



[Switch to English?](#) [Español](#)

[Home](#) > [ARQUITECTURA Y URBANISMO](#) > NORMA PANIAGUA-CASTRO

NORMA PANIAGUA-CASTRO

CIENCIAS MÉDICO BIOLÓGICAS, BIOTECNOLOGÍA

[Home](#) [Sinopsis del Experto](#) [Perfil](#) [Publicaciones](#) [Fondos](#) [Patentes](#) [Expertos Afines](#) [Revistas](#) [Tendencias](#) [Red Institucional](#)
[Red de Coautores](#) [Red de Investigación](#) [Curriculum Vitae](#)

DRA. NORMA PANIAGUA-CASTRO

[Area of Knowledge](#)

CIENCIAS MÉDICO BIOLÓGICAS [BIOTECNOLOGÍA](#)

Teléfono de oficina (+52) 55 57296000

Perfil [más >](#)

[Teratogens](#)

[Lipid Peroxidation](#)

[Neural Tube Defects](#)

[Abnormalities, Drug-Induced](#)

[Spirulina](#)

[Cadmium](#)

[Glycine](#)

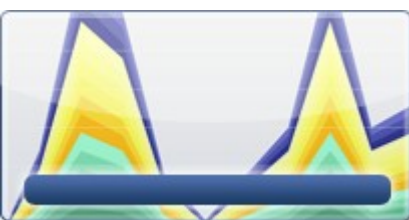
[Cadmium Chloride](#)

[Hyperglycemia](#)

[Antioxidants](#)

[Fetal Growth Retardation](#)

Tendencias



Tendencias en Investigación

Red de Investigación



Explore la red del experto

Publicaciones [más >](#)

- 2013 Sible Marbey González-Rentería; Verónica Loera-Castañeda; Isaías Chairez-Hernández; Martha Sosa-Macias; Norma Paniagua-Castro; Ismael Lares-Aseff; Martha Rodríguez-Moran; Fernando Guerrero-Romero; Carlos Galaviz-Hernández [Association of the polymorphisms 292C>T and 1304G>A in the SLC38A4 gene with hyperglycaemia](#)
Diabetes/Metabolism Research and Reviews. 2013;29(1):39-43.
- 2012 Gerardo N. Escalona-Cardoso; Norma Paniagua-Castro; Ricardo Pérez-Pastén; Germán Chamorro-Cevallos [Spirulina \(Arthrospira\) protects against valproic acid-induced neural tube defects in mice](#)
Journal of Medicinal Food. 2012;15(12):1103-1108.
- 2011 Norma Paniagua-Castro; Gerardo Escalona-Cardoso; Dolores Hernández-Navarro; Ricardo Pérez-Pastén; Germán Chamorro-Cevallos [Spirulina \(Arthrospira\) protects against cadmium-induced teratogenic damage in mice](#)
Journal of Medicinal Food. 2011;14(4):398-404.

Expertos Afines [más >](#)

GERMAN ALBERTO CHAMORRO-CEVALLOS
GERARDO NORBERTO ESCALONA-CARDOSO
EDUARDO MADRIGAL-BUJAJIDAR
RICARDO PEREZ PASTEN-BORJA

Publicaciones

94

5

86

9

Revistas [más >](#)

Journal of Medicinal Food	2
Journal of Pharmacy and Pharmacology	1
Reproductive Toxicology	1
Toxicology in Vitro	1
Diabetes/Metabolism Research and Reviews	1

Publicaciones

2

1

1

1

1

Red Institucional [>](#)

Instituciones internas

Shared Pub.

BIOTECNOLOGÍA	6
CIENCIAS QUIMICOBIOLOGICAS	6
QUÍMICO FARMACÉUTICO INDUSTRIAL	5
BIOTECNOLOGÍA	2
CONSERVACIÓN DEL PATRIMONIO PAISAJÍSTICO	1
GESTIÓN AMBIENTAL	1

Instituciones externas	Shared Pub.
Universidad Autónoma del Estado de México	1
Instituto Mexicano del Seguro Social	1
CIIDIR-Durango IPN	1
Doctorado en Ciencias en Biotecnología IPN	1

Red de Coautores [más >](#)

Coautores internos	Shared Pub.
GERMAN ALBERTO CHAMORRO-CEVALLOS	5
GERARDO NORBERTO ESCALONA-CARDOSO	5
RICARDO PEREZ PASTEN-BORJA	3
CARLOS GALAVIZ-HERNANDEZ	2
EDUARDO MADRIGAL-BUJAI DAR	2
ELIZDATH MARTINEZ-GALERO	2

Coautores externos	Shared Pub.
Dolores Hernandez Navarro	1
Fernando Guerrero Romero	1
Veronica Loera Castaneda	1
Martha Rodriguez Moran	1
Ismael Laresaseff	1
Siblie Marbey Gonzalez Renteria	1



© 2013 [Elsevier B.V](#) Todos los derechos reservados.

SciVal ® es una marca registrada de Elsevier Properties SA | [Sobre SciVal Experts](#) | [Términos y condiciones](#) | [Declaración de privacidad](#) | [Contacto](#)
 Cookies are set by this site. To decline them or learn more, visit our [Cookies](#) page.



Por concepto

Por apellido



Por texto libre



NORMA PANIAGUA-CASTRO

CIENCIAS MÉDICO BIOLÓGICAS, BIOTECNOLOGÍA

[Publicaciones](#)

Scopus Publication Detail

Los detalles de la publicación contienen el título, autores (con indicadores que muestran a otros autores perfilados), información sobre la organización que publica, un resumen del artículo y un enlace al texto en [Scopus](#). Con el resumen se crea la identidad de la publicación.

[Spirulina \(Arthrospira\) protects against cadmium-induced teratogenic damage in mice](#)

Norma Paniagua-Castro; Gerardo Escalona-Cardoso; Dolores Hernández-Navarro; Ricardo Pérez-Pastén; Germán Chamorro-Cevallos (Autores Reseñados: [GERMAN ALBERTO CHAMORRO-CEVALLOS](#); [NORMA PANIAGUA-CASTRO](#); [RICARDO PEREZ PASTEN-BORJA](#); [GERARDO NORBERTO ESCALONA-CARDOSO](#))

Journal of Medicinal Food. 2011;14(4):398-404.

Resumen

[Full text](#) | [Scopus](#)

The role of Spirulina (Arthrospira) in preventing cadmium (Cd) teratogenicity in ICR mice was studied. Cd was administered intraperitoneally to female mice at 1.5mg/kg on gestation day (GD)-7, and Spirulina was given by peroral (intra-gastric) administration at 62.5, 125, 250, or 500mg/kg from GD-0 through GD-17 (the day when animals were sacrificed). Because among the mechanisms suggested to account for reproductive damage are oxidative stress and lipoperoxidation, embryonic hydroperoxides were also determined. Treatment with Spirulina at the three highest doses significantly decreased the frequency of fetuses with exencephaly, micrognathia, and skeletal abnormalities induced by Cd. Furthermore, Spirulina treatment significantly and dose-dependently decreased lipid peroxidation, which was dramatically increased by administration of the metal. The results of the present study clearly point to the therapeutic potential of Spirulina in Cd-induced teratogenicity and probably through its antioxidant activity. © Copyright 2011, Mary Ann Liebert, Inc. and Korean Society of Food Science and Nutrition.

PMID: 21254891

Contexto Científico

Aquí podrá encontrar datos relacionados con esta publicación, según lo reseñado en su ficha identificadora. Esto incluye a otras publicaciones, así como a expertos cuyos perfiles coinciden significativamente con el perfil de la publicación. Los

puntos rojos indican cuando los artículos o investigadores son directamente nombrados en la publicación, dando origen a conexiones actuales y potenciales futuras.

Medicine & Life Sciences

Publicaciones Relacionadas

1. 2012 Gerardo N. Escalona-Cardoso; Norma Paniagua-Castro; Ricardo Pérez-Pastén; Germán Chamorro-Cevallos [Spirulina \(Arthrospira\) protects against valproic acid-induced neural tube defects in mice](#)

Journal of Medicinal Food. 2012;15(12):1103-1108.

2. 2008 Norma Paniagua-Castro; Gerardo Escalona-Cardoso; Eduardo Madrigal-Bujaidar; Elizdath Martínez-Galero; Germán Chamorro-Cevallos [Protection against cadmium-induced teratogenicity in vitro by glycine](#)

Toxicology in Vitro. 2008;22(1):75-79.

3. 2007 Norma Paniagua-Castro; Gerardo Escalona-Cardoso; Germán Chamorro-Cevallos [Glycine reduces cadmium-induced teratogenic damage in mice](#)

Reproductive Toxicology. 2007;23(1):92-97.

Tópicos Relacionados

● Appears in this Document

● [Teratogens](#)

[Abnormalities, Drug-Induced](#)

● [Neural Tube Defects](#)

● [Spirulina](#)

● [Lipid Peroxidation](#)

● [Antioxidants](#)

● [Oxidative Stress](#)

[Glutathione Peroxidase](#)

● [Food Technology](#)

[Superoxide Dismutase](#)

[Catalase](#)

● [Mice, Inbred ICR](#)

[Valproic Acid](#)

[Free Radicals](#)

[Cadmium Chloride](#)

● [Fetus](#)

[Embryo, Mammalian](#)

● [Cadmium](#)



 [Embryonic Structures](#)



 [Glycine](#)



Expertos Relacionados



 Author of this Document


Expertos Internos


  [GERMAN ALBERTO CHAMORRO-CEVALLOS](#)

  [GERARDO NORBERTO ESCALONA-CARDOSO](#)

  [NORMA PANIAGUA-CASTRO](#)

  [RICARDO PEREZ PASTEN-BORJA](#)

 [EDUARDO MADRIGAL-BUJAI DAR](#)

 [ELIZDATH MARTINEZ-GALERO](#)

Publicaciones


94 

5 

7 

9 

86 

13 

This is a preview of SCOPUS.

[Click here](#) to learn more about accessing SCOPUS with our Integration Services. Visit also our [SCOPUS Info Site](#)

1 of 1

[Download](#) [Export](#) [Print](#) [E-mail](#) [Create bibliography](#) [Add to My List](#)

Journal of Medicinal Food

Volume 14, Issue 4, 1 April 2011, Pages 398-404

Spirulina (Arthrospira) protects against cadmium-induced teratogenic damage in mice

Paniagua-Castro, N.a, Escalona-Cardoso, G.a, Hernández-Navarro, D.b, Pérez-Pastén, R.c, Chamorro-Cevallos, G.c

a Department of Physiology, National School of Biological Sciences, National Polytechnical Institute, Mexico City, Federal District, Mexico

b Laboratory of Pharmacy, Faculty of Chemistry, Autonomous University of the State of Mexico, Toluca, State of Mexico, Mexico

c Department of Pharmacy, National School of Biological Sciences, National Polytechnical Institute, Ave. Wilfrido Massieu s/n, C.P. 07738 Mexico City, D.F., Mexico

[View references](#)

Abstract

The role of Spirulina (Arthrospira) in preventing cadmium (Cd) teratogenicity in ICR mice was studied. Cd was administered intraperitoneally to female mice at 1.5mg/kg on gestation day (GD)-7, and Spirulina was given by peroral (intra-gastric) administration at 62.5, 125, 250, or 500mg/kg from GD-0 through GD-17 (the day when animals were sacrificed). Because among the mechanisms suggested to account for reproductive damage are oxidative stress and lipoperoxidation, embryonic hydroperoxides were also determined. Treatment with Spirulina at the three highest doses significantly decreased the frequency of fetuses with exencephaly, micrognathia, and skeletal abnormalities induced by Cd. Furthermore, Spirulina treatment significantly and dose-dependently decreased lipid peroxidation, which was dramatically increased by administration of the metal. The results of the present study clearly point to the therapeutic potential of Spirulina in Cd-induced teratogenicity and probably through its antioxidant activity. © Copyright 2011, Mary Ann Liebert, Inc. and Korean Society of Food Science and Nutrition.

Author keywords

antioxidant activity; cadmium; mice; Spirulina; teratogenicity

Indexed keywords

EMTREE drug terms: cadmium chloride; hydroperoxide; Spirulina extract

EMTREE medical terms: animal experiment; animal model; animal tissue; antioxidant activity; article; controlled study; dose response; embryo; embryo development; exencephaly; female; gestation period; lipid peroxidation; male; micrognathia; mouse; nonhuman; oxidative stress; priority journal; reproduction; skeleton malformation; Spirulina; teratogenicity

MeSH: Animals; Antioxidants; Cadmium; Female; Lipid Peroxidation; Male; Mice; Mice, Inbred ICR; Oxidative Stress; Spirulina; Teratogens

Medline is the source for the MeSH terms of this document.

Species Index: Animalia; Arthrospira; Mus; Spirulina

Chemicals and CAS Registry Numbers: cadmium chloride, 10108-64-2; Antioxidants; Cadmium, 7440-43-9; Teratogens

Manufacturers: Drug manufacturer: alimentos esenciales para la humanidad, Mexico.

ISSN: 1096620X **CODEN:** JMFOF **Source Type:** Journal **Original language:** English

DOI: 10.1089/jmf.2010.0070 **PubMed ID:** 21254891 **Document Type:** Article

Chamorro-Cevallos, G.; Department of Pharmacy, National School of Biological Sciences, National Polytechnical Institute, Ave. Wilfrido Massieu s/n, C.P. 07738 Mexico City, D.F., Mexico;

© Copyright 2011 Elsevier B.V., All rights reserved. © MEDLINE® is the source for the MeSH terms of this document.

Cited by since 1996

This article has been cited 4 times in Scopus:

(Showing the 2 most recent)

Patel, S. , Goyal, A.

Current and prospective insights on food and pharmaceutical applications of spirulina

(2013) *Current Trends in Biotechnology and Pharmacy*

McCarty, M.F.

Zinc and multi-mineral supplementation should mitigate the pathogenic impact of cadmium exposure

(2012) *Medical Hypotheses*

[View details of all 4 citations](#)

[Inform me when this document is cited in Scopus:](#)

[Create alert](#) | [Create feed](#)

Related documents

Find more related documents in Scopus based on:

[Authors](#) | [Keywords](#)

About Scopus

[What is Scopus](#) [Content coverage](#)

Language

[日本語に切り替える](#)

Customer Service

[Contact and support](#) [Live Chat](#)

About

[Elsevier](#) [Terms and Conditions](#) [Privacy Policy](#)



[Unbound MEDLINE](#)

Spirulina (Arthrospira) protects against cadmium-induced teratogenic damage in mice.

Abstract

The role of Spirulina (Arthrospira) in preventing cadmium (Cd) teratogenicity in ICR mice was studied. Cd was administered intraperitoneally to female mice at 1.5 mg/kg on gestation day (GD)-7, and Spirulina was given by peroral (intra-gastric) administration at 62.5, 125, 250, or 500 mg/kg from GD-0 through GD-17 (the day when animals were sacrificed). Because among the mechanisms suggested to account for reproductive damage are oxidative stress and lipoperoxidation, embryonic hydroperoxides were also determined. Treatment with Spirulina at the three highest doses significantly decreased the frequency of fetuses with exencephaly, micrognathia, and skeletal abnormalities induced by Cd. Furthermore, Spirulina treatment significantly and dose-dependently decreased lipid peroxidation, which was dramatically increased by administration of the metal. The results of the present study clearly point to the therapeutic potential of Spirulina in Cd-induced teratogenicity and probably through its antioxidant activity.

Links

[Publisher Full Text](#)

Authors

[Paniagua-Castro N](#), [Escalona-Cardoso G](#), [Hernández-Navarro D](#), [Pérez-Pastén R](#), [Chamorro-Cevallos G](#)

Institution

Department of Physiology, National School of Biological Sciences, National Polytechnical Institute, Mexico City, Federal District, Mexico.

Source

[Journal of medicinal food](#) 14:4 2011 Apr pg 398-404

MeSH

[Animals](#)
[Antioxidants](#)
[Cadmium](#)
[Female](#)
[Lipid Peroxidation](#)
[Male](#)
[Mice](#)
[Mice, Inbred ICR](#)
[Oxidative Stress](#)
[Spirulina](#)
[Teratogens](#)

Pub Type(s)

Journal Article

Research Support, Non-U.S. Gov't

Language

eng

PubMed ID

21254891

LINKS

[Publisher Full Text](#)

AUTHORS

[Paniagua-Castro N](#)

[Escalona-Cardoso G](#)

[Hernández-Navarro D](#)

[Pérez-Pastén R](#)

[Chamorro-Cevallos G](#)

MESH

[Animals](#)

[Antioxidants](#)

[Cadmium](#)

[Female](#)

[Lipid Peroxidation](#)

[Male](#)

[Mice](#)

[Mice, Inbred ICR](#)

[Oxidative Stress](#)

[Spirulina](#)

[Teratogens](#)



Related Citations

[Spirulina \(arthrospira\) protects against valproic acid-induced neural tube defects in mice.](#)

[Glycine reduces cadmium-induced teratogenic damage in mice.](#)

[Protective effect of grapefruit juice on the teratogenic and genotoxic damage induced by cadmium in mice.](#)

[Protection against cadmium-induced teratogenicity in vitro by glycine.](#)

[Endomorphin 1 effectively protects cadmium chloride-induced hepatic damage in mice.](#)

[Caffeine decreases the occurrence of cadmium-induced forelimb ectrodactyly in C57BL/6J mice.](#)

[Ascorbic acid protects against lipopolysaccharide-induced intra-uterine fetal death and intra-uterine growth retardation in mice.](#)

[Royal jelly \(honey bee\) is a potential antioxidant against cadmium-induced genotoxicity and oxidative stress in albino mice.](#)

[More](#)



Liebert Open Access Options and Benefits



[Home](#) [Publications](#) [Resources](#) [Librarians](#) [Press](#) [Advertise](#)



MY LIEBERT

Hello. [Sign in](#) to personalize your visit. New user? [Register now](#).

[All Issues](#) [In This Issue](#) [Previous Article](#) [Next Article](#)

Journal of Medicinal Food

[About This Journal...](#) [Subscribe...](#) [Buy Article...](#)

Spirulina (Arthrospira) Protects Against Cadmium-Induced Teratogenic Damage in Mice

To cite this article:

Norma Paniagua-Castro, Gerardo Escalona-Cardoso, Dolores Hernández-Navarro, Ricardo Pérez-Pastén, and Germán Chamorro-Cevallos. *Journal of Medicinal Food*. April 2011, 14(4): 398-404. doi:10.1089/jmf.2010.0070.

Published in Volume: 14 Issue 4: March 28, 2011

Online Ahead of Print: January 23, 2011

[Full Text HTML](#) [Full Text PDF](#) (157.8 KB) [Full Text PDF with Links](#) (157.4 KB)

Author information

Norma Paniagua-Castro,¹ Gerardo Escalona-Cardoso,¹ Dolores Hernández-Navarro,² Ricardo Pérez-Pastén,³ and Germán Chamorro-Cevallos³

¹Department of Physiology, National School of Biological Sciences, National Polytechnical Institute, Mexico City, Federal District, Mexico

²Laboratory of Pharmacy, Faculty of Chemistry, Autonomous University of the State of Mexico, Toluca, State of Mexico, Mexico

³Department of Pharmacy, National School of Biological Sciences, National Polytechnical Institute, Mexico City, Federal District, Mexico

Address correspondence to: Germán Chamorro-Cevallos, Department of Pharmacy, National School of Biological Sciences, National Polytechnical Institute, Ave. Wilfrido Massieu s/n, Esq. Manuel L. Stampa, Col. Unidad Profesional Adolfo López Mateos, Del. Gustavo A. Madero, C.P. 07738 Mexico City, D.F., Mexico, E-mail: gchamcev@yahoo.com.mx

Manuscript received 30 March 2010

Revision accepted 6 July 2010

ABSTRACT

The role of *Spirulina (Arthrospira)* in preventing cadmium (Cd) teratogenicity in ICR mice was studied. Cd was administered intraperitoneally to female mice at 1.5 mg/kg on gestation day (GD)-7, and *Spirulina* was given by peroral (intra-gastric) administration at 62.5, 125, 250, or 500 mg/kg from GD-0 through GD-17 (the day when animals were sacrificed). Because among the mechanisms suggested to account for reproductive damage are oxidative stress and lipoperoxidation, embryonic hydroperoxides were also determined. Treatment with *Spirulina* at the three highest doses significantly decreased the frequency of fetuses with exencephaly, micrognathia, and skeletal abnormalities induced by Cd.

Furthermore, *Spirulina* treatment significantly and dose-dependently decreased lipid peroxidation, which was dramatically increased by administration of the metal. The results of the present study clearly point to the therapeutic potential of *Spirulina* in Cd-induced teratogenicity and probably through its antioxidant activity.

This paper was cited by:

***Spirulina* (Arthrospira): An Important Source of Nutritional and Medicinal Compounds**

Abdulmumin A. Nuhu

Journal of Marine Biology. Jan 2013, Vol. 2013: 1-8

[CrossRef](#)

***Spirulina* (Arthrospira) Protects Against Valproic Acid–Induced Neural Tube Defects in Mice**

Gerardo N. Escalona-Cardoso, Norma Paniagua-Castro, Ricardo Pérez-Pastén, Germán Chamorro-Cevallos

Journal of Medicinal Food. Dec 2012, Vol. 15, No. 12: 1103-1108

[Abstract](#) | [Full Text PDF](#) or [HTML](#) | [Reprints](#) | [Permissions](#)

Zinc and multi-mineral supplementation should mitigate the pathogenic impact of cadmium exposure

Mark F. McCarty

Medical Hypotheses. Nov 2012, Vol. 79, No. 5: 642-648

[CrossRef](#)

Eya1 and Eya2 gene expression is down-regulated during somitic myogenesis in the cadmium-induced omphalocele chick model

Takashi Doi, Prem Puri, John Bannigan, Jennifer Thompson

Journal of Pediatric Surgery. Jun 2012, Vol. 47, No. 6: 1123-1127

[CrossRef](#)

Presenilin genes are downregulated during somitogenesis in the cadmium-induced omphalocele chick model

Takashi Doi, Naho Fujiwara, Prem Puri, John Bannigan, Jennifer Thompson

Pediatric Surgery International. Oct 2011

[CrossRef](#)

[About This Journal...](#) | [Subscribe...](#) | [Buy Article...](#)

Users who read this article also read

***Arthrospira* Protects Against Valproic Acid–Induced Neural Tube Defects in Mice**

Gerardo N. Escalona-Cardoso, Norma Paniagua-Castro, Ricardo Pérez-Pastén, Germán Chamorro-Cevallos

Journal of Medicinal Food. December 2012: 1103-1108.

[Abstract](#) | [Full Text PDF](#) or [HTML](#) | [Reprints](#) | [Permissions](#)

***Spirulina* Improves Antioxidant Status by Reducing Oxidative Stress in Rabbits Fed a High-Cholesterol Diet**

Mi Yeon Kim, Sun Hee Cheong, Jeung Hee Lee, Min Ji Kim, Dai-Eun Sok, Mee Ree Kim

Journal of Medicinal Food. April 2010: 420-426.

[Abstract](#) | [Full Text PDF](#) or [HTML](#) | [Reprints](#) | [Permissions](#)

***Spirulina maxima* on Postprandial Lipemia in Young Runners: A Preliminary Report**

Patricia Victoria Torres-Durán, Aldo Ferreira-Hermosillo, Arnulfo Ramos-Jiménez, Rosa Patricia Hernández-

Torres, Marco Antonio Juárez-Oropeza

Journal of Medicinal Food. August 2012: 753-757.

[Abstract](#) | [Full Text PDF](#) or [HTML](#) | [Reprints](#) | [Permissions](#)

***Spirulina* on Vascular Reactivity**

M.A. Juárez-Oropeza, D. Mascher, P.V. Torres-Durán, J.M. Farias, M.C. Paredes-Carbajal

Journal of Medicinal Food. February 2009: 15-20.

[Abstract](#) | [Full Text PDF](#) | [Reprints](#) | [Permissions](#)

***Spirulina* as a Source of Phycocyanobilin**

Mark F. McCarty

Journal of Medicinal Food. December 2007: 566-570.

[Abstract](#) | [Full Text PDF](#) | [Reprints](#) | [Permissions](#)

***Spirulina* in the Control of Glycemia and Lipidemia in Type 2 Diabetes Mellitus**

Panam Parikh, Uliyar Mani, Uma Iyer

Journal of Medicinal Food. December 2001: 193-199.

[Abstract](#) | [Full Text PDF](#) | [Reprints](#) | [Permissions](#)



Publication Tools

[Help with PDFs](#)

[Add to my favorites](#)

[Email to a colleague](#)

[Reprints](#)

[Permissions](#)

[Sign up for TOC alerts](#)

 [Citation Alert](#) 

[Recommend this title to your librarian](#)

[Most read articles](#)

[Most recently read articles](#)

[Most cited articles](#)

[Most recently cited articles](#)

[PubMed citation](#)

Related articles in [Liebert Online](#), [PubMed](#)

Mary Ann Liebert, Inc. publishers

RESOURCES/TOOLS

[Advertise Custom Collections](#) [Download Publication List For Librarians](#) [Licensing – Institutional](#) [Licensing – Personal](#)

[Liebert Author Advocacy Program](#) [Liebert Open Access Benefits](#) [Mobile Applications](#) [My Liebert \(Sign-in/up\)](#) [NIH/HHMI Wellcome Trust Policies](#)

[Recommend a Title](#) [Screen Savers](#) [Self-Archiving Policy](#)

SUBSCRIPTIONS

[Change of Address](#) [Collections](#) [Custom Collections](#) [Customer Support](#) [Licensing – Institutional](#) [Licensing – Personal](#) [Recommend a Title](#)

NEWS & EVENTS

[Company News](#) [Events](#) [Press](#)

ONLINE ACCESS

[Additional Features](#) [Full Text Papers](#) [Getting Started](#) [Institutional Admin](#) [Searching](#) [User Accounts](#)

COMPANY

[About Us](#) [Conferences](#) [Contact](#) [Directions](#) [Institute for Professional Education](#) [Privacy Policy](#)



Liebert Open Access Options and Benefits



You have requested the following:



Spirulina (Arthrospira) Protects Against Cadmium-Induced Teratogenic Damage in Mice

Norma Paniagua-Castro, Gerardo Escalona-Cardoso, Dolores Hernández-Navarro, Ricardo Pérez-Pastén, and Germán Chamorro-Cevallos

Journal of Medicinal Food. April 2011, Vol. 14, No. 4: 398-404

INSTANT ACCESS OPTIONS

- PAY PER VIEW** Journal of Medicinal Food - 14(4):398-404; *Spirulina (Arthrospira) Protects Against Cadmium-Induced Teratogenic Damage in Mice* (access for 24 hours for US \$51.00)
- PAY PER VIEW** Journal of Medicinal Food (unlimited access for US \$1,137.00)