



# Driving Under the Influence of Psychoactive Substances — A Historical Review

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**ABSTRACT:** Important events in the history of driving under the influence of alcohol (DUI) and/or other drugs (DUID) are reviewed covering a period of approximately 100 years. This coincides with major developments in the pharmaceutical industry and the exponential growth in motor transportation worldwide. DUID constitutes an interaction between the driver, the motor-driven vehicle, and one or more psychoactive (mind-altering) substances. In this connection, it is important to differentiate between drugs intended and used for medical purposes (prescription or licit drugs) and recreational drugs of abuse (illicit drugs). All chemicals with a mechanism of action in the central nervous system (brain and spinal cord) are potentially dangerous to use when skilled tasks, such as driving, are performed.

The evidence necessary to charge a person with drug-impaired driving has evolved over many years and initially rested on a driver's own admissions and observations made about the driving by police officers or eyewitnesses. Somewhat later, all suspects were examined by a physician, whose task was to ask questions about any recent ingestion of alcohol and/or other drugs and to administer various clinical tests of impairment. By the 1940s–1950s, the driver was asked to provide samples of blood, breath, or urine for toxicological analysis, although the test results served only to verify the type of drug causing impairment of the driver. The current trend in DUID legislation is toward zero-tolerance or concentration per se statutes, which are much more pragmatic, because behavioral evidence of impairment is no longer a lynchpin in the prosecution case. This legal framework puts considerable emphasis on the results of toxicological analysis; therefore, the methods used must be accurate, precise, and fit for forensic purposes.

Many traffic delinquents charged with DUI or DUID suffer from a substance use and/or personality disorder, with high recidivism rates. In addition to conventional penalties and sanctions for drug-related traffic crimes, many offenders would probably benefit from a medical intervention, such as counseling, rehabilitation, and treatment for substance use disorder, which often coexists with a mental health problem.

**KEYWORDS:** Alcohol, concentration per se limits, driving, drug impairment, drugs, forensic toxicology, history, law enforcement, psychoactive substances.

## INTRODUCTION

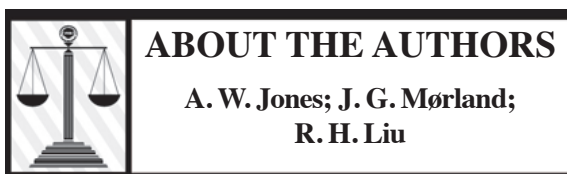
Compared with drunken driving, which is as old as motor-driven transportation, driving under the influence of psychoactive substances other than alcohol is a relatively new problem for road-traffic safety. According to a 2018 report from the World Health Organization (WHO), approximately 1.3–1.4 million people die each year as a result of road-traffic accidents [245]. Among these fatalities many drivers are impaired by excessive drinking or taking other psychoactive substances before driving, thereby increasing the risk of involvement in a traffic crash. Drug-impaired driving represents a global problem for public health and longevity and more effective ways of dealing with traffic delinquents and high-risk offenders should be made a top priority for government action.

### *Early Development*

When the first “motor-wagons” appeared on the roads, driving under the influence of alcohol was not considered a criminal offense. The UK Licensing Act of 1872 had made it an offense to be “*drunk while in charge on any highway or other public place of any carriage, horse, cattle or steam engine*” [225]. It was not until the UK Criminal Justice Act of 1925 that this requirement was extended to cover “*any mechanically propelled vehicle*”. In 1930 it became illegal to drive, attempt to drive, or be in charge of a vehicle on a road or other public place while “*under the influence of drink or drugs to such an extent as to be incapable of having proper control of the vehicle*” [227].

The proof necessary to convict a person for drunken driving was elusive, because of the difficulty in convincing a judge or jury that a person was drunk to the extent of not being able to drive safely. The crux of the problem was

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**Alan Wayne Jones** received both a B.Sc. in chemistry (1969) and a Ph.D. (1974) from the University of Wales (Cardiff, UK). Dr. Jones retired in 2013 from his appointment as a senior scientist at Sweden’s National Laboratory of Forensic Medicine, Division of Forensic Genetics and Forensic Toxicology (Linköping, Sweden). He is currently a guest professor in forensic toxicology at the Department of Clinical Pharmacology, University of Linköping, Sweden.

Prof. Jones’s doctoral thesis was entitled “Equilibrium Partition Studies of Alcohol in Biological Fluids” and dealt with analytical and physiological aspects of ethanol analysis in blood and breath for research and forensic purposes. Since 1973 Dr. Jones has been active in research on the pharmacology and toxicology of ethanol and other drugs of abuse. He is particularly interested in quantitative analysis of psychoactive substances in biological specimens, as well as the disposition and fate of drugs in the body and their impairment effects on performance and behavior. In 1993 Dr. Jones was awarded a senior doctorate degree (D.Sc.) by the University of Wales for his body of published work entitled “Methods of Analysis, Distribution and Metabolism in the Body and Biological Effects of Alcohol and Narcotics”.

Dr. Jones has written hundreds of expert statements in matters involving drunk and drugged driving and he has appeared as an expert witness in several countries when alcohol- and/or drug-related crimes were litigated. The results of Dr. Jones’s research appear in over 400 scientific articles, reviews, and book chapters, most of which were published in peer-reviewed journals. His publications are widely cited in scientific articles, and also in court cases involving driving under the influence of alcohol and/or other drugs.

In recognition of his career-long contributions to the field of forensic alcohol research and toxicology, Dr. Jones has received numerous awards including the Widmark Award from the International Council on Alcohol, Drugs and Traffic Safety (ICADTS) in 1997.

**Jørg G. Mørland** received an M.D. degree from the University of Oslo in 1967 and a Ph.D. degree in pharmacology from the same university in 1975. Dr. Mørland is now a senior scientist at the Division of Health Data and Digitalization of the Norwegian Institute of Public Health and a professor emeritus at the University of Oslo.

Throughout his professional career, Dr. Mørland has served as professor of pharmacology at the University of Oslo and the University of Tromsø (Tromsø, Norway), director of the former Norwegian National Institute of Forensic Toxicology, and director of the Division of Forensic Medicine and Drug Abuse Research of the Norwegian Institute of Public Health (Oslo, Norway) until 2012.

Dr. Mørland is a medical specialist in clinical pharmacology. His main research field is biomedical effects of alcohol and drugs of abuse, their metabolites and metabolism. He has been and is the principal supervisor for approximately 30 Ph.D. students, as well as being the scientific project manager for several projects supported by the Research Council of Norway.

Dr. Mørland has published more than 400 articles in peer-reviewed journals on pharmacology, toxicology, forensic sciences, neuroscience, alcoholism, epidemiology, drug analysis, and road traffic safety. He has also written more than 8,000 expert-witness statements for the police and courts in Norway, and has had several hundred court appearances as an expert witness in courts at all levels in Norway as well as in some courts in Sweden.

Dr. Mørland was the recipient of a Widmark Award from the International Council on Alcohol, Drugs and Traffic Safety (ICADTS) in 2004.

**Ray H. Liu** began his career with a degree in law from the Central Police Academy (now Central Police University) in Taiwan before receiving a Ph.D. (1976) in chemistry from Southern Illinois University (Carbondale, IL). Before his doctoral thesis, Dr. Liu studied forensic science under the guidance of Professor Robert F. Borkenstein at Indiana University (Bloomington, IN) and received internship training at the Centre of Forensic Sciences in Toronto, Canada, headed by Dr. Doug Lucas.

Dr. Liu has held positions at the University of Illinois at Chicago (Chicago, IL), the US Environmental Protection Agency's Central Regional Laboratory (Chicago, IL), and the US Department of Agriculture's Eastern Regional Research Center (Philadelphia, PA) and Southern Regional Research Center (New Orleans, LA). He was a faculty member at the University of Alabama at Birmingham (UAB) for 20 years (serving as the director of the University's graduate program in forensic science for the last 10 years), before his retirement in 2004; he was granted the "professor emeritus" status in 2005. Following his retirement from UAB, Dr. Liu taught at Fooyin University (Kaohsiung, Taiwan) for eight years (2004–2012).

Dr. Liu's scientific works have been mainly in the field of analytical and toxicological chemistry of drugs of abuse (criminalistics and forensic toxicology), with a significant number of publications in each of the following areas: Enantiomeric analysis, quantitative determination using isotopic analogs as internal standards, correlation of immunoassay and GC-MS test results (and other workplace drug testing related topics), seized drug profiling, and analytical method development. He has authored/edited (or coauthored/coedited) approximately 150 journal articles, book chapters, and five books.

Dr. Liu has long served as editor-in-chief of *Forensic Science Review*, and is a member of the editorial boards for several international journals.