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Characterization and antiplasmodial activities new Thiazole-Thiosemicarbazone derivative

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INTRODUCTION

The significant rise in mortality associated with malaria can be predominantly linked to the growing prevalence of strains resistant to artemisinin-based combination therapies (ACT), particularly in *Plasmodium falciparum*. It is imperative to explore novel antiplasmodial derivatives to present innovative therapeutic options for combating malaria. In this context, derivatives of thiazole-thiosemicarbazone have exhibited diverse biological activities in both *in vitro* and *in vivo* studies.

OBJECTIVE

Evaluate the cytotoxic effect from novels derived thiazole thiosemicarbazone in two distinct cell lines – RAW 264.7 macrophages, Chinese hamster lung fibroblasts (V79), hepatoma (HepG2). Characterize antimalarial effect against 3D7-GFP strains of *Plasmodium falciparum*, moreover evaluate the interaction of new derivatives with bovine soroalbumin (BSA) by UV-visible absorption and fluorescent emission spectroscopies.

METHODOLOGY

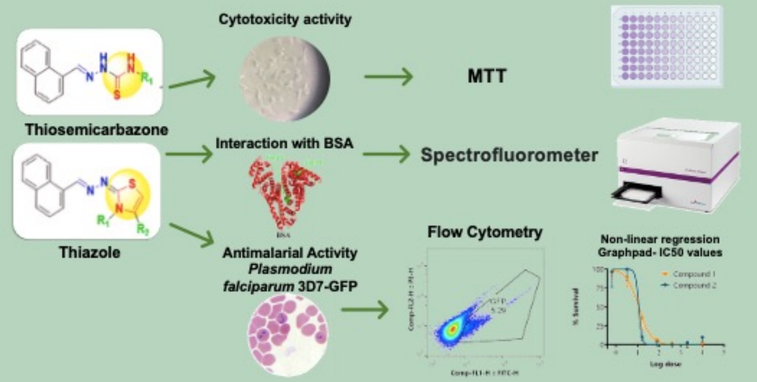

Figure 1: Biologic activities of the new compounds

RESULTS

In this study, thiazoles exhibited superior activity compared to thiosemicarbazones. Thiazoles demonstrated high capacity for promoting growth inhibition, achieving IC_{50} values ranging from 0.47 to 4.11 µM. Out of the compounds assessed in this activity, four demonstrated particularly promising results.

Table 1: *In vitro* cytotoxicity promoted by the compounds against RAW 264.7 macrophage cells, Chinese hamster lung fibroblasts (V79), hepatoma (HepG2), antiplasmodial activity and BSA interaction .

Compounds	Macrophages (RAW 264.7) CC_{50}uM	Fibroblasts (V79) CC50 (µM)	Hepatoma (HepG2) CC50 (µM)	*P. falciparum* IC50 (µM)	SI
2f	89.87 ± 0.2	100.21 ± 0.3	132.1 ± 0.1	0.53 ± 0.02	167.92/189/249
2h	>200	>200	>200	0.47 ± 0.01	425.53/446/535
2i	113.44 ± 0.1	124.3 ± 0.3	166.8 ± 1.4	2.67 ± 0.01	42.48/46.55/62.47
2j	>200	>200	>200	0.79 ± 0.01	>200
CQ	-	>100	>100	0,02± 0.01	-

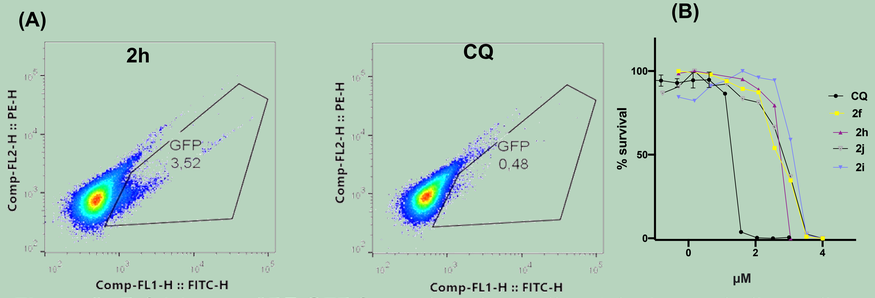

Figure 2: *P. falciparum* 3D7-GFP flow cytometry scatter plots demonstrating gating signals (A) and dose-response curves of the tested compounds (B)

CONCLUSIONS

This study showed that cytotoxicity assays against mammalian cells revealed that thiazoles a low cytotoxicity. In antiplasmodial activity assays, thiazoles were able to inhibit the growth of the parasite in vitro, futhermore, a good interation with BSA. While these findings suggest the potential of thiazoles,particularly for the 2h compound, underscore the potential of thiazoles as viable drug candidates for combating malaria. Nevertheless, a comprehensive characterization of these compounds are required, such as a stage-specific and mode of action assays.

REFERENCES

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