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# Study of the Fluorine- and Boron-Compounds toward MRI and

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Mitsunori Kirihata<sup>3</sup>, Masao Takagaki<sup>4</sup>, and Tatea

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Magnetic resonance imaging (MRI) and boron neutron capture therapy (BNCT) are quite attractive technologies for cancer, respectively. In order to develop novel compounds containing both <sup>19</sup>F and <sup>10</sup>B atoms, we designed and synthesized the novel molecule. In this study, we investigated the internalization rates of the novel molecule into tumor cells of the rat brain. Furthermore, their <sup>19</sup>F NMR measurements are also reported.

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**Keywords:** boron neutron capture therapy (BNCT), boron-10 (B<sup>10</sup>), 3-(4-borono-2,6-difluorophenyl)alanine [Bpa], 3-(4-borono-2,6-difluorophenyl)alaninol [Bpa(F<sub>2</sub>)-ol], magnetic resonance imaging (MRI), and boron neutron capture therapy (BNCT).

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## Introduction

According to our previous study, magnetic resonance imaging (MRI) based on the dipeptides containing 3-(4-fluorophenyl)alanine [Phe(F)] internalized into tumor cells may be accessible as a promising means for diagnosis of cancer.

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From the standpoint of a treatment of brain tumor, boron neutron capture therapy (BNCT) is a promising method. The interaction of <sup>10</sup>B isotope and thermal neutrons [1-3]. In order to develop practical tools for BNCT, we designed and synthesized the novel compounds containing both <sup>19</sup>F and <sup>10</sup>B atoms in a single molecule.

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## Results and Discussion

At present 3-(4-boronophenyl)alanine (Bpa) (1) [4] and 3-(4-boronophenyl)alaninol (Bpa-ol) (2) [5] enriched with <sup>10</sup>B isotope seem to be good candidates for BNCT as the <sup>10</sup>B carrier. In the present study we carried out the synthesis of

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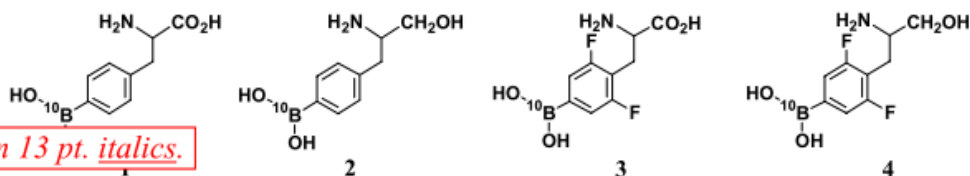
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two novel compounds containing both  $^{19}\text{F}$  and  $^{10}\text{B}$  atoms in a single molecule such as 3-(4-borono-2,6-difluorophenyl)alanine [ $\text{Bpa}(\text{F}_2)\text{-}^{10}\text{B}$ ] (3) and 3-(4-borono-2,6-difluorophenyl)alaninol [ $\text{Bpa}(\text{F}_2)\text{-}^{10}\text{B-ol}$ ] (4); these compounds may be useful for not only

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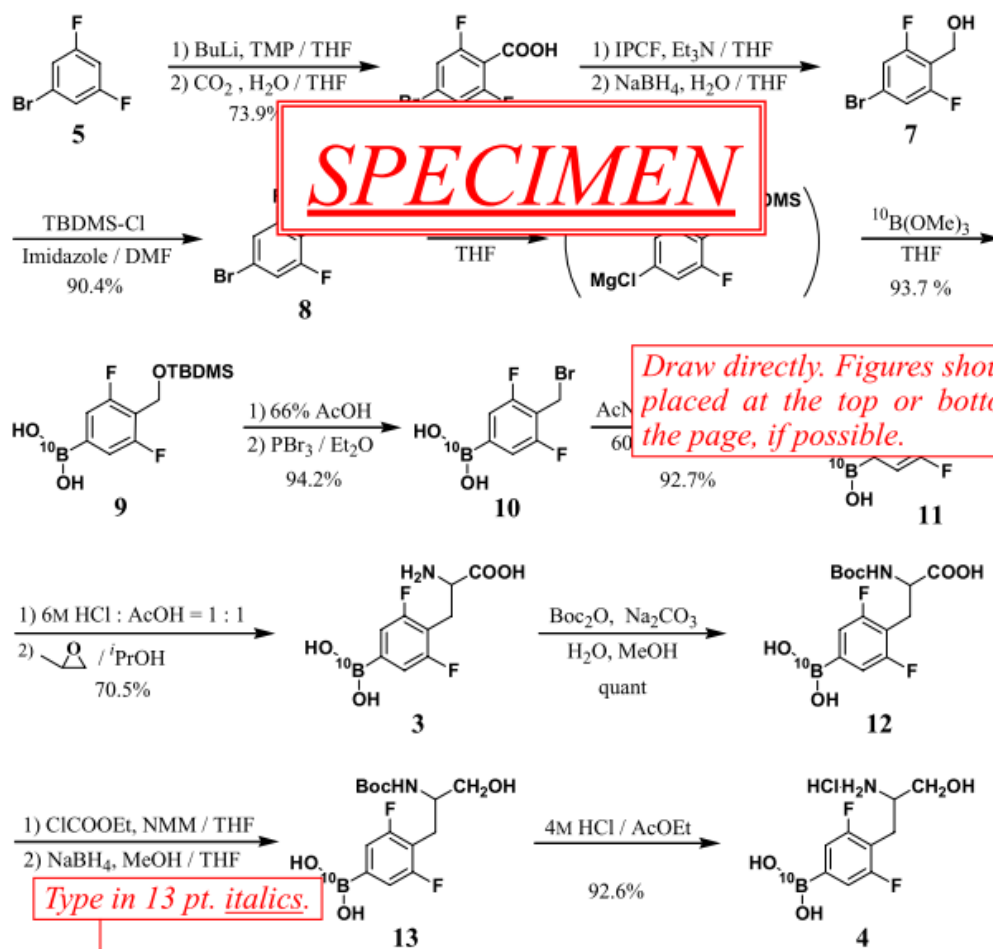


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Fig. 1.  $\text{Bpa-}^{10}\text{B}$  (1) and the related compounds 2 ~ 4.

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Fig. 2. Synthetic scheme of  $\text{Bpa}(\text{F}_2)\text{-}^{10}\text{B}$  (3) and  $\text{Bpa}(\text{F}_2)\text{-}^{10}\text{B-ol}$  (4).

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## References

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