Tulane
Department of Biochemistry

INTERDEPARTMENTAL
CORRESPONDENCE

**NEWS RELEASE (NEW GRANT)**

Carl Bernofsky, Ph.D.

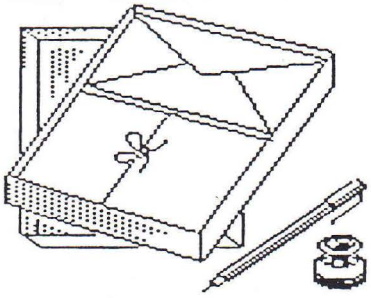
February 6, 1995

Dr. Carl Bernofsky has received a grant of $250,932 from the Air Force Office of Scientific Research to conduct a study entitled, "Radical Intermediates of Haloacetic Acids." The purpose of the study is to determine the mechanism by which a common environmental pollutant, 1,1,2-trichloroethylene, causes cancer. Trichloroethylene is a solvent that is widely used by the military and by industry to clean metal parts; the chemical also has applications in adhesives, paint stripping, dry cleaning, and the manufacture of pharmaceuticals and textiles. Hundreds of millions of pounds of trichloroethylene are produced each year. Because of its widespread use and often improper disposal, trichloroethylene has become a frequent environmental contaminant of ground and surface waters and is among the ten most cited chemicals at hazardous waste sites. Public exposure to trichloroethylene occurs by means of contaminated waters that ultimately find their way into water used for human consumption. Trichloroethylene produces hepatocellular carcinomas and lung tumors in the mouse and renal tubular adenomas and testicular tumors in the rat. However, a role for trichloroethylene in human cancer is not firmly established.

Past research has shown that trichloroethylene is metabolized in the liver to a variety of products that include chloral hydrate, dichloroacetic acid, trichloroacetic acid, and trichloroethanol. In particular, dichloroacetic acid and trichloroacetic acid ("haloacetic acids") are believed to be responsible for the carcinogenesis of trichloroethylene. Bernofsky hypothesizes that these haloacetic acids give rise to free radical intermediates that are genotoxic by virtue of their ability to form stable adducts with with DNA. Radicals derived from the haloacetic acids would also be capable of damaging proteins and initiating the process of lipid peroxidation.

Free radicals that are produced in living cells are reactive, short-lived chemical species that contain an unpaired electron. Ordinarily, they cannot be directly observed. Their presence is often inferred by examination of target structures that have been damaged. Alternatively, radicals can be trapped by reaction with certain nitrones or nitroso compounds called spin-trapping agents that can combine with the primary radical to yield a longer-lived radical derivative (spin adduct) that can be observed by electron paramagnetic resonance spectroscopy (EPR). In many instances, a radical can be identified by the characteristic EPR spectrum of its spin adduct. However, in living cells the detection of a free radical by spin trapping can be difficult if the spin adduct is itself metabolized to other products. Bernofsky has proposed new methods to deal with this situation.

This is the fifth major grant received by the Medical Center in support of Bernofsky's program in free radical research. Prior awards from the National Institutes of Health, National Science Foundation, and Air Force Office of Scientific Research supported studies of free radicals generated by interaction of hypochlorous acid with cellular components. That work lead to discovery of the adenosine free radical and yielded additional insights into the mechanism of neutrophil-mediated tissue damage, an important facet of inflammatory disease. In 1992, Bernofsky received an LEQSF grant from the State Board of Regents for the purchase of a $250,000 EPR spectrometer. This new instrument will greatly facilitate Bernofsky's free radical work and make collaborative studies in this field at the Medical Center more practical.



# OF NOTE

2/6/95

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WHO Carl Bernofsky, Ph.D. Phone# 584-2447
(INCLUDE PREFIX)

TITLE Research Professor
(INCLUDE DEGREE[S] IF ANY)

WHAT Received new 2-year grant from Air Force Office of Scientific Research; $250,932; Title: "Radical Intermediates of Haloacetic Acids"

WHEN

WHERE

OTHER See attached News Release

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