

TRIFLUOROBORATED AZAMACROCYCLIC CHELATORS AS VALUABLE TRACERS FOR MEDICAL IMAGING



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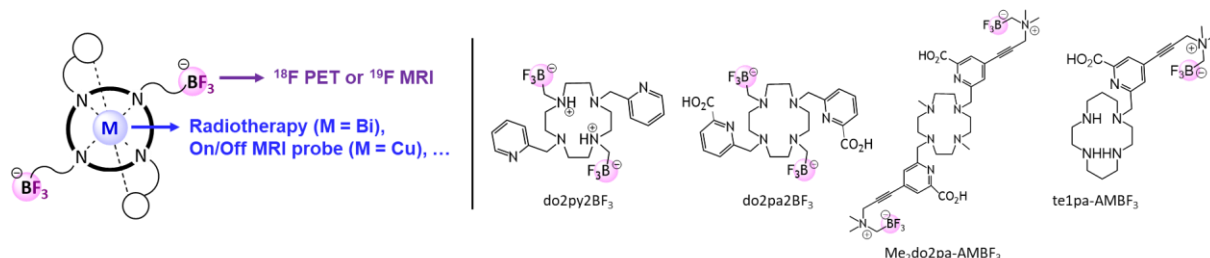
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Fluorine is a particularly suitable element for medical imaging owing to its ^{18}F and ^{19}F isotopes. Indeed, the positron (β^+) emitting isotope (^{18}F) is the most widely used and available for Positron Emission Tomography (PET) due to its daily production in hospital cyclotrons. The ^{19}F isotope, which is the stable isotope of fluorine, is also very valuable in Magnetic Resonance Imaging (MRI). It is the second most sensitive element after proton (^1H) and it allows a direct detection without any background.

Metallic cations also have interesting properties in the field of imaging or radiotherapy (paramagnetic or particle-emitting properties). However, most of them are toxic if they are not chelated.¹ Azamacrocyclic chelators are an ideal platform for the coordination of metallic cations. They form chelates that are thermodynamically stable and kinetically inert, therefore preventing transchelation or the release of metals into the body.

The addition of a fluorine moiety on polyazamacrocycles will enable us to combine the properties of fluorine with those of metals. There are many ways to introduce fluorine into the design of a molecule,² but our choice fell on the trifluoroborate group,³ which is known to be particularly stable in aqueous media, easily substituted by its radioisotope ^{18}F (radiolabelling by isotope exchange) and carries three isochronous fluorine atoms, making it ideal for use in both PET and MRI.

Our aim is therefore to synthesise polyazamacrocycles (cyclen, cyclam) functionalized by trifluoroborate arms and to study their coordination properties for various applications in medical imaging. We present herein the synthesis of an innovative family of chelators, their coordination properties, their ^{18}F radiolabelling and ^{19}F relaxivity.



References

¹ V. Pachauri *et al.* *Int. J. Environ. Res. Public Health*, **2010**, *7*, 2745-2788.

² S. J. Archibald *et al.* *Contrast Media Mol. Imaging*, **2014**, *10*, 96-110.

³ D.M. Perrin *et al.* *Angew Chem*, **2014**, *126*, 12070-12074.