Synthetic arsonolipids, structurally similar to phosphonolipids in which P has been replaced by As, have been synthesized. Although these lipids possess interesting biophysical and biochemical properties their anticancer or antiparasitic activity is not considered adequate for therapeutic applications. However, when arsonolipids are incorporated in liposomes, the vesicles formulated (arsonoliposomes) have interesting properties. In cell culture studies arsonoliposomes show increased toxicity against cancer cells (compared to that of arsenic trioxide) while being less toxic or non-toxic for normal cells. Furthermore, arsonoliposomes have interesting antiparasitic activity, as assessed in vitro and in vivo.

If used as nanocarriers for the delivery of other anticancer drugs, in addition to the per se anticancer activity, arsonoliposomes may provide a cancer-cell specific trigger, which is a very interesting asset for such drug delivery systems. It has indeed been recently demonstrated (in vitro) that arsonoliposomes are “thiol sensitive” and encapsulated molecules are released faster from the arsonoliposomes when they are incubated in thiol-rich (glutathione) environments.

Arsonoliposome lipid composition has been recently found to influence their physicochemical properties and as a consequence to this, their in vitro and in vivo stability, in vivo kinetics and trypanocidal activity. However, the anti-cancer activity of arsonoliposomes is not substantially influenced by their lipid composition. Thereby, it becomes obvious that depending on the intended therapeutic application, different aspects should be predominantly considered when designing arsonoliposome formulations for the development of anticancer or antiparasitic drug delivery systems.