(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
19 June 2008 (19.06.2008)

PCT

(10) International Publication Number
WO 2008/073979 A2

(51) International Patent Classification:
C12N 5/04 (2006.01)

(21) International Application Number:
PCT/US2007/087264

(22) International Filing Date:
12 December 2007 (12.12.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/874,424	12 December 2006 (12.12.2006)	US
11/981,340	31 October 2007 (31.10.2007)	US
11/981,431	31 October 2007 (31.10.2007)	US
Not furnished	31 October 2007 (31.10.2007)	US

(71) Applicant *(for all designated States except US)*: **NOMIR MEDICAL TECHNOLOGIES, INC.** [US/US]; 275 Grove Street, Suite 2-400, Newton, MA 02466 (US).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **BORNSTEIN, Eric** [US/US]; 232 Pond Road, Natick, MA 01760 (US).

(74) Agents: **KUSMER, Toby, H.** et al.; McDermott Will & Emery LLP, 28 State Street, Boston, MA 02109 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report*

WO 2008/073979 A2

(54) **Title:** NEAR-INFRARED ELECTROMAGNETIC MODIFICATION OF CELLULAR STEADY- STATE MEMBRANE POTENTIALS

(57) **Abstract:** Systems and methods are disclosed herein for applying near-infrared optical energies and dosimetries to alter the bioenergetic steady-state trans-membrane and mitochondrial potentials ($\Delta\Psi$-steady) of all irradiated cells through an optical depolarization effect. This depolarization causes a concomitant decrease in the absolute value of the trans-membrane potentials $\Delta\Psi$ of the irradiated mitochondrial and plasma membranes. Many cellular anabolic reactions and drug-resistance mechanisms can be rendered less functional and/or mitigated by a decrease in a membrane potential $\Delta\Psi$, the affiliated weakening of the proton motive force Δp, and the associated lowered phosphorylation potential ΔGp. Within the area of irradiation exposure, the decrease in membrane potentials $\Delta\Psi$ will occur in bacterial, fungal and mammalian cells in unison. This membrane depolarization provides the ability to potentiate antimicrobial, antifungal and/or antineoplastic drugs against only targeted undesirable cells.