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Short communication

Patent protection of pharmaceutical inventions: from academic research to intellectual property

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Introduction

Pharmaceutical research is closely connected with the generation of new knowledge, innovative concepts and technical solutions that may have scientific, therapeutic and practical value. When such results are protected as intellectual property through a patent, they are not only published and communicated to the professional community, but also legally protected as an invention with potential for further development and application.

In medicinal chemistry, this is particularly important because the design and synthesis of new molecules require a rational scientific concept, an appropriate synthetic strategy and experimental confirmation of biological activity. Unlike material objects, new molecules can be reproduced, modified and further developed once they are disclosed. Therefore, patent protection is essential for defining ownership, protecting the inventive contribution and creating a basis for future research, technology transfer and possible pharmaceutical development.

A patent provides time-limited exclusive rights, but only when the invention fulfils the essential patentability criteria: novelty, inventive step and industrial applicability. In the pharmaceutical field, these criteria are especially important because scientific relevance alone is not sufficient for patent protection. The invention must offer a clearly defined technical contribution that is new, non-obvious and applicable in practice.

Patentability of pharmaceutical inventions

Pharmaceutical inventions may refer to different types of technical solutions, including new active substances, new chemical entities, new combinations of compounds, new therapeutic uses, synthetic procedures, pharmaceutical formulations, dosage forms or technological processes. Regardless of the specific type of invention, patent protection requires that the technical contribution is clearly defined and sufficiently supported by appropriate experimental, analytical or technological data.

In the pharmaceutical field, the assessment of patentability is closely related to the comparison of the invention with the existing state of the art. Novelty means that the invention has not been previously disclosed in any publicly available source. Inventive step requires that the invention is not obvious to a person skilled in the relevant field, even when related compounds, methods or therapeutic concepts are already known. Industrial applicability implies that the invention can be produced, used or further developed within a defined pharmaceutical or biomedical context.

This is particularly relevant in medicinal chemistry, where structurally similar compounds may be known, but a new molecular design may still represent a patentable invention if it provides a non-obvious structural concept, a new technical effect or a specific biological profile. Therefore, patent protection of new chemical entities is not based only

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on the fact that a compound has been synthesized, but on the overall inventive contribution arising from its design, preparation, characterization and demonstrated biological relevance.

For research institutions, patent protection provides a formal mechanism for safeguarding innovative results before their broader scientific or professional dissemination. It also creates a basis for further optimization, international protection, collaboration with industry and possible technology transfer. In this context, the patent should not be understood as a final scientific outcome, but as a protected framework that enables the invention to be further developed and evaluated.

Example of a patent-protected pharmaceutical invention

An example of patent protection arising from medicinal chemistry research is the invention related to novel coumarin-1,2,3-triazole-isatin hybrid molecules. The invention is based on the rational design, synthesis and biological evaluation of new chemical entities with potential relevance in disorders associated with cholinergic deficit.

The compounds were designed as hybrid molecules that integrate three structurally and biologically relevant fragments: 4-hydroxycoumarin, 1,2,3-triazole and isatin. This design enables the combination of different pharmacophoric elements within one molecule, with the aim of improving interactions with cholinesterase enzymes. Structural variation was introduced through different substituents on the isatin ring and through modification of the linker length between the coumarin and triazole fragments.

The synthesized compounds were evaluated as inhibitors of acetylcholinesterase and butyrylcholinesterase, enzymes involved in the hydrolysis of acetylcholine. The compounds showed inhibitory activity in the low micromolar range, with a tendency toward more pronounced activity against butyrylcholinesterase. These results were supported by molecular docking studies, which indicated favourable positioning of selected compounds within the enzyme active site (Dimkovski et al., 2025).

From the patent perspective, the relevance of the invention is primarily based on the creation of new chemical entities with original structures, supported by a rational design concept, synthetic feasibility and experimentally confirmed biological activity. The invention was protected through an international PCT application, with priority from July 2024, and the cited prior art in the international search report was classified in category A, supporting the novelty and inventive step of the invention (WIPO, 2026).

In this way, the example illustrates how pharmaceutical research can move from molecular design and experimental validation toward formal intellectual property protection, creating a basis for further optimization, development and possible practical application.

Conclusion

Patent protection is a key step in transforming pharmaceutical research into protected intellectual property. It enables scientific results to obtain legal and developmental value beyond publication alone. The example of coumarin-1,2,3-triazole-isatin hybrid molecules illustrates how rational medicinal chemistry, supported by synthesis, biological evaluation and patent protection, can create a basis for further research and potential pharmaceutical innovation. In this context, the patent is not the final outcome of the idea, but a protected starting point for future development, optimization and possible practical application.

References

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