Invest Ophthalmol Vis Sci. 2007 Nov;48(11):5000-6.

*

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

Said T[1], Dutot M, Christon R, Beaudeux JL, Martin C, Warnet JM, Rat P.

Author information

- [1]Laboratoire de Toxicologie, Faculté des Sciences Pharmaceutiques et Biologiques, Université René Descartes Paris, Paris, France.

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.

1.

Folia Microbiol (Praha). 2003;48(6):731-5.

Susceptibility of Escherichia coli to C2-C18 fatty acids.

Marounek M[1], Skrivanová E, Rada V.

Author information

- [1]Institute of Animal Physiology and Genetics, Academy of Sciences of the Czech Republic, Research Institute of Animal Production, Prague-Uhríněves, Czechia. marounek@iapg.cas.cz

Abstract

The antimicrobial activity of C2-C18 fatty acids was determined in vitro in cultures of two strains of Escherichia coli grown on glucose. Antimicrobial activity was expressed as IC50 (a concentration at which only 50% of the initial glucose in the cultures was utilized). Utilization of glucose was inhibited by caprylic acid (IC50 0.30-0.85 g/L) and capric acid (IC50 1.25-2.03 g/L). Neither short-chain fatty acids (C2-C6) nor fatty acids with longer chain (C12-C18) influenced substrate utilization. Caproic acid, however, decreased cell yield in cultures of E. coli in a dose-dependent manner. No inhibition of glucose utilization was produced with unsaturated fatty acids, oleic and linoleic. Calcium ions added in excess reversed the antimicrobial effect of capric acid, but not that of caprylic acid. Antimicrobial activity of caprylic and capric acid decreased when the bacteria were grown in the presence of straw particles, or repeatedly subcultured in a medium containing these compounds at low concentrations. Counts of viable bacteria determined by plating decreased after incubation with caprylic and capric acid (30 min; 1 g/L) at pH 5.2 from > 10(9) to approximately 10(2)/mL. A reduction of a mere 0.94-1.96 log10 CFU was observed at pH 6.5-6.6. It can be concluded that caprylic acid, and to a lesser extent also capric acid, has a significant antimicrobial activity toward E. coli. Effects of other fatty acids were not significant or absent

2.

J Oleo Sci. 2014;63(11):1117-24.

Antioxidative effect of rice bran oil and medium chain Fatty Acid rich rice bran oil in arsenite induced oxidative stress in rats.

Sengupta A[1], Ghosh M, Bhattacharyya DK.

Author information

- [1]School of Community Science and Technology Indian Institute of Engineering, Science and Technology.

Abstract

The present study was adopted to evaluate the antioxidant efficacy of medium chain fatty acid (caprylic, capric and lauric) rich rice bran oils in comparison to rice bran oil in terms of altered biochemical parameters of oxidative stress following sodium arsenite treatment in rats. Animals were divided into ten groups; five normal groups and five arsenite treated groups. Results showed that activities of antioxidant enzymes in liver, brain and erythrocyte membrane increased with the administration of rice bran oil and MCFA rich rice bran oils both in normal and arsenite treated cases. Lipid peroxidation increased with the administration of sodium arsenite, but again administration of rice bran oil and MCFA rich rice bran oils decreased the lipid peroxidation. Caprylic acid rich rice bran oil showed the best ameliorative effects.

3.

The Effect of Medium Chain Triglycerides–Containing Tear Substitute on the Dynamics of Lipid Layer Interference Patterns (DLIP) in Dry Eye Patients

A. Mastromarino[1], M. Papadia[1], V. Amico[2], S. Giuffrida[2] and M. Rolando[1]

[1] Dept Neurosciences Ophthalmology, University of Genova, Genova, Italy
[2] Global Research and Development, Bausch&Lomb, Catania, Italy

Commercial Relationships: A. Mastromarino, None; **M. Papadia**, None; **V. Amico**, Bausch&Lomb E; **S. Giuffrida**, Baush&Lomb E; **M. Rolando**, None.

Support: None.

Abstract

Purpose: The lipid layer of the tear film in keratoconjunctivitis sicca (KCS) shows the inability to maintain a consistent interference pattern with repeated blinking while in the normal healthy eye it maintains a consistent pattern of interference among several blinks. The aim of the study was to evaluate the possibility of improving the consistency of dynamic lipid interference patterns (DLIP) in dry eyes by means of a lipid–containing tear substitute.

Methods: Twenty patients with bilateral definite clinical diagnosis of dry eye (positive to at least two out of the following three tests: Schirmer I<5 mm/5 min, BUT<7 sec, positive lissamine green staining of the ocular surface) were enrolled for the study. All subjects underwent DLIP test which measures the number of blinks during which the precorneal tear film lipid layer maintains a definite interference pattern. The DLIP test was performed in a randomly chosen eye of each subject at three different times: 1) in basal condition (without instillation of any tear substitute), 2) 5 minutes after the instillation of a 0.2% carbopol tear substitute and 3) 5 minutes after the instillation of a 0.2% carbopol+medium chain triglycerides–containing tear substitute.

The differences in the average number of blinks for each eye showing a consistent lipid layer interference pattern at the three different times of the experiment was statistically evaluated using Student t–test.

Results: The number of blinks providing the same consistent lipid layer interference pattern of the tear film measured by means of DLIP test was increased both by carbopol only tear substitute and carbopol+triglycerides–containing tear substitute. In particular the KCS eyes showed an average of 2.3±1.5 blinks with consistent DLIP, KCS eyes after 0.2 carbopol instillation showed an average of 4.2±3.2 blinks with consistent DLIP($p<0.01$) and KCS eyes after 0.2 carbopol+triglycerides containing tear substitute instillation showed an average of 8.2±3.4 blinks with consistent DLIP ($p<0.001$ vs. untreated KCS and $p<0.01$ vs. 0.2% carbopol treated KCS eyes).

Conclusions: The presence of the medium chain triglycerides component in a carbopol tear substitute significantly improved the results of the DLIP test in dry eye patients. These results

could be possibly due to the ability of triglycerides to be included in the polar structural portion of the tear film lipid layer with consequent improvement of its stability.