

## Garcinielliptone FC: Antiparasitic activity without cytotoxicity to mammalian cells

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### Introduction

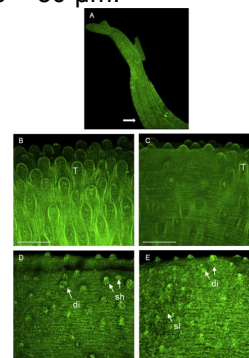
Garcinielliptone FC (GFC) is a natural prenylated benzophenone found in the seeds of *Platonia insignis* Mart. (Clusiaceae), a native Brazilian plant (Costa Junior et al., 2011). It has been chemically characterized and it is known that GFC has several biological activities such as antiplasmodial (Marti et al., 2010), activities such as antioxidant and vasorelaxant properties. (Costa Junior et al., 2011 and Arcanjo et al., 2014). In this study, we report the *in vitro* effect of GFC against the blood fluke *Schistosoma mansoni*, the parasite responsible for schistosomiasis mansoni. The anti-*S. mansoni* activity and cytotoxicity toward mammalian cells were determined for the compound. GFC  $\geq 6.25 \mu\text{M}$  showed antischistosomal activity and confocal laser scanning microscopy analysis demonstrated several morphological alterations on the tegument of worms, and a correlation between viability and tegumental damage was observed.

### Results e Discussion

First, GFC was isolated from seeds of *P. insignis* and was identified by 1D and 2D NMR spectroscopic analysis and mass spectrometry. Subsequently, the *in vitro* antischistosomal effects of GFC against adult *S. mansoni* were evaluated at concentrations of 0.78, 1.56, 3.12, 6.25, 12.5, 25 and 50  $\mu\text{M}$ . The control worms were assayed in RPMI 1640 medium and RPMI 1640 with 0.5% DMSO (negative control groups) and in 3  $\mu\text{M}$  praziquantel (positive control group). The effect of the drug was assessed with emphasis on changes in worm motor activity, viability, oviposition, and morphological alterations on *S. mansoni* tegument.

**Figure 1.** Confocal laser scanning microscopy observations of *Schistosoma mansoni* male worm after *in vitro* incubation. In these experiments, pairs of adult worms were incubated in 24-well culture plates containing RPMI 1640 medium and treated with different concentrations of GFC. (A) General view of the

anterior worm region showing the dorsal surface where tegument was analyzed (arrow). (B) Control after 120 h, showing tubercles (T). (C) Worm treated with 12.5  $\mu\text{M}$  GFC, showing some tubercles intact (T). (D) Worm treated with 25  $\mu\text{M}$  GFC, showing tubercles shrunken (sh) disintegrate (di). (E) Worm treated with 50  $\mu\text{M}$  GFC; dorsal tegumental surface showing sloughing (sl) and tubercles disintegrate (di). Scale bars = 50  $\mu\text{m}$ .



### Conclusion

The present results suggest that GFC, a prenylated benzophenone isolated from seeds of *P. insignis*, has antischistosomal activities against *S. mansoni* adult worms. Additionally, confocal laser scanning microscopy of *in vitro*-treated worms indicated that GFC was able to cause morphological changes in the tegument. Similar to praziquantel, GFC showed an *in vitro* antischistosomal effect at low concentrations. Furthermore, in contrast to praziquantel, which has only a lethal effect, GFC at sub-lethal concentrations interfered with the reproductive fitness of the worms and the number of eggs was significantly reduced.

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