

Synthesis of ^{13}C -labeled naphthyridine derivatives for NMR analysis

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More than 40 neurodegenerative disorders are caused by expansions of simple sequence repeats in the human genome. Naphthyridine carbamate dimer (NCD), a small molecule which our group has developed, recognizes guanine-guanine mismatches and has specific binding abilities to d(CG)_n repeat (responsible sequence of fragile X syndrome)¹ and r(UGGAA)_n repeat (responsible sequence of SCA31).² These structures of complexes have been clarified by NMR spectroscopy.

Although NMR experiments are typically performed in the dilute buffer, the inside of the cells is crowded with various kinds of molecules. It is still unclear whether these complex structures comprised of NCD and nucleic acids obtained by NMR structural determination actually exist under such crowding conditions in the living cells. Toward this end, we synthesized ^{13}C -labeled NCD (^{13}C -NCD, Fig 1) for investigating the interactions between NCD and nucleic acids in the presence of crowding reagents and in cells by NMR.

In this presentation, we report the preparation of ^{13}C -NCD and the NMR analysis of the complexes composed of nucleic acids and ^{13}C -NCD (Fig 2).

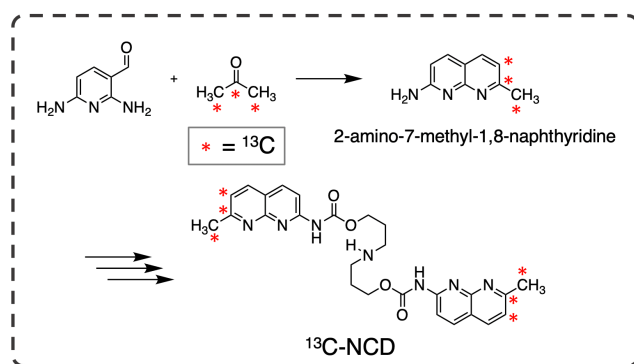


Figure 1. Synthetic route of ^{13}C -NCD

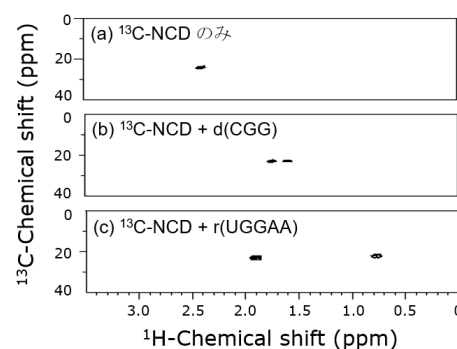


Figure 2. ^{13}C - ^1H HSQC spectra of (a) ^{13}C -NCD, (b) the complex of ^{13}C -NCD and d(CG) and (c) the complex of ^{13}C -NCD and r(UGGAA)

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