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# Inclusion Complex of Gold(I) Organometallics in β-Cyclodextrin: Advancing Therapeutic Applications

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Since ancient times, gold has been used to treat various diseases. Gold thiolates were one of the first FDA-approved class of gold-based drugs used to treat rheumatoid arthritis, and later they showed potential anticancer activity[1]. Researchers then explored other gold compounds with various types of ligands. In our research group, we study gold(I) complexes containing different classes of ligands, including N-heterocyclic carbenes, as drug candidates for the treatment of neglected tropical diseases such as *leishmaniasis*[2], arboviruses infections (*Zika*, *Chikungunya*)[3], and various types of tumor cell lines (ovarian, prostate, thyroid). The organometallic Au(I)IBnCl (1,3-benzyl-1H-imidazol-2-ylidene, Figure 1), studied by our group, exhibited $EC_{50}$ values of 1.65 ± 0.16 for *L. amazonensis* and 1.70 ± 0.42 for *L. braziliensis*, with a $CC_{50}$ of 18.52 ± 1.08 for BMDM macrophages[2], consequently having selectivity index of 11.2 and 10.9 for *L. amazonensis* and *L. braziliensis*, respectively. One of the main characteristics of gold(I) compounds is their speciation (ligand exchange) and reduction in biological media[4]. If controlled, this speciation can be advantageous for developing pro-drugs. Our group is investigating methodologies to control this speciation, and one of them is the formation of inclusion complexes with β-cyclodextrin. Recent research has shown that including a gold(I) complex with dithiocarbamates selectively killed cancer cells[5]. In this work, we successfully encapsulated Au(I)IBnCl in β-CD. The $^1$H NMR shows the 1:2 encapsulation and NOESY suggests the benzyl groups are the guests into the cavity of two units of β-cyclodextrin (Figure 1). The elemental analysis and ICP-OES confirm the 1:2 complex:β-CD ratio.

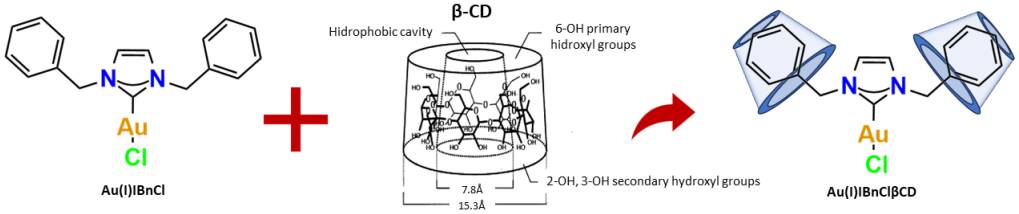


**Figure 1. Structure and inclusion of gold(I) complex Au(I)IBnCl and β-CD.**

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