Pegylated gold nanoparticles as promising carrier for multiple sclerosis drugs

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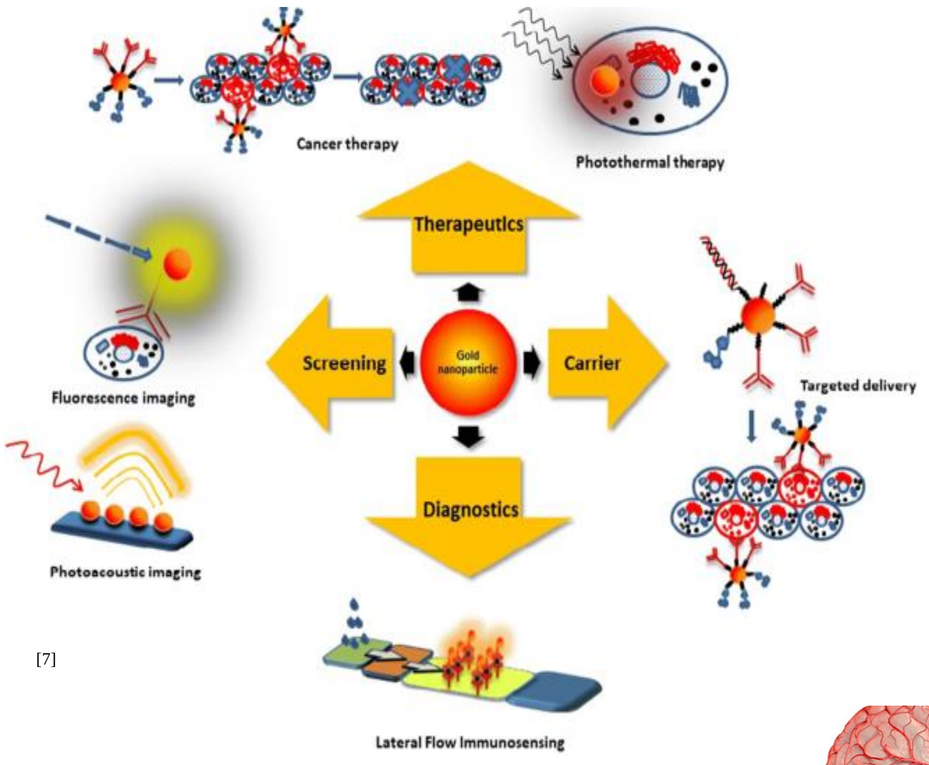
Gold nanoparticles (AuNPs) have wide application in nanomedicine, from imaging to therapy, drug delivery and targeted therapies [1,2]

The AuNPs reduced size means that these materials can be functionalized with different molecules; peptides and drugs can be bound to their surface, allowing a controlled transport and release of desired drugs to desired site [3].
An example of drug that can be delivery could be teriflunomide (multiple sclerosis drug) [10].



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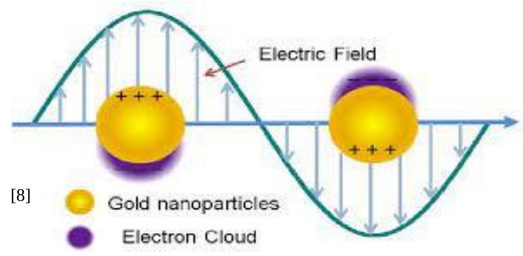

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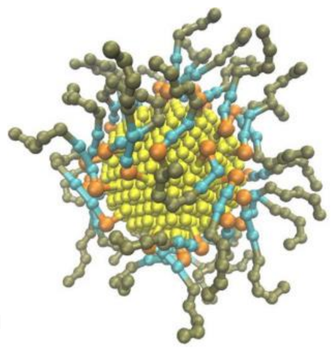
The AuNPs small size determines their ability to give rise to the surface plasmonic effect (LSPR) and consequently the possibility of studying them and tracking them in biological tissues using UV-VIS and NIR spectroscopic techniques (ultraviolet-visible and near-infrared spectroscopy) [4].



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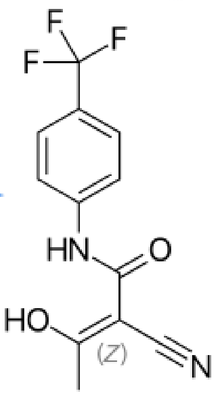
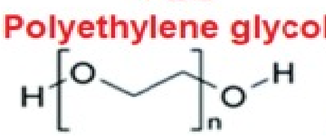


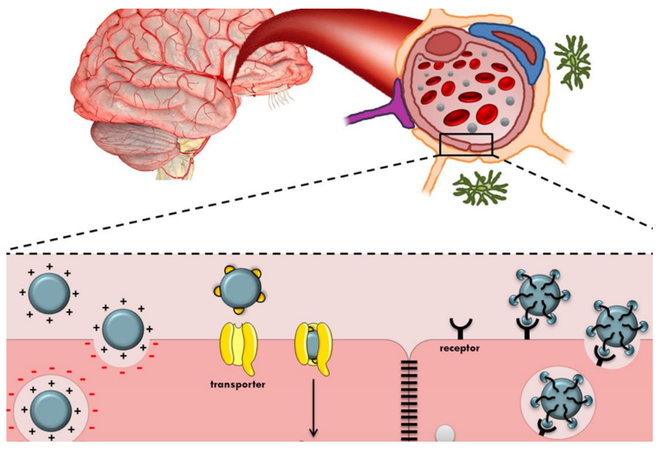
[10]

(*Z*)-teriflunomide

PEG
Polyethylene glycol



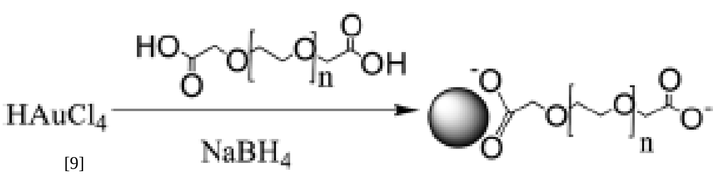
PEG coatings on nanoparticles shield the surface from aggregation, opsonization, and phagocytosis, prolonging systemic circulation time. This also promotes the penetration of NPs across the blood-brain barrier [5]



The aim of this study is the synthesis of PEG-AuNRs, capable of binding molecules used as a drug in the treatment of multiple sclerosis (like teriflunomide). Spectroscopic characterisations by UV–visible (Uv-Vis) and Fourier-transform infrared (FT-IR) spectroscopies, and microscopic analysis by scanning electron microscope (SEM) were carried out confirming the AuNPs functionalization.

SYNTHESIS AND CHARACTERISATION

PEG-stabilized Au NPs were synthesized from tetrachloroauric acid ($HAuCl_4$) to which PEG, sodium hydroxide (NaOH) and sodium boron hydride ($NaBH_4$) were added. Characterization achieved by UV-VIS spectroscopy.



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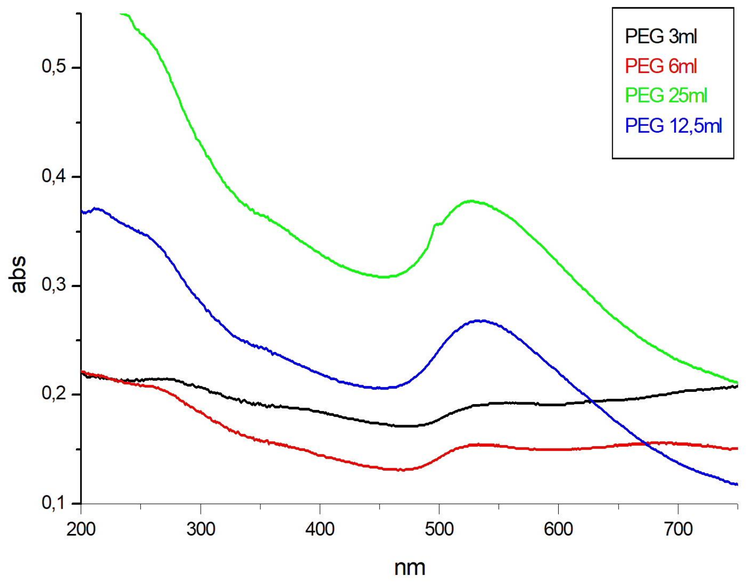
PEG-Au NPs



The UV-VIS absorption spectrum of NPs varies according to the volume of PEG in solution.

CONCLUSIONS

In the synthesis of AuNPs - PEG, according to UV-VIS spectroscopic analysis, the volume of PEG that is added to the gold is significant to ensure the gold is completely enveloped on the surface by the PEG.
Uv-Vis and FT-IR confirmed the PEG functionalization and the nanosize of the AuNPs, showing the typical plasmon band at 520 nm.

References
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