

Benefits and side effects of different vegetable oil vectors on apoptosis, oxidative stress, and P2X7 cell death receptor activation.

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Abstract

PURPOSE:

Ocular side effects in patients using eye drops may be due to intolerance to the vector used in eye drops. Castor oil is the commonly used lipophilic vector but has been shown to be cytotoxic. Effects on cells of four oils (olive, camelina, Aleurites moluccana, maize) were compared with those of castor oil in human conjunctival cells.

METHODS:

Human conjunctival cells were incubated with the oils for 15 minutes. After a 24-hour recovery period, cells were tested for viability, proliferation, apoptosis (P2X7 cell death receptor and caspase 3 activation), intracellular redox potential, and reactive oxygen species production. Fatty acid incorporation in cell membranes was also analyzed. In vivo ocular irritation was assessed using the Draize test.

RESULTS:

Compared to the four other oils, castor oil was shown to induce significant necrosis and P2X7 cell death receptor and caspase 3 activation and to enhance intracellular reactive oxygen species production. Aleurites moluccana and camelina oils were not cytotoxic and increased cell membrane omega-3 fatty acid content. None of the five tested oils showed any in vivo ocular irritation.

CONCLUSIONS:

The results demonstrated that **castor oil exerts cytotoxic effects on conjunctival cells. This cytotoxicity could explain the side effects observed in some patients using eye drops containing castor oil as a vehicle.** The lack of cytotoxic effects observed with the four other

oils, Aleurites, camelina, maize, and olive, suggest that they could be chosen to replace castor oil in ophthalmic formulations.