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Variance and Dissent

THE SURGEON GENERAL'S "EPIDEMIOLOGIC CRITERIA FOR CAUSALITY." A CRITIQUE

P. R. J. BURCH

Department of Medical Physics, University of Leeds, The General Infirmary, Leeds LS1 3EX, U.K.

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Abstract—The methodology of the 1982 Report of the Surgeon General is examined with special reference to smoking and lung cancer. Part II of the Report describes the five criteria for causality that have guided the judgment of committees since 1964. I show that not one of the criteria, plausibly interpreted, is satisfied by the epidemiologic evidence for lung cancer. A weakness underlying all the Reports is a prior failure to recognize all the logical possibilities inherent in an association between smoking and a disease. The five criteria and the subjective method of "judgment" are inappropriate to a scientific analysis; they should be replaced by the objective testing of hypotheses. Limitations in the evidence and in concepts about tobacco carcinogenesis preclude definitive conclusions. Nevertheless, the entire association between cigarette smoking and lung cancer—at least in male Caucasoid populations—is unlikely to be explained by causation.

"The search for causes is perhaps the essence of science. The history of medicine reveals the many different causes that have been propounded to explain disease."

Lester S. King, *Medical Thinking: A Historical Preface*, Princeton University Press, 1982

1. INTRODUCTION

IN A FOREWORD, the Assistant Secretary for Health claims that the 1982 Report of the Surgeon General on "The Health Consequences of Smoking [1] presents... a comprehensive evaluation of the relationship between cigarette smoking and cancer." He concludes (Foreword, page v): "Cigarette smoking is the major single cause of cancer mortality in the United States. Tobacco's contribution to all cancer deaths is estimated to be 30 per cent."

The first report [2] by the Surgeon General in the series on smoking and health appeared in 1964 and it was followed in 1965 by Brownlee's critical review in the *Journal of the American Statistical Association* [3]. Brownlee argued that the Surgeon General's Committee had not established the case for causality between smoking and lung cancer. Neither did he believe that the causal hypothesis had been falsified; he held that it was not possible, at that stage, to reach definitive conclusions because, amongst other things, the genetic hypothesis had not been disproved.

No reference is made to Brownlee's analysis in the 1982 Report and, so far as I am aware, no extensive review of the Surgeon General's Reports and their methodology has been published since 1965. This paper, in common with Brownlee's, seeks to examine the fundamental assumptions and methods underlying the Reports with particular reference to the interpretation of the association between smoking and lung cancer. Alternative methods are proposed.

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