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Inhibition of glioblastoma growth and angiogenesis by gambogic acid: An *in vitro* and *in vivo* study

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Abstract

Gambogic acid (GA) is the major active ingredient of gamboge, a brownish to orange resin exuded from *Garcinia hanburyi* tree in Southeast Asia. The present study aims to demonstrate that gambogic acid (GA) has potent anticancer activity for glioblastoma by *in vitro* and *in vivo* study. Rat brain microvascular endothelial cells (rBMEC) were used as an *in vitro* model of the blood-brain barrier (BBB). To reveal an involvement of the intrinsic mitochondrial pathway of apoptosis, the mitochondrial membrane potential and the western blot evaluation of Bax, Bcl-2, Caspase-3, caspase-9 and cytochrome c released from mitochondria were performed. Angiogenesis was detected by CD31 immunochemical study. The results showed that the uptake of GA by rBMEC was time-dependent, which indicated that it could pass BBB and represent a possible new target in glioma therapy. GA could cause apoptosis of rat C6 glioma cells *in vitro* in a concentration-dependent manner by triggering the intrinsic mitochondrial pathway of apoptosis. *In vivo* study also revealed that *i.v.* injection of GA once a day for two weeks could significantly reduce tumor volumes by antiangiogenesis and apoptotic induction of glioma cells. Collectively, the current data indicated that GA may be of potential use in treatment of glioblastoma by apoptotic induction and antiangiogenic effects.

Keywords: Gambogic acid; Apoptosis; Glioblastoma; Angiogenesis; Caspase; Mitochondrion

JEL classification codes: Neuropharmacology

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