PN ACT-951
121701

Production of Arachidonic Acid (AA) From the Alga *Parietochloris incisa*

CDR Grant No. TA-MOU-C20-013

Semi annual report for the period: April 1, 2002 to September 30, 2002

Submitted by: Prof. Zvi Cohen

Albert Katz Department of Drylands Biotechnologies, Jacob Blaustein Institute for Desert Research, Ben Gurion University of the Negev, Sde Boker campus, Israel 84990

1) Scientific summary:

We have hypothesized that among algae of alpine environment there could be strains particularly rich in long chain polyunsaturated fatty acids (LC-PUFA). Indeed, the Chlorophyte (trebuxiophyceae) *Parietochloris incisa* isolated from Mt. Oyama, Japan, was found to be the richest plant source of the pharmaceutically valuable LC-PUFA, arachidonic acid (AA, 20:4ω6). The alga is also extremely rich in triacylglycerols (TAG), which reaches 43% (of total fatty acids) in the logarithmic phase and up to 77% in the stationary phase. In contrast to most algae whose TAG are made of mainly saturated and monounsaturated fatty acids, TAG of *P. incisa* are the major lipid class where AA is deposited, reaching up to 47% in the stationary phase. Except for the presence of AA, the PUFA composition of the chloroplastic lipids resembled that of green algae, consisting predominantly of C_{16} and C_{18} PUFAs. The composition of the extrachloroplastic lipids is rare, including phosphatidylcholine (PC), phosphatidylethanolamine (PE) as well as diacylglyceryltrimethylhomoserine (DGTS). PC and PE are particularly rich in AA and are also the major depots of the presumed precursors of AA, 18:3ω6 and 20:3ω6, respectively.

Both the fatty acid content (% of dry weight) and the proportion of AA (of total fatty acids) were found to increase with cell concentration. Subsequently, the content of AA increased significantly with increasing the cell concentration. This phenomenon was predominantly attributed to accumulation of AA-rich TAG.

Physiological and biosynthetical studies are already ongoing and will be reported in the annual report.

2) Scientific issues:

The lack of experience of most of the staff in UNAM in areas related to the cultivation of microalgae and lipid analysis and biochemistry will be addressed by intensive training of one or

two staff members in the BIDR and short (about 2 weeks each) trainings in UNAM by some of the senior scientists from BIDR.

3) **Managarial issues:**

Unfortunately, although the contract was approved on 4/02, actual funding started much later. While BGU was able to cover the interim cost of funding, UNAM was unable to do so, subsequently the actual research in UNAM was delayed.

4) **Special concerns: None**

5) **Collaboration, Travel, Training and Publications:**

The co PI Dr. Fergus Molloy visited the facilities at the BIDR on 9/02. During his visit he was briefed on the various methodologies required to grow the algal biomass. Similarly, we have decided on mutual methodologies that will be used for lipid extraction and analysis.

In the next 6 months we plan to have a student from UNAM visit the BIDR for an extended period for training. One or more of the senior scientists from BIDR will visit the lab at UNAM.

Publications:

C. Bigogno, I. Khozin-Goldberg, S. Boussiba, A. Vonshak & **Z. Cohen** (2002) Lipid and fatty acid composition of the green alga *Parietochloris incisa*. *Phytochemistry* **60**, 497-503.