplay of legal and ethical challenges is presented in the fast-emerging discipline of neurotechnologies; a collaboration of governments, ethicists, and legal scholars should be achieved.

Considering expert protections in the scenario of brain technologies, quite a few countries, starting from Chile, Brazil, to Spain, have started adding neurorights into the legislative frameworks. Yet, much work remains to be done to ensure that neurotechnologies are used to further society's betterment while also protecting the individual rights that are fundamental Rights can be categorized. To establish a structured legal approach to neurorights, legal scholars have turned to existing frameworks of rights classification. One such approach is Hohfeld's categorization, which classifies rights into four distinct types according to Hohfeld into four different types: claim-rights, privileges, powers, and immunities, each being defined by its relational counterpart-claim-rights are related to duties.

II. NEURO "RIGHTS"

'The term neurorights was coined by Marcello Ienca and Roberto Andorno (2017) proposing the standardization of four new human rights – the right to mental privacy, the right to mental integrity, the right to psychological continuity and the right to cognitive liberty. These are rights that partially follow the four ethical priorities, also identified as "four areas of concern that call for immediate action"[6]

Building on the work of Ienca & Andorno (2017), these rights aim to protect cognitive liberty, mental privacy, and personal identity in the face of advancing neurotechnology. However, ensuring these rights are legally enforceable requires a structured legal framework. This is where Hohfeld's categorization of rights becomes relevant. The notion of "neurorights," particularly mental integrity and cognitive liberty, can be analyzed using Wesley Hohfeld's framework of legal concepts. Hohfeld categorizes rights into four types: claim-rights, privileges, powers, and immunities, each defined by its relational counterpart (e.g., claim-rights are paired with duties).

Neuro-rights are legal and ethical protections intended to safeguard people from invasive neurotechnologies that may violate mental privacy, alter cognitive functions, or reveal private thoughts. Key aspects of neuro-rights include:

Mental Integrity: Defense against inappropriate or adverse alterations in cognitive states.

[6]Rafael Yuste et al., *Four Ethical Priorities for Neurotechnologies and AI*, 551 **Nature** 159, 161 (2017), https://doi.org/10.1038/551159a.

Cognitive Liberty: The right to think, believe, and make decisions independently.

Mental Privacy: One's right to keep all his or her thoughts, mental states, and even neural data private.

These neuro-rights protect the individual against a wide spectrum of neurotechnology threats, including monitoring of brainwaves, tampering of memory, and predictive analytics that infer thought or intent.

III. HOHFELD'S LEGAL STRUCTURE AND NEURO-RIGHTS

The legal structure of Wesley Hohfeld proves useful to the analysis of neuro-rights. Hohfeld. Hohfeld categorizes rights into four types—claim-rights, privileges, powers, and immunities—each defined by a counterpart (e.g., a claim-right is paired with a duty). Using this model, neuro-rights may be re-conceptualized as privileges rather than traditional enforceable claim-rights.

- **Claim-Rights:** If mental privacy were a claim-right, it would impose duties on others not to intrude into or manipulate one's cognitive functions.
- **Privileges:** If mental privacy is considered a privilege, individuals have the freedom to maintain cognitive autonomy, but this does not impose a duty on others to refrain from all forms of mental influence.

Under Hohfeld's analysis, neuro-rights align more closely with privileges, as they do not establish enforceable duties on others to protect mental states in all circumstances. It affects the enforceability of neuro-rights and also elucidates the problems caused by absolute ideas of protections in the attempt to outline these rights.

IV. MENTAL PRIVACY AND COGNITIVE LIBERTY IN THE AGE OF NEUROTECHNOLOGY

Neurotechnology can monitor brain activity and manipulate cognitive functions, posing unprecedented threats to mental privacy. Such as BCIs that can decode brain signals, or neuroimaging that can reveal thoughts or feelings. Such technologies left unregulated could expose people to unwanted access to mental content, manipulative interventions, and infringements of personal autonomy.

Brain activity data is often deeply personal in nature and may recapitulate thought, intention, or emotional states.Neurotech firms could, without restraint, commodify that sort of data for advertising, profiling, and other exploitative purposes, potentially threatening mental privacy.

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(A) Manipulation of Cognitive Liberty

Neurotechnologies capable of an influence on thought patterns or behavior are a threat to cognitive liberty. Be very careful. If such people really do nothing to control themselves, that will result in unauthorized alterations of the cognition of such persons, thus hindering their freedom to think.

Neurotechnology will advance with time and with it also will come a variety of risks that threaten mental privacy and cognitive liberty. The future integration of neural data into predictive analytics makes ethical issues concerning thinking and intentions inferred without consent pertinent to a pre-emptive intervention or bias in decision making involving law enforcement, employment, and healthcare possible. Then activity modeled as algorithmic profiling would make brain activity more prone to discrimination among the different targets, leading to new meanings of surveillance capitalism in which cognitive patterns would profile access opportunities. This poses the challenge of keeping neurotech firms in check because these firms are transnational, which allows them to evade scrutiny on the issue of legal protections since they operate across multiple jurisdictions. The lack of governance structures on any topic makes commoditization of neural data a natural routine. Hence, it would change the very nature of relations between individuals, corporate agencies, and state authorities itself in a way which challenges conventional wisdom on autonomy and free will.

(B) The Role of International Institutions in Neurorights Protection

Since 2017, the term "neurorights" has been commonly used in literature to encompass "ethical, legal, social, or natural principles of freedom or entitlement related to a person's cerebral and mental domain; that is, the fundamental normative rules for the protection and preservation of the human brain and mind." Neurorights are linked to basic human rights, as articulated in **Article 12 of the Universal Declaration of Human Rights (1948)**[7], which states that no one "shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honor and reputation. Everyone has the right to the protection of the law against such interference or attacks." Similarly, **Article 3, paragraph 1, of the Charter of Fundamental Rights of the European Union (2016)**[8] affirms that everyone has "the right to respect for his or her physical and mental integrity."

Recent legislative measures of different countries indicate that there is concern for neurorights around the world and the ethics of neurotechnologies involved:

[7] Universal Declaration of Human Rights, Art 12 ,(Dec. 10, 1948).
[8] (European Union, 2016)

1. **Chile**: On October 14, 2021, Chile passed an amendment to the constitution in which it is mentioned,"Scientific and technological development will be at the service of people and will be carried out with respect for life and physical and mental integrity. The law will regulate the requirements, conditions and restrictions for its use in people, and must especially protect brain activity, as well as the information from it."[9] Additionally, Chile's draft bill on neurorights seeks to protect mental integrity, ensure equitable access to neurotechnology, and mandate informed consent for using neural data.
2. **Brazil:** Proposals for the General Law on Data Protection include requirements of explicit consent for processing neural data and prohibitions of nanotechnological applications that could infringe upon identity or autonomy. Neural data is a sensitive health category that needs strong protection.
3. **France**: The Public Health Law of France allows for the banning of neurotechnological methods if they are harmful to health. A complementary charter supports responsible use and protection against abuses that could threaten freedom of the mind.
4. Argentina: A draft amendment of the Federal Criminal Procedure Code in Argentina suggests that the use of brain imaging techniques is allowed only after judicial authorization and informed consent; these should avoid cognitive biases.
5. **Ecuador**: A 2023 draft bill on neuroprotection in Ecuador outlines provisions for safeguarding dignity, mental integrity, and neural data privacy, along with public involvement in regulating neurotechnology.
6. **Non-binding Charters**: Spain and Mexico have issued charters within digital rights frameworks that address neurorights, focusing on personal identity control, data security, and ensuring that neurotechnological applications respect autonomy and equality.

There is also increase awareness in the United States concerning brain health and neurotechnology. The US Congress passed a Joint Resolution 174 on July 25, 1989, which stated "the excitement and productivity of the study of the brain and central nervous system and its potential for contributing to the health of humanity" in order to emphasize the importance of brain research during the time. Furthermore, on April 2nd, 2013, the United States initiated the Brain Research Through Advancing Innovative Neurotechnologies(BRAIN) Initiative, which

[9] Constitución Política de la República de Chile, art. 19(1) (2021) (Chile).

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was aimed at fast-tracking the discoveries related to the functionalities of the brain along with developing methods for treatment of various types of brain disorders.

It can be concluded that there isn't any standard of regulation of neurorights on the international level, and it is continually evolving with constitutional amendments, special legislation, and nonbinding charters. The OECD Recommendation on Responsible Innovation in Neurotechnology of 2022 with internationally coherent standards does well to highlight the need for international standards, as well as guides the development as well as the ethical usage of neurotechnology. These frameworks should be flexible yet concrete enough to provide strong protections for people and be in line with the universal principles of human rights, considering the accelerated advancement of neurotechnology.

(C) Challenges in Enforcing Neurorights Across Jurisdictions

The enforcement of neurorights presents significant hurdles due to the global reach of neurotechnologies and the complexities of legal frameworks across different jurisdictions. As these technologies advance, challenges such as medical tourism, international supply chains, and the cross-border flow of neural data make it increasingly difficult for individual states to implement and uphold neurorights effectively. As noted, *"through numerous mechanisms such as medical tourism and global value chains, it appears likely that neural data, products, services, patients, and consumers will all flow across borders in the process of accessing and using various types of neurotechnologies"*[10]. These expected transnational flows regarding neurotechnologies will likely impinge on efforts of individual states to comprehensively monitor and enforce neurorights standards within legally accepted notions of national jurisdiction.

Large multinational corporations, including Meta, Snap, and Apple, have actively invested in or acquired neurotechnology startups, signaling the growing commercialization of this sector. The trend of market consolidation suggests that corporate influence over neurotechnologies will likely increase, raising concerns about accountability and potential human rights violations. *"Trends in global political economy towards market consolidation suggest that startup acquisition in the neurotechnology sector will likely continue, which could augur greater power for transnational private actors in the space moving forward"*[11]. The potential for technologies with troubling neurorights implications to be deployed and managed by firms with overwhelming market power is even more concerning from a legal and human rights

[10]Walter G. Johnson, Lucille M. Tournas & Reina Magistro Nadler, *Implementing Neurorights: Legal and Regulatory Considerations*, **Sci. & Eng'g Ethics**, 10, 14 (2024), https://doi.org/10.1007/s12152-024-09576-z.
[11]Supra note 12

accountability perspective. This may call for further regulatory interventions in the realm of competition policy or elsewhere.

Legal scholars have highlighted the broader challenges of regulating digital human rights on a global scale, particularly in areas concerning data privacy and the misuse of personal information. These issues are closely tied to neurorights, as existing national laws may be insufficient to address the ethical concerns posed by neurotechnologies. Additional concerns arise in safeguarding vulnerable populations, including children and employees, from potential exploitation through neurotechnology-based monitoring or cognitive manipulation. Without coordinated international efforts, these regulatory gaps will persist, hindering the effectiveness of neurorights enforcement. *"Scholars have already described the challenges that a transnational, digital world creates for enforcing human rights around data protection and associated harms. Such trends will also have substantial relevance for understanding the likely limitations on efforts to use neurorights to address issues of neural data protection and governance"*[12].

(D) Legal Remedies for Neurorights Violations

One of the basic legal maxims believes that "there is no right without a remedy." Now neurorights are entitlements but do not have clear means to address their deprivations. Thus, legal remedies that deter and compensate affected individuals will be necessary to give effective enforcement. Basically, any implementation of the neurorights will entail specification of appropriate remedies forcing the champions of those rights and judicial actors to deal with blood-curtains questions about suitable remedial structures for such abstract, non-fungible, and incommensurable goods as cognitive liberty or mental privacy.

There are generally three main categories of remedies in international human rights law: rehabilitation of the victim to his state before the violation, pecuniary compensation, and symbolic reparations such as formal apologies. Problems arise when it comes to remedying these issues with respect to neurorights. Normally, the remedies for violation of human rights apparently include provision of restoration to previous state, monetary indemnification, or symbolic remedial such as public apologies. However, the effective implementation of such measures with respect to neurorights should consider international and domestic jurisdictional problems and obstacles relating to rights enforcement.

Most of the time, the focus by international human rights courts is on prevention rather than redress because after a violation, there are limited options left to people concerning just services.

[12] Supra note 12

This has the outcome of inciting the need for a more structured approach to infringement of neurorights. The success of legal remedies in this area will depend on the frameworks within which they are established. The absence of such unified international standards clouds the inconsistencies of enforcement; at the same time, domestic jurisdictions often practice financial compensation, which does not always correspond to wider human rights issues. Moreover, it is indispensable to create and synchronize the international legal approaches with local mechanisms of enforcement for effective action against violation of neurorights.

V. FUTURE DIRECTIONS FOR RESEARCH AND POLICY

Extending research and policy initiatives would strengthen the protection of neurorights at national and international levels. Some of the fields that deserve further investigation are:

(A) Incorporation into Development of Existing Human Rights Frameworks

Neurorights activists must deal with existing human rights frameworks in many areas, for instance, privacy, freedom of thought, and personal integrity. The majority of the enforcement challenges in the neurorights field are not new and can bring in many lessons from other human rights regimes. Studying "gold standard" practices from different legal fields may give insight into dealing with legal uncertainties, interpretative challenges, and litigation strategies.

(B) Creating Global Regulatory Models

Because neurotechnologies are transnational in nature, any enforcement gap might as well have to do with creating institutional hybrid regulatory models that would cater for their diversity in legal standards and jurisdictional mismatches. These may include improvements in regulatory capacity or transparency requirements from neurotechnology firms as well as collaborative governance of international and national oversight bodies. A proper examination of regulatory approaches may help develop those concerned by an advanced architecture of human rights norms into practical and enforceable instruments.

(C) Expanding the Role of Neurorights Regulators

Governance of neurorights should not stop at state actors but extend to independent regulatory agencies, civil society organizations, professional associations, and health institutions. The diversification of regulatory means and modes through various stakeholders would ensure a much broader scope of oversight and protection. This kind of variety that encourages participation-from government figures through researchers to industry stakeholders-would serve to bolster the ethical standards and accountability in the development and use of neurotechnologies.

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To ensure that neurorights are not merely theoretical concepts but rather something which will be implemented, both empirical and theoretical research shall be factors to be considered in the policy formulation process. Further, contributions from diverse legal traditions, including Africa, Asia-Pacific, and Latin America, proper perspectives must be incorporated in order to develop an inclusive governance framework with a global perspective. In this respect, another important step is to reinforce the legal protection of neurorights, thereby safeguarding that advancements in neurotechnology are done on a solid basis of ethical and legal grounds.

VI. CONCLUSIONS

Neurotechnology is clamoring to be addressed as a matter of urgency, and at times quite prophetically, on the ethical and legal fronts of mental privacy and cognitive liberty. Conceptually, neuro-rights emerge as a fundamentally significant framework within which to protect individuals against any possible expropriations and violations. Neuro-rights embrace critical protections such as mental privacy, cognitive liberty, and mental integrity, among many other rights that are increasingly indispensable in this world where technology continually intersects with our mental activities. It will be easy to understand it in association with Wesley Hohfeld's legal framework about the nature of these rights and problems in enforcement.

Enforcement of neuro-rights poses legal, ethical, and regulatory challenges of great complexity across many jurisdictions. The neurotechnologies engaged in sophisticated development and becoming part of daily lives come with the strong requirement that legislation must be constantly updated and necessary fortifications made for cognitive liberties, mental privacy, and other fundamental rights from law to drafters. This requirement is born out of the nature of the neurotechnology itself and the multinational corporations accompanying it, cross-border data flows, and the international inconsistencies in national regulations. The response needed is enforcement on an internationally coordinated basis; otherwise, there will be continuing gaps in enforcement, showing that individuals remain vulnerable to exploitation and violation of rights.

Neuro-rights should not now be recognized as a theoretical exercise, but need to translate into real, enforceable, protective legal frameworks against future possible misuse and exploitation. It may include improving legal and regulatory frameworks, enhancing international cooperation, and setting ethical standards for stakeholders engaged in the development and use of neurotechnologies that would provide leverage to ensure that science in neuroscience is for the common good, without degrading fundamental human rights.

Most relevant legislation currently in the process is being taken recently, and increasingly point

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by Chile, Brazil, and France to a clear underlining of the fact that neurotechnologies need some protection. Yet at this point, the general landscape is still to be splintered and still remains without

such a broad, utterly comprehensive set of international standards. Here, too, countries have advanced much in preparatory steps proposed by constitutional amendments with provisions in favor of mental integrity and consent; yet in many areas, proper recognition of neuro-rights fails to materialize. As such, there is a potential of risk for such heterogeneity, with people waiting to be put in positions or jurisdictions where no protective measures exist being sure that anyone else can access their neural data without authorization or even invasive neurotechnological interventions.

Such combinations will be part of the government, the ethicists, and the legal fraternity in building solid frameworks that respect the rights of individuals while traversing through many dilemmas, through innovations brought by newer neurotechnologies. Collaboration will provide guidelines applicable to anyone everywhere, as well as technological improvement which allows neurotechnology, ethically-proper application. The neuro-rights discourse is still incomplete; any further discussion would be more fruitful in constructing an adaptable yet stringent kind of regulation keeping into consideration brain data and its implications to human autonomy.

It makes nearness to a reality where depriving cognition of individual privacy, in some form, threatens deprivation of freedom in personal thought. This is against which preservation takes a proactive turn in the face of the very structure misuse of neurotechnology may be put to the manipulative practices set against individual autonomy. More stringent data protection laws combined with neuro-rights can thus work together to strengthen mental integrity in a digital world.

Ultimately, it will depend on whether the engagement of all stakeholders is a commitment toward making sure technological progress does not undermine but instead safeguards our most inherent human rights. Public debate on how neurotechnology influences ethical choices, education of one another on possible threats, and advocacy towards policies that ensure mental privacy with inclusive outcomes would also be vital steps towards a better future. Society can unlock the blessings of neurotechnology while protecting the rights and freedoms of people through comprehensive solutions to these issues.

Law-makers must open up neuro rights for creation in existing human rights, compose a complete model of global regulation, and increase other roles of different actors in the

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regulatory arena to make the most of these challenges as well. As definitely in definitions, neuro-right culpability must be clarified for victims such that it can be upheld in justice and restitution by opening legal remedies to both types of redress. Further, interdisciplinary research and the relationship between jurisdictions will be crucial to the effective custodianship of legal responses to the emergent states of neurotechnologies.

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 [ISSN 2581-5369]