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Human Enhancement Technologies: Protection Under IPR

BLESSY PRIYA NIRANJANA[1] AND SONASRI S[2]

ABSTRACT

As mankind increases so does technology, it has improved in such way that it has helped in replacing biological creature parts with mechanical or electronic components. A cyborg is a cybernetic organism, a creature of science fiction and a creature of social reality, a living being whose powers are enhanced by computer implants or mechanical body parts. Cyborgs improves the functions of human body parts with the help of technology, such acts raises serious legal and political questions. A new class of individuals might be created, for instance, if implants are successfully implanted into humans, new cognitive and motor abilities emerge as a result. Without a doubt a legitimate and political reaction would be basic for this unused course of people with astounding capacity. However, they resemble more as machines than men or women, the question of what legal rights could be granted to these individuals arises. The following legal considerations are crucial: the laws governing cyborgs' obligations and rights, as well as access rules. As we become more advanced with cyborg technology, it is more important to ask what legal rights are involved when using technology to fix, enhance, and improve the human body and mind, and how law would treat such technologically enhanced persons from general population This article looks at various laws and regulations governing this new kind of intellectual property from various jurisdictions in the United States, the European Union, and India regarding cyborg technology.

Keywords*: Cyborg, Human Body Part Enhancement, Neuroprostheses, Patent Law and Copyright, Semiconductor Chip Protection Act, International Law, India.*

I. INTRODUCTION

The term "human enhancement technology" has been getting a lot of attention and debate in the tech world. It's all about improving people's physical and mental abilities. It's a hot topic among scientists, ethicists, and the public at large. People love the benefits of these technologies, but they also bring up some serious ethical issues that need to be thought through. Human enhancement technologies that are in the process of being developed can enable us to become more intelligent, with greater vivid memories, better resilience, faster, stronger endurance, live

[1] Author is an Assistant Professor at Bharath Institute of Law, India.
[2] Author is an Assistant Professor at Bharath Institute of Law, India.

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a longer life, fight off disease and lead meaningful lives. These opportunities are exciting for a few of us and they're terrifying for others. Millions of people all over the world are now using some form of cyborg tech, like prosthetic limbs, thought-activated arms, brain implants, pacemakers and even cochlear implants for hearing loss. Plus, some scientists are even working on creating an artificial limbic brain to help people remember things better. This article makes a claim that the law 'must be more prepared' to address the issues posed by the connection of an organic, biological individual to synthetic, non-organic components and devices. For example, should an internal medical device that keeps a person alive be regarded as a part of that person or as an object (or anything else)? Is the destruction of a neuroprostheses (e.g. nervous system integral limb prosthesis) a personal injury or property damage? Who should control/own software in an implanted medical device? How should the law address risks associated with third party device access (i.e. unauthorized access and hacking). So, in this day and age, we need to make sure that cyborgs are allowed to make, sell, and use them legally, and that laws are in place to stop them from breaking the law. As technology advances, laws need to be made to protect us as "homosapiens." The purpose of this article is not to fully answer such complex questions, but rather to begin investigating the uncharted legal ground that cyborgs present. As a result, this study provides the first detailed examination of the legal issues raised by cyborgs. It also shows some of the flaws in the conceptual framework that serves as the foundation of the legal system.

II. EMERGING FRONTIERS: EXPLORING THE WORLD OF CYBORG TECHNOLOGY IN THE MODERN ERA

Human Body Enhancement refers to the use of various technologies, procedures, or interventions to improve or augment the physical and/or cognitive abilities of an individual beyond their natural or baseline capabilities. These enhancements can include but are not limited to advancements in medical prosthetics, genetic engineering, pharmaceuticals, neuro enhancement, and wearable devices. The goal is to enhance attributes such as strength, intelligence, endurance, sensory perception, and overall health. A cyborg, which stands for "cybernetic organism[3]," is an entity that mixes biological and artificial components or systems to improve its skills or functions. Cyborgs frequently combine technology and the human body, blurring the distinction between man and machine. Implanting electronic devices, computer interfaces, or other artificial parts to improve physical, sensory, cognitive, or communication functions is one example. Cyborg technology seeks to augment or restore human capacities,

[3] https://web.mit.edu/digitalapollo/Documents/Chapter1/cyborgs.pdf, Visited on August 18 ,2023

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with applications in medicine, prosthetics, and human-computer interaction. Cyborgs have received a lot of attention in talks about the future of human augmentation and its ethical and societal ramifications**.**

Kevin Warwick, Woodrow Barfield, and Alexander Williams defined "cyborg technology" in a special issue of *Cyberphenemonology: Technominds Revolution*[4] as "technology that is integrated into the human body and that not only restores lost functions but also enhances the anatomical, physiological, and informational capabilities of the body."This encompasses everything from medical implants (such as pacemakers) to future brain implants that can affect memory and cognitive capacities. Furthermore, the phrase "cyborg prosthesis" is used to refer to artificial body improvements that give computing capabilities and operate as a feedback system. These upgrades can be improved, and in certain situations, they can be thought-controlled or inserted directly into the body. In the last few years, we've been able to bring technology from outer space right into our bodies, and even more recently, inside our bodies. Cyborgs can be divided into two distinct categories: those that are physically present in the body and those that are external to the human body. Examples of these are the artificial limb, the cochlear implant, and the wearable sensor. Additionally ICDs (internal cardioverter defibrillators) are devices that are similar to pacemakers in that they monitor and regulate an individual's heart rhythm, but they can also deliver an electrical shock if the heart's electrical activity and rhythm become irregular. These devices do not require any intervention from the user or third parties[5], and neuroprostheses I.e. artificial hippocampus[6] a prototype which is being developed to aid Alzheimer's patients, are found inside human body.

Modern cyborgs are typically equipped with prostheses that are affixed to their bodies or implanted in them for a variety of reasons, ranging from medical necessity to personal growth. Generally, cyborgs do not opt to be fitted with implants and devices solely to recuperate lost abilities, but in some cases, to improve their performance, abilities, and skills – whether they are cognitive, sensory, or physical. Cyborg technology may play a significant role in human enhancement in the future. Currently, it is being utilized for medical purposes, and may be utilized for other applications in the future.

[4] Barfield, W. and Williams, A. (2017) *Cyborgs and Enhancement Technology*, *MDPI*. Available at: https://doi.org/10.3390/philosophies2010004 (Accessed: 22 April 2025).

[5] (No date) *Everyday Cyborgs: On Integrated Persons and Integrated Goods — University of Birmingham*. Available at: https://research.birmingham.ac.uk/en/publications/everyday-cyborgs-on-integrated-persons-and-integrated-goods (Accessed: 22 April 2025).

[6] Song, D. (2011) *A cortical neural prosthesis for restoring and enhancing memory*, *Journal of Neural Engineering*. Available at: https://www.academia.edu/14046505/A_cortical_neural_prosthesis_for_restoring_and_enhancing_memoy (Accessed: 22 April 2025).

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III. ETHICAL AND LEGAL ISSUES IN PROTECTING ENHANCEMEN TECHNOLOGIES

As the prevalence of cyborg technology increases, there is a pressing need to regulate the legal rights and obligations of these individuals, as well as the regulation and control of technologies that are employed to modify, augment, and enhance the human body**.** When we think about cyborgs with tech embedded in them, we might wonder if there are any laws that apply to the end product. One area of law that should be looked at when it comes to cyborg embodiment is the right to bodily integrity, which is basically saying that you have the right to be free from any kind of non-consensual interference with your body.

The legal concept of humanity must be defined in the law in order to ensure legal certainty. The current legal approach is biological: any creature born of a Human parent is considered human and thus has legal personality. However, if human enhancement is becoming a technological reality, it will become increasingly relevant to argue that the concepts of humanity and natural personhood should be understood and constructed in terms of factors that go beyond physical structure and biological identity, such as social and environmental interaction. This raises the question of whether human rights should be applied to such enhanced beings without distinction, or whether there should be a system of justice and equality. The ethical distinction between traditional technology applications and human enhancement necessitates legal and ethical considerations. Before considering particular regulatory topics, society must consider whether, how, and to what degree the individual's capacity to make decisions regarding health, appearance, and physiology may be restricted in a democratic system founded on the principle of human rights[7]. The enhancement ethical debate is not entirely new or exclusive to enhancement, and can be assimilated to a certain degree into existing legal principles. Initially, the debate takes on a fundamental rights dimension, and most of the issues raised can be conceptualized internationally as human rights and domestically as constitutional rights and legal principles. In the light of the current international legal system, human enhancement may be seen as a violation of human rights, including but not limited to human dignity, liberty,

[7] Patentability of Human Enhancement: From Ethical Dilemmas to Legal (Un)Certainty Book chapter, in Tana Pistorius (ed), Intellectual Property Perspectives on the Regulation of New Technologies, Edward Elgar Publishing, Incorporated (Forthcoming) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2768071 , visited on August 18,2023

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equality[8] and non-discrimination[9]; the right to privacy[10]; informed consent regarding medical acts[11]; the right to partake of the advantages of scientific advancement[12]; the right to intellectual freedom; the freedom of conscience and religion[13]; and the freedom of thought and expression[14].

If scientific progress leads to the development of the technical capabilities necessary for the widespread induction of human evolution, the potential for "enhanced" humans to co-exist with "natural" humans would likely lead to social disruption and ultimately the need to reconsider the concept of humanity. Every individual has the legal right to be recognized as a person[15], and every individual is entitled to the protection of human rights[16]. The ethical considerations surrounding cyborg technology are vast and require ongoing deliberation, involving not only ethicists but also policymakers, technologists, and society as a whole. Striking a balance between the potential benefits of cyborg enhancements and the ethical principles that safeguard individuals and society is a critical challenge for the future.

IV. PRESENT LEGISLATIONS ON PROTECTION OF CYBORGS

The relationship between cyborg technologies and intellectual property rights can be a complex one and is contingent upon a variety of elements, such as the type of technology and the applicable jurisdiction. This article outlines some of the key points regarding the potential implications of intellectual property law for cyborgs.

With regard to patent protection of cyborgs, Companies and researchers who are working on new types of cyborg technology, like cutting-edge prosthetics, brain implants, or implants, can apply for patent protection. Patents give inventors exclusive rights to their ideas for a certain amount of time, so they can control how they use and sell their inventions. Patent protection is

[8] Article 1 United Nations Universal Declaration on Human Rights, adopted by the General Assembly on December 10, 1948, General Assembly Resolution 217A (III), U.N. Doc.A/180 (UDHR); Art 1. Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine, Oviedo, 4.IV.1997 (Oviedo Convention).

[9] Article 7 UDHR; Article 14 Council of Europe Convention for the Protection of Human Rights and Fundamental Freedoms as amended by Protocols No. 11 and No. 14, Rome, 4.XI.1950 (ECHR); Article 1, Protocol No. 12 to the Convention for the Protection of Human Rights and Fundamental Freedom, Rome,4.XI.2000. In similarity see also Article 2, Treaty on European Union, OJ C 326, 26.10.2012, pp. 13–390.

[10] Article 12 UDHR; Article 17 International Covenant on Civil and Political Rights, adopted by the United Nations General Assembly on December 16, 1966 (ICCPR); Article 8 ECHR, Articles 12 UDHR; Article 17 ICCPR; Article 8 ECHR. Similarly see also Articles 7 and 8 Charter of Fundamental Rights of the European Union (2010/C 83/02), OJ C 364, 18.12.2000, pp. 1–22

[11] Article 7 ICCPR. Similarly see also Article 5 EU Charter.

[12] Article 15 International Covenant on Economic, Social and Cultural Rights, Adopted and opened for signature, ratification and accession by General Assembly resolution 2200A (XXI) of 16 December 1966, entry into force 3 January 1976 (CESCR).

[13] Article 18 UDHR; Article 18 ICCPR; Article 9 ECHR.

[14] Article 19 UDHR; Article19 ICCPR; Article 10 ECHR.

[15] Article 6 UDHR

[16] Article 2 UDHR

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a great way to encourage innovation because it gives inventors the confidence to keep investing in their research and development. In the United States of America, neuroprosthetic devices that are implanted in the brain are protected as intellectual property under patent law, while the software controlling the device is also subject to the same law. This is due to the fact that the software can be altered remotely, for example over a wireless network. Ultimately, when cyborg devices are considered by humans as part of their body, the distinction between intellectual property and human rights is blurred, thus making the issue of liability more complex[17]. Cyborg technology often includes medical devices, such as implants, prosthetics, or diagnostic tools. These medical devices can be patented if they meet the patentability criteria. The patent holder would have exclusive rights to make, use, and sell the patented device for a specified period. The FDA[18] is a federal law that the US government administers. It's responsible for regulating all kinds of medical devices, from implants to prostheses. Medical devices are divided into different categories based on their potential risks. Less complicated ones don't need to be regulated and may not even need FDA approval, while more complicated ones need to go through clinical trials before they can go on the market.

In South Korea, the regulation of cyborg-related devices is analogous to that of the United States, as it has a comprehensive classification system for regulating medical devices, as well as addressing the issue of proper production. The Ministry of Health and Welfare is responsible for exercising oversight, as it adheres to the regulations for prosthetic devices under the Disability Persons Welfare Act[19]. In the EU, there are laws about active implantable medical devices, as well as ones about machinery and medical devices, and about the safety of prosthetic devices. In some countries, people can be banned from getting prostheses or implants that aren't medically necessary, or they can be considered to be reconstructive[20]. For a design to qualify for a patent, it must stand apart from existing designs (referred to as "prior art"), possess aesthetic appeal, and not closely resemble any existing design. Furthermore, the "ornamentality" criterion necessitates that the design should not be primarily driven by its

[17] *Managing the risks of China's access to U.S. data and control of software and connected technology | Carnegie Endowment for International peace*. Available at: https://carnegieendowment.org/research/2025/01/managing-the-risks-of-chinas-access-to-us-data-and-control-of-software-and-connected-technology?lang=en (Accessed: 22 April 2025).

[18] Quigley, M. and Ayihongbe, S. (2018) *Everyday Cyborgs: On Integrated Persons and Integrated Goods, Medical law review*. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5963303/ (Accessed: 22 April 2025).

[19] South Korea – Welfare Laws for Persons with Disabilities, Disability Rights Education & Defense Fund (Sept. 2, 2023), available at https://dredf.org/legal-advocacy/international-disability-rights/ international-laws/south-korea-welfare-law-for-persons-with-disabilities.

[20] Council Directive 90/385/EEC of 20 June 1990 on the approximation of the laws of the Member States relating to active implantable medical devices (Sept. 3, 2023), available at http://ec.europa.eu/growth/ single-market/european-standards/harmonised-standards/implantable-medical-devices_en.

practical function. Moreover, whether cyborg technology is externally worn or surgically implanted, it may be eligible for protection through a utility patent, which emphasizes the technology's functionality rather than its visual aspects. While utility patents are the most commonly submitted applications, ornamental design patents acknowledge the significance of preserving the substantial time and effort invested in crafting the technology's appearance. The biggest controversy is over how to regulate devices that are used to enhance the quality of people's brains, specifically chips and software for neuroprosthetic and other implants. Chip implants in the brain and the software that goes with them are the most recent developments in tech that's being used to enhance a cyborgs cognitive ability. For example, neuroprostheses like the artificial hippocampus are being developed to help people remember things better. The United States Court of Appeals for the Federal Circuit ruled in favor of the copyright protection of software encoded on chips in the case of Apple Computer, Inc., vs. Franklin Computer Corp[21], This ruling marks a significant milestone in the history of cyber litigation, as it was the first time a court of appeal in the United States had upheld the right of copyright protection for a computer operating system. In South Korea Neuroprosthetic software cannot be patented on its own, however, information processing devices (such as medical devices) that interact with the software, the mode of operation, and the medical device software stored on storage devices can be subject to patent protection. Additionally, medical device software can be protected as a form of copyright[22].

In the US and other countries, there's another type of protection that applies to brains that have been upgraded with computing technology. This protection is specifically for integrated circuits, and in the US, it's called the semiconductor chip protection law[23]. Because of how important it is to keep integrated circuits safe from piracy, many countries like India and the EU have followed the US's lead and passed similar laws that recognize and protect integrated circuit designs. Basically, the main goal of semiconductor chip laws is to stop chip piracy, which is when people copy and sell products made with semiconductors that were originally created by other people. Computers can be used in medical devices like pacemakers and prostheses to control prostheses, which can help with memory and other cognitive functions. However, when we focus on chip protection acts alone, we observe that the privileges granted to owners of integrated circuit designs are more limited compared to what copyright and patent holders enjoy. For instance, the concept of modification or creating derivative works is not an exclusive

[21] Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240 (3d Cir. 1983)
[22] https://iclg.com/practice-areas/digital-health-laws-and-regulations/korea, visited on September 6,2023
[23] Wikipedia. Semiconductor Chip Protection Act of 1984. Available online: https://en.wikipedia.org/wiki/Semiconductor_Chip_Protection_Act_of_1984 visited on August 24, 2023

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right for owners of integrated circuit designs. This particular aspect has notable implications in the context of neuroprostheses. Additionally, the exclusive right given to a patent holder to "use" an invention does not extend to the exclusion of independently produced identical integrated circuit designs. Consequently, most jurisdictions explicitly permit the reproduction of an integrated circuit design for the purposes of reverse engineering. Given this, one might question whether this legal framework suggests that reverse engineering the synaptic structure of another person's "cyborg brain" can be done without facing legal consequences. Another aspect to consider is when software is loaded onto a computer, the RAM—the operating system's RAM-operating storage device—creates a copy of the software. Even if no physical copy is made, the temporary storage of the program in the RAM constitutes reproduction and, therefore, a possible copyright infringement. According to the United States Court of Appeals, the Ninth Circuit's case-law on copyright infringement in computer software MAI Systems Corp. Peak computer, Inc[24]., the Court held that "when the software is loaded into the computer, the RAM is created as a copy," and "potentially infringed reproduction" within the meaning of the United States Copyright Act. Turning on a computer means that operating system programs are "copied" because they're automatically stored in the RAM every time the computer is turned on or a file is transmitted from one user on a computer's network to another.

V. INDIA'S ROLE IN THE PROTECTION OF CYBORGS WITHIN THE FRAMEWORK OF INTELLECTUAL PROPERTY RIGHTS IS BEING DISCUSSED

Cyborg technology, which involves the integration of artificial components or systems with the human body to enhance capabilities, raises several legal and ethical considerations in India, as in many other countries. While the legal landscape in India is evolving, here are some key points to consider regarding cyborgs and the laws in India:

Cyborg technology often includes medical devices, such as implants or prosthetics. In India, the Medical Devices Rules, 2017[25], regulate the manufacture, import, sale, and distribution of medical devices. Companies developing medical cyborg technologies must comply with these regulations, ensuring that their devices meet safety and quality standards. Companies and researchers in India involved in developing cyborg technology may seek patent protection for their innovations. The Indian Patent Act provides legal mechanisms for patenting inventions, including those related to medical and technological advancements. Protecting intellectual property through patents can be crucial for innovation in the field. Cyborg technology often

[24] MAI Systems Corp. v. Peak Computer, Inc., 991 F. 2d 511 (9th Cir. 1993).
[25]https://cdsco.gov.in/opencms/resources/UploadCDSCOWeb/2022/m_device/Medical%20Devices%20Rules,%202017.pdf, visited on September 5,2023.

involves the collection and transmission of personal and health-related data. India has enacted data protection laws, including the Personal Data Protection Bill, 2019 (expected to become law soon), which govern the processing of personal data. Companies involved in cyborg technology must ensure compliance with data privacy and security regulations. Ethical considerations play a significant role in the development and deployment of cyborg technology. Researchers and institutions must seek ethical approvals for human trials and experiments involving cyborg enhancements. India has guidelines and regulatory bodies, such as the Indian Council of Medical Research (ICMR), which oversee ethical aspects of medical research. As cyborg technology evolves, India may need to develop a specific regulatory framework to address the unique legal and ethical challenges posed by these technologies. Regulatory bodies, such as the Ministry of Electronics and Information Technology, may play a role in shaping the regulatory landscape. India is known for its vast and diverse population, and ensuring equitable access to cyborg technologies is an important consideration. Legal frameworks must address issues of accessibility and affordability to prevent disparities in access to these enhancements.It's important to note that the legal landscape regarding cyborg technology is continually evolving, and stakeholders, including government agencies, researchers, and policymakers, should actively engage in discussions and updates to ensure that the legal framework keeps pace with technological advancements while upholding ethical and societal values.

VI. LICENSING OF CYBORGS

Devices which help in enhancing human cognitive and physical capacities play a crucial role in modern healthcare, offering innovative solutions for diagnosis, treatment, and patient care. However, access to these life-saving devices is not always guaranteed, especially in lower-income countries where affordability remains a significant barrier. To address this issue, compulsory licensing of medical devices has emerged as a mechanism to strike a balance between promoting innovation and ensuring broader access to essential healthcare technologies. Basically, a compulsory license is when the government gives permission to someone else to make a product based on a patented invention without asking permission from the patent owner. This is because the patent owner has been taking advantage of the rights granted by the patent without asking permission. The government wants to stop this from happening because it could be bad for public health or because it could hurt trade or stop technology from being passed on. Intellectual property rights (IPR), including patents, provide inventors and manufacturers with exclusive rights to their creations. Article 31 of the TRIPs[26] Agreement is a crucial provision

[26] https://www.wto.org/english/tratop_e/trips_e/intel2_e.htm, visited on September 5,2023.

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because it allows flexibility for member countries to address public health concerns and other urgent situations while respecting the rights of patent holders. It strikes a balance between protecting intellectual property rights and ensuring access to essential goods and services, such as medicines, especially in cases where patented products may be unaffordable for large segments of the population. These protections incentivize innovation by allowing inventors to recoup their investments and profit from their inventions. In the cyborg industry, patents play a crucial role in stimulating research and development efforts, leading to the creation of groundbreaking technologies. However, strong IPR protection can also result in higher prices for cyborg devices, limiting access for patients in need. This tension between innovation and access has prompted governments to explore compulsory licensing as a means to address public health challenges.

Compulsory licensing in the cyborg sector is not without its challenges and controversies. While it can increase access to essential technologies, it also raises concerns: it is argued that compulsory licensing may discourage companies from investing in research and development, potentially slowing down innovation in the human enhancement industry. The issuance of compulsory licenses can have international repercussions, affecting trade agreements and intellectual property relations between countries. The issue of compulsory licensing of cyborgs lies at a crossroads between innovation, intellectual property (IP), and public health. Establishing the appropriate balance between innovation, IP, and public health necessitates an in-depth analysis of the individual circumstances of each case, with a primary focus on the overall health of patients around the world. As technology progresses and global health disparities remain, the debate surrounding compulsory licensing will remain a major factor in determining the future of access to healthcare.

VII. Conclusion

The current legislation is inadequate for the regulation and advancement of cyborg technology, and further legislative action is necessary. While some countries have taken a proactive approach and formulated a strategy for the technological future, others are still grappling with the ethical issues posed by the alteration of the human body and its capabilities. However, it is essential to consider the ethical and civic implications of such technologies when they interact with the human brain. For instance, neuroprostheses (a body-incompatible technology) can alter the activity of the brain, which is essential for human mental functioning, and thus has considerable legal implications. It's important to recognize that the legal and regulatory landscape for emerging technologies like cyborgs can evolve over time. As cyborg technologies

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become more integrated into society, governments and policymakers may develop specific laws and regulations to address the unique ethical, privacy, and safety considerations they present. Additionally, the protection of cyborgs' rights and interests may also depend on how these individuals are integrated into society and the extent of their augmentation. It is essential for the global community to establish future-proof legislation concerning the manufacturing of cyborgs; the trafficking of them; the prevention of invasion by cyborgs; and the protection against attacks by them.

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