FORENSIC ALCOHOL TEST EVIDENCE (FATE)

FORENSIC ALCOHOL TEST EVIDENCE (FATE)

A Handbook for Law Enforcement and Accident Investigation

By

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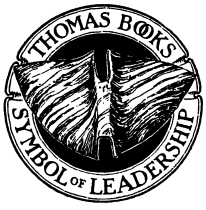

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FOREWORD

The legal world has needed a text such as this for a long time. Over-consumption of alcohol and the ensuing drunken behavior and its consequences have been around for centuries, if not millennia. Such over-consumption of alcohol exerts an enormous toll on individuals, families, marriages, society, and health. Even today, patients with physical and mental pain, discomfort, and frank diseases are seen by physicians, pharmacists, nurses, and social workers, who unknowingly are trying to overcome the physical and emotional consequences of drinking too much alcohol. Acute and long-term alcohol-using patients who are not well-handled by such health professionals often end up seeing lawyers and judges to sort out the social, physical, and legal consequences of drunken behavior leading to physical or mental impairment, traffic accidents, and criminal acts.

I have been a colleague of John Brick for almost 30 years, and in full disclosure, Dr. Brick and I have written several books together (and helped each other with others), except this one. Thus I know his writing well, I know his strengths and weaknesses, and therefore I am able to (and happy to) write this Foreword to his latest book. I promise to be as unbiased as I can.

I suggest that the reader begin reading this book by looking first at the chapter headings and subdivisions. If you do this, you will have difficulty finding a forensic topic regarding alcohol that isn't listed. In fact, it gets even better: I've noticed that the chapters and topics break down into four types of information, depending on what you are looking for: basic questions, classical topics, practical topics, and new topics. Let's see if I can make it simple for the reader and provide a quick overview of the panoply of information (the following list is illustrative, not meant to be exhaustive):

Basic questions

What is forensics?
What is alcohol?
What is forensic alcohol test evidence?
How do objective alcohol tests relate to intoxication?

How do neurons function?
Why do people combine drugs?
How much drinking will cause liver damage?
Who drinks?
What is a drink?
What is memory and how does it work?
Amnesia as a defense?

Classical topics

types of alcohol
alcohol tolerance
collection of samples
chronic alcohol use
alcohol-induced liver injury
breath and blood alcohol testing
functional neuroanatomy

Practical topics

types of research
years of life lost
misdiagnosis of intoxication
heavy drinking
alcohol intoxication and memory
translating [blood alcohol expression] into something understandable
alcohol proof and percentages
calculations of alcohol use and intoxication
standard field sobriety tests
alcohol and the law
the DWI and crash investigation, and arrest
alcohol-medication interactions

New topics

alcohol and energy drinks
severe alcohol use disorder
calculation of breath alcohol detection threshold
alcohol and age and abstinence
emergence of laws related to alcohol intoxication
alcohol in everyday activities – water sports, aircraft, bicycling, thermal injuries, homicide and suicide, etc.

odor of alcohol beverages on the breath
alcohol and narcotic pain relievers
dram shop liability laws
biomarkers of alcohol use
alcohol and medical problems

Writing a book with this thoroughness and detail takes a great deal of talent, knowledge, and real-world experience. The only "missing" alcohol and law topics I would like to see Dr. Brick write about concern a) the treatment of alcohol use disorders in the criminal justice system, b) the importance of drug courts, c) the use of disulfiram (Antabuse) in the treatment of multiple DWI offenders, and d) new medications for people with severe alcohol use disorders. However, knowing John Brick as I do, he is probably working on those chapters for the next edition of FATE (although one may argue that these topics are far-removed from alcohol test evidence).

It feels to me that the word FATE in the title of this book should have some practical meaning. Is it fate that Dr. Brick and I are colleagues who both have an interest in forensic alcohol testing? Is it fate that positioned Dr. Brick to apply his unique combination of clinical and laboratory experience to forensic alcohol matters? Is it fate that this book is being published at the same time that drunk driving around the world is still a major problem, and that this book will help solve many of those problems? Or is it fate that brought you (the reader) to buy (or borrow) this book to deal with a major problem involving alcohol in your life (either professionally or personally)? Whichever question resonates with you, this book will certainly lead you to answers for questions that you may have had over the years or are dealing with now, because of the immense information contained herein.

FATE is good for beginners in the alcohol forensic field as well as those with previous experience. I recommend that the former read the book like a novel, beginning with the first chapter and reading it straight through. This way you will get an overview – if not the full details – of all the topics. For the latter, this book will make an excellent resource text – providing reminders of those topics that you may have forgotten, or finding the answer to a question about something new for the first time. In either case, I'll bet that both beginners and experienced scholars will return to this book many times. Its real value is in the details!

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PREFACE

The motivation to write *Forensic Alcohol Test Evidence (FATE)* is an extension of my long-standing interest in learning and explaining how things work. As an undergraduate, my focus on the neurophysiology of the brain and behavior was a passion that grew, as did the opportunity to work with excellent mentors at Queens College of the City University of New York and at Rockefeller University, where I continued working after completing my undergraduate degree and before starting my graduate work in psychobiology at Binghamton University. My research at the Rutgers University Center of Alcohol Studies and the Rutgers Alcohol Behavior Research Lab allowed me to follow my scientific curiosity about the relationship between the brain, behavioral psychology, and alcohol. Coincidentally, this academic background in both laboratory research and clinical testing related to alcohol met the need of the legal community to have a resource to answer both analytical and biobehavioral questions about the role, if any, of alcohol in a crime or accident.

It is a privilege to apply my lifelong experience as an alcohol research scientist, teacher, and author on the biobehavioral effects of alcohol to matters of the law. Everyday medico-legal problems associated with the consequences of alcohol use disorders require answers, and it is for this reason, *FATE* was written. In *FATE*, many of the issues pertinent to a thorough forensic evaluation and trial testimony are discussed, but most importantly, my philosophy in forensic cases is to focus on consistent, unbiased, and comprehensive application of diverse scientific disciplines and research to questions of forensic interest. This philosophy requires evaluating behavioral, analytical, physiological, and pharmacological, and toxicological evidence in the puzzle; determining if the pieces go together; and reaching a conclusion to a reasonable degree of scientific certainty.

J.B.

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CONTENTS

FORENSIC ALCOHOL TEST EVIDENCE (FATE)

Chapter 1

WHAT IS FORENSIC ALCOHOL TEST EVIDENCE?

1.1 WHAT IS FORENSICS?

Forensics is the application of scientific knowledge and principles, from a number of disciplines, to a matter of law. Almost every field has a forensic application in criminal investigation and prosecution or civil litigation in which forensic examiners collect, analyze, or interpret evidence in order to render an opinion to assist in the interpretation of law or violations thereof.

Forensic alcohol test evidence focuses on the evaluation, interpretation and application of the effects of alcohol or an alcohol test result to some legal issue such as a crime, accident, or consequence of alcohol exposure. For example, was the person under the influence of alcohol, either as defined by a legal statute or as defined clinically? Was the methodology used to report intoxication reliable, and could the analytical results or behavioral observations be affected by some physiological condition? Was the cause of some event (e.g., an injury) due to intoxication or a mechanical failure (e.g., of a vehicle, structure, or machine)? The range of scientific disciplines that can be encompassed in this field of study is almost as large as the number of applications to which those fields of study can be applied. For example, forensic alcohol test evidence may include anatomy, biochemistry, biomechanics, chemistry, neuropharmacology, neurophysiology, physiology, psychology, and toxicology to answer questions about the role, if any, of alcohol in pedestrian, bicycle, boating, drowning or motor vehicle accident; fall-down injury; or overdose or in crimes ranging from first-degree murder to vehicular homicide to simple assault to medical consequences from chronic or acute high doses of alcohol that may cause organ damage or developmental changes.

1.2 WHY STUDY FORENSIC ASPECTS OF ALCOHOL INTOXICATION?

Alcohol more than any other drug continues to be overrepresented in a wide range of injuries from accidents and crimes. In recent years, cocaine, other drugs such as cannabinoids, antianxiety medications (e.g., benzodiazepines), pain medications (e.g., oxycodone and other opioids), and inhalants (e.g., chlorinated hydrocarbons, toluene, and fluorocarbons) have been detected with increasing frequency. However, the fact remains that more people drink alcohol than consume any other psychoactive drug, and more is known about the causal role of alcohol intoxication in crimes and accidental injuries.

Historically, the study of the effects of alcohol has its earliest roots in the study of intoxicating poisons. In the most basic sense, alcohol is a poison, although that definition is often lost on the general public. The term intoxication derived from the Greek *toxikon* and the Latin *toxikom* means poison. Hence, the derivation of the word intoxicate. Toxicology is the study of a wide range of poisons, including alcohols.

The poisonous effects of alcohol have been known at least since biblical times. The pernicious relationship between alcohol use in pregnancy and harm is expressed in The Book of Judges (13:7), which states "behold, thou shalt conceive and bear a son; and now drink no wine nor strong drink. . . ." It was not until the 1970s that the toxicological basis for this warning began to develop with the first reports of fetal alcohol syndrome (FAS). FAS (now also called fetal alcohol spectrum disorder FASD) results in anatomical (e.g., craniofacial dysmorphology, incomplete organ development) and psychological (e.g., developmental delay, impulse control, boundary and emotional attachment) problems. Alcohol abuse during pregnancy may result in criminal prosecution of the mother, who exposed her unborn child to a poison (child endangerment).

The physician-alchemist Paracelsus (1493–1541) is credited with some of the most basic concepts in toxicology and pharmacology that are directly relevant to the forensic psychopharmacology of alcohol and other drugs. Paracelsus believed that experimentation was essential in understanding the response to toxic agents (the "toxicon"). He further proposed that there is an important distinction between the therapeutic and the toxic effects of agents and that it is the dose of the toxic agents that often determines its helpful or harmful properties.

"All substances are poisons; there is none which is not a poison. The right dose differentiates a poison from a remedy." The views put forth by Paracelsus are believed to have set the foundation for the dose–response relation, which is the basis of most studies in pharmacology and toxicology and many other services (Pachter, 1961, as cited by Gallo, 1996).

In the late eighteenth and early nineteenth century, American Surgeon General Dr. Benjamin Rush put forth the somewhat radical view that alcohol intoxication, or "inebriety," was an illness (Jellinek, 1960). This view, and many other social and historical events eventually led to a U.S. constitutional amendment that prohibited the manufacture, sale, or use of alcohol. Prohibition of alcohol did not work and eventually was repealed, but there was an interesting consequence: it generated studies on the neurotoxic effects of a variety of toxic agents in bootleg liquor that were probably used by some advocates as further evidence to support prohibition. One such toxin was the organophosphate, triorthocresyl phosphate (TOCP).

In the nineteenth century, TOCP was an additive to Ginger Beer, a high-alcohol patent medicine that circumvented prohibition laws. When ingested through bootleg liquor, TOCP causes a neurological syndrome commonly referred to as a "ginger-jake," a spastic gait that was also caused by drinking TOCP adulterated ginger beer. Today TOCP is a gasoline additive (Pachter, 1961).

Throughout history, people have been aware of the potential harmful effects of drugs like alcohol. It was not until the middle of the nineteenth century that scientific and public interest in alcohol really began to take off. In part, this interest was precipitated by two events: the development and widespread use of the motorized vehicles and the eventual development of quantitative methods of analysis for alcohol.

Certainly by the mid-1800s, concerns about safety and alcohol intoxication were already forcing changes in law and public policies. For example, the New York Central Railroad prohibited employees from drinking on the job as early as 1843. Apparently, the problem of intoxicated railroad employees was so great that in North America "Rule G" was adapted by the American Railway Association in 1899. Rule G prohibited drinking by railway crewmembers while on duty (cited by Borkenstein, 1984). By the turn of the last century, research using quantitative methods of analysis of alcohol and the effects of alcohol on the body was gaining momentum. It was not until the early 1900s, however, that there was enough data to correlate measured amounts of alcohol in the body with impaired behavior. E.M.P. Widmark, a Swedish physician, was probably the first person to develop a protocol to evaluate suspected drunk drivers. Some of Widmark's "diagnostic factors" are still used today by police and clinicians to assist in determining if someone is intoxicated and are discussed in Chapter 7.

In the United States, a U.S. Army physician, Dr. Herman Heise, was responsible for performing autopsies of soldiers who died in automobile crashes "after a night on the town." Heise observed that the majority of soldiers were "heavily loaded with alcohol" (as cited by Dubowski, 1985). After finishing his tour of duty in the Army, Heise returned to Uniontown, Pennsylvania,