Antiplasmodial and Antitrypanosomal Activity of Tanshinone-Type Diterpenoids from Salvia miltiorrhiza

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In a medium throughput screen of 880 plant and fungal extracts for antiprotozoal activity, a dichloromethane extract of Salvia miltiorrhiza roots was active against both Trypanosoma brucei rhodesiense and Plasmodium falciparum. With HPLC-based activity profiling in combination with on- and off-line spectroscopic methods (PDA, -MSn, HR-MS, microprobe NMR), the active compounds were identified as tanshinone-type diterpenoids. Subsequent isolation and structure elucidation yielded the known substances miltirone (1), tanshinone IIa (2), 1,2 dihydrotanshinquinone (3), methylenetanshinquinone (4), 1-oxomiltirone (5), 11-hydroxymiltiodiol (6), tanshinone I (7), methyltanshinonate (8), and cryptotanshinone (9). The IC(50)s of the compounds were determined against the two parasites and rat myoblast (L6) cells. They ranged from 4.1 mu M to over 30 mu M against P. falciparum K1 strain with selectivity indices (SI) from 0.3 to 1.9. IC(50)s against T. brucei rhodesiense STIB 900 were from 0.5 mu M (1,4) to over 30 mu M, and 4 showed the greatest selective activity with an SI of 24.
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