DOI: 10.1017/S1431927603447211
Microsc Microanal 9(Suppl 2), 2003


# Phycocyanin as an anti-inflammatory and hepatoprotective compound. An Electron Microscopy study.

O. Ancheta*, S. Rodríguez*, R. González**, D. Remírez**, Ch. Romay**, T. Valdés*.

*Cell Biology Section. Electron Microscopy Laboratory. National Center for Scientific Research (CNIC). P.O. Box 6414. Havana. Cuba. odelsa@infomed.sld.cu
**Pharmacology Department. Ozone Research Center. CNIC.

The anti-inflammatory effect of phycocyanin, a biliprotein extracted from the blue-green algae *Spirullina* (*Arthospira maxima*), has been tested in three experimental damage models:
1. Acetic acid-induced colitis in rats.
2. Zymosan-induced arthritis in mice.
3. Galactosamine-induced hepatitis in rats.

Fragments of colon, tibial articular cartilage and liver were taken and processed for electron microscopy as follow: samples were fixed in 3.2 % glutaraldehyde in cacodylate buffer, postfixed in 2 % osmium tetroxide and embedded in Spurr resin [1]. Sections were stained with lead citrate and uranyl acetate [2]. Specimens were observed in a JEOL JEM 100 S electron microscope.

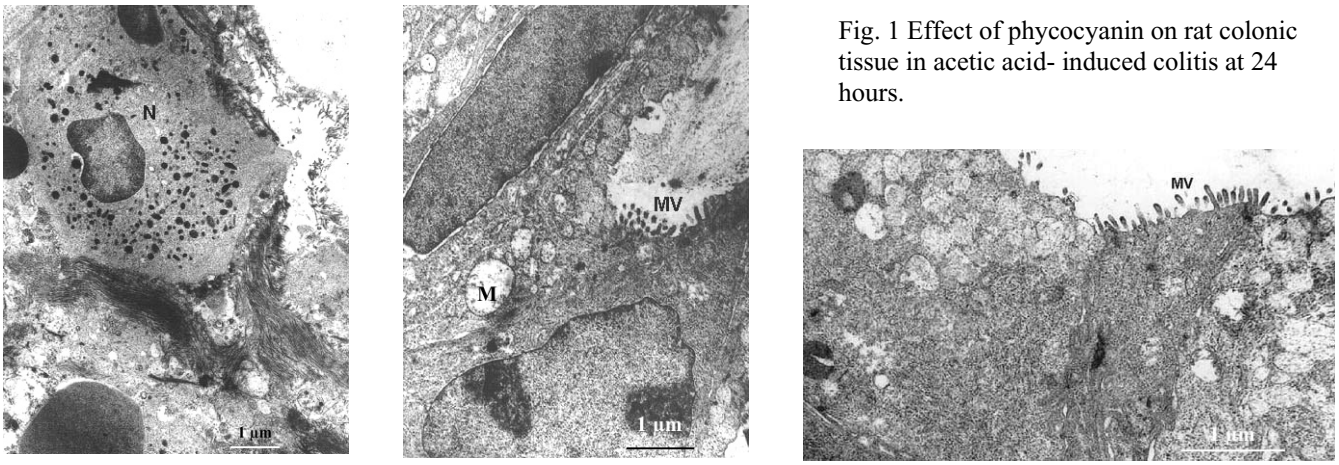
**Acetic acid-induced colitis in rats.**
Epithelial cells and sub-epithelial connective tissue of rats with induced colitis, previously treated with phycocyanin (300 mg/kg b.w), show recovered ultrastructure (Fig. 1).

**Zymosan-induced arthritis in mice.**
Articular cartilage cells of mice with induced arthritis, previously treated with phycocyanin (200 mg/kg b.w.), show diminished damage [3] (Fig. 2).

**Galactosamine-induced hepatitis in rats.**
Liver cells of rats with induced hepatitis pretreated with phycocyanin (200 mg/kg), show normal ultrastructure and diminished inflammatory infiltration (Fig. 3).

Antioxidant properties of phycocyanin extracts [4] may explain these protective effects. Phycocyanin could scavenge hydroxyl radicals, which induce and develop inflammatory responses.

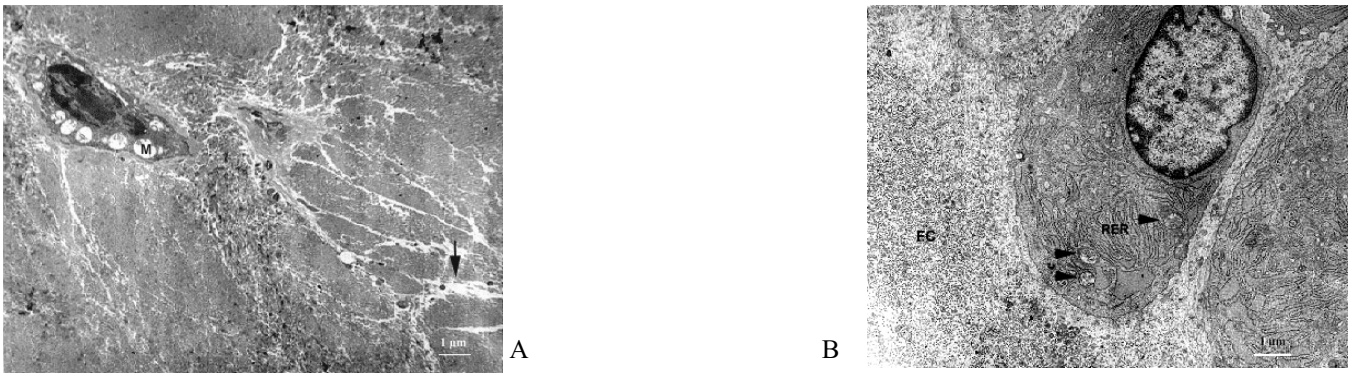
**References:**
[1] A.R. Spurr. J. Ultrastruct. Res. 26, (1969), 31.
[2] E.S. Reynolds. J. Cell Biol. 17, (1963), 208.
[3] D. Remírez et al. Med. Inflamm. (2002), in press.
[4] C. Romay et al. Inflamm. Res. 47, (1998), 36.




A B C

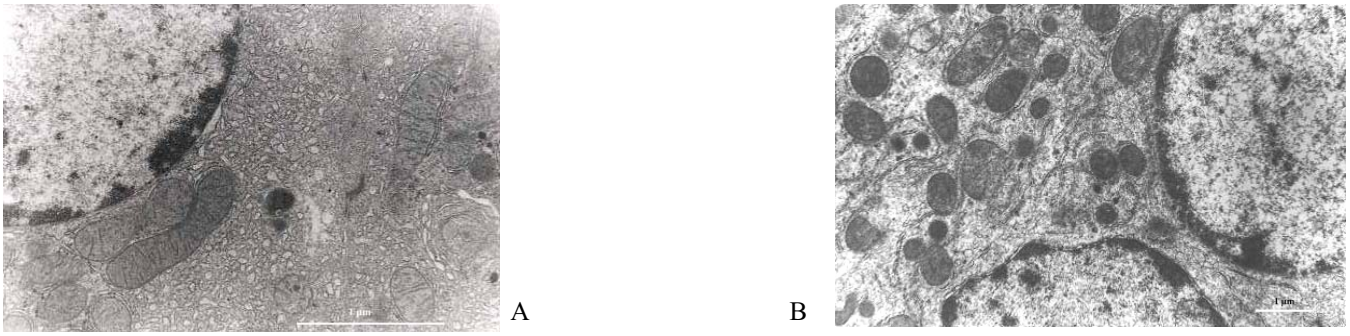
Fig. 1 Effect of phycocyanin on rat colonic tissue in acetic acid- induced colitis at 24 hours.

Fig. 1 A, B)Rat colonic tissue in acetic acid-induced colitis at 24 h without phycocyanin. A) Area basal, infiltration of neutrophils (N). B) Epithelial cells with loss of microvilli (MV), swollen mitochondria (M) and nuclear envelope dilation. C) Treatment with phycocyanin. Slight recovery of microvilli (MV) in epithelial cells.




A B

Fig. 2. Tibial articular cartilage. A) Treatment with zymosan. Observe a condrocyte with altered mitochondria (M) and edema between collagen fibers packages (arrow). B). Effect of phycocyanin. Note well-preserved condrocytes with normal rough endoplasmic reticulum (RER). Collagen fibers packages (FC) show normal disposition.



A B

Fig. 3A. Portion of rat hepatocyte after treatment with galactosamine. Extense cytoplasmic vacuolization, swelling of rough endoplasmic reticulum and nuclear envelope and normal structure of mitochondria are noted. 3B. Rat liver hepatocyte after a treatment with phycocyanin. Normal structure of the cell is noted.

https://doi.org/10.1017/S1431927603447211 Published online by Cambridge University Press