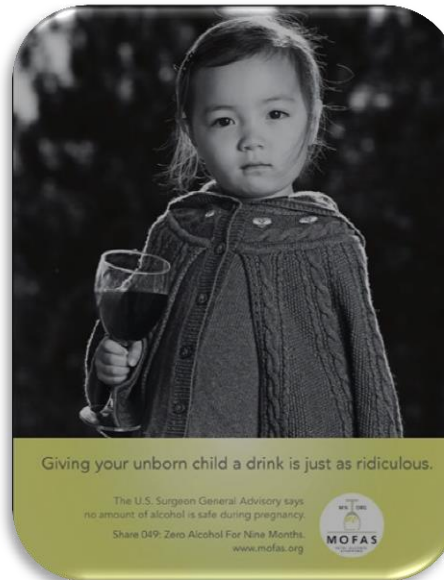




An Historically Hidden Health Problem: Alcohol and Pregnancy

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National Institute
on Alcohol Abuse
and Alcoholism

Overview

For most of the 20th Century, alcohol was considered to be safe to drink at anytime and any level during pregnancy

We now know that this view was wrong.

By the mid-1970s a birth defects disorder attributable to prenatal alcohol had been recognized in both France and the U.S., and our perspective on the safety of alcohol in pregnancy began to change.

This Birth Defect was named Fetal Alcohol Syndrome

- A specific pattern of facial features
- Growth deficiency
- And the presence of brain or neurobehavioral deficits – subsequently noted to fit a characteristic pattern

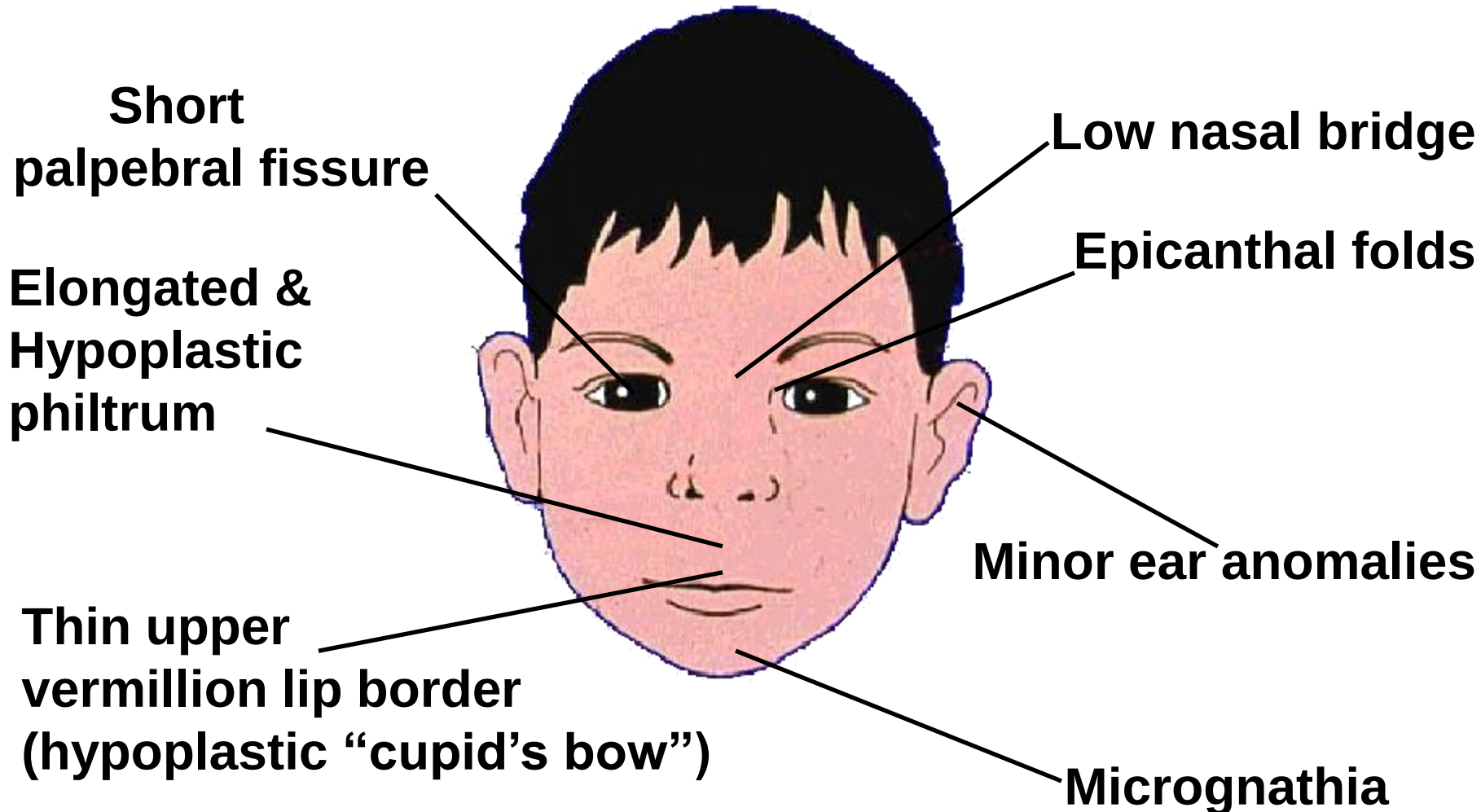


Photo courtesy of Teresa Kellerman

Face of Fetal Alcohol Syndrome

Cardinal Features

Associated Features



OTHER PHYSICAL FEATURES OF FAS FEATURES



Renal

Cardiac



Skeleton

**Eyes/
Ears**



.....and other minor abnormalities

CNS Deficits in FAS

Physical and Neurophysiological:

Sm Head Circumference < 10th
Hearing/Visual abnormalities

Structural Abnormalities
Fine and Gross Motor
Deficits

Cognitive:

Global Intellectual Impairment
Executive Functioning Deficits
(Planning; Abstract reasoning)
Poor Visual Spatial Abilities

Learning Problems
Math Deficits > Language
Memory Deficits

Impaired Behavioral Regulation:

Impulse Control Problems
Mood or Behavioral Regulation

Attention Problems
Perserveration

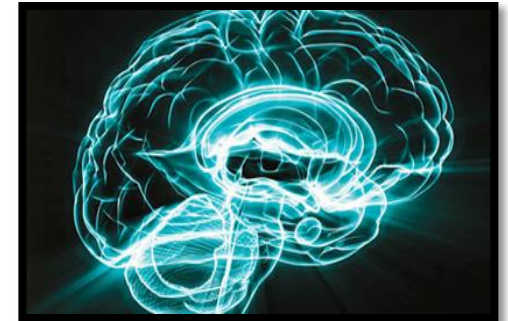
Deficits in Adaptive Functioning:

Communication Issues
Problems with Daily Living

Poor Social Skills
Motor Challenges

Fetal Alcohol Spectrum Disorder

- It did not take long before researchers began to notice that there were children with a history of prenatal alcohol exposure who showed the neuro-behavioral deficits without having the facial features of FAS.
- Several terms were proposed over the next years to refer to these individuals, such as, **Partial FAS (pFAS)** and **Alcohol Related Neurobehavioral Disorder (ARND)**.
- By the early 2000s, the term **Fetal Alcohol Spectrum Disorders (FASD)** to cover the full range of deficits arising from prenatal alcohol exposure.



Epidemiology: Current Evidence on the Prevalence of FAS and pFAS) in Select Locations (Countries)

Location (Reference Year)	FAS* (FAS+pFAS) Rate per 1000
United States: Mid-Western Medium Size City (May et al. 2009)	6 – 11 (14 – 25)
Italy; Lazio Region (May et al. 2007)	4 – 9 (27 – 55)
South Africa: Western Cape (2007)	51 – 67 (68 – 90)
South Africa: Northern Cape (Urban et al. 2008)	67 (75 – 119)

All obtained from In School Active Case Ascertainment

***IOM 1996 prevalence estimated in U.S. for FAS at 0.5 – 2 /1000**

Misconception on Alcohol Safety in Pregnancy



National Institute
on Alcohol Abuse
and Alcoholism

Given its high prevalence, why were we so unaware of the risk of alcohol in pregnancy for so long in the 20th Century?

There appears to be two primary reasons:

1. Rejection of earlier perspectives on alcohol and pregnancy as a reaction to world-wide prohibition movements in the early part of the Century;
2. Lack of medical familiarity with the pattern of deficits that would become known as fetal alcohol syndrome so that:
 - The deficits would go undiagnosed,
 - Or, not attributed to the causal agent, alcohol.



Some Early Appeals on Alcohol and Pregnancy

- But there were early historical indications that societies were aware of the dangers of alcohol in pregnancy.
- One of the earliest occurred almost 300 years ago in 1725 as a partition from the London College of Physicians to the House of Commons during the London Gin Epidemic. It stated...



19 January 1725

Petition From the London College of Physicians
To the Honorable House of Commons



*We... do think it our Duty most humbly to
represent that **we have with concern observed,**
for some years past, the fatal effects of the
frequent use of several sorts of distilled
Spirituuous Liquors... **and too often the**
cause of weak, feeble, distempered children,
who must be instead of an advantage and
strength, a charge to their Country.*

Sullivan 1899



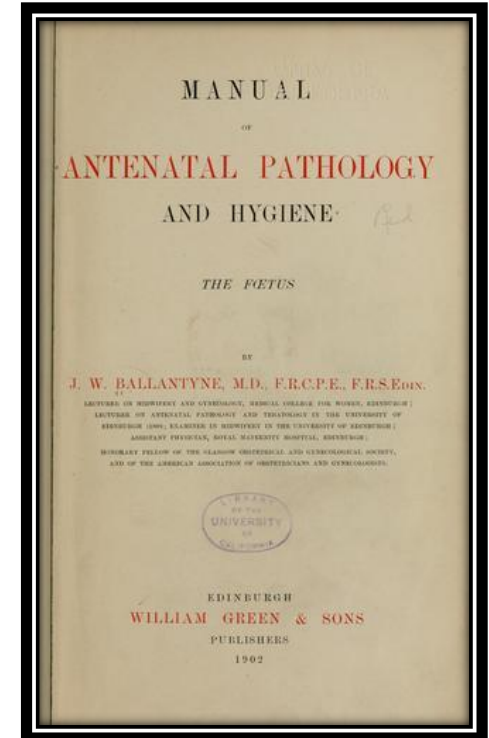
- First true epidemiological study.
- Liverpool Jail
 - 600 children of 120 alcoholic women
 - 28 non-drinking relative controls
- Infant mortality 2-1/2 times higher
- Healthy children with forced abstinence in prison



* *Image: the convict nursery at Brixton*

1904 Ballantyne

- J.W. Ballantyne, in the 1904 *Manual of Antenatal Pathology and Hygiene*, divided pregnancy into the germinal, embryonic and fetal stages.
- He noted that alcohol can act in all three phases causing:
 - structural abnormalities in the first phases,
 - And, abortion, and premature labor in the latter two.



Temperance Organizations

- During the Temperance period of the late 19th and early 20th century, Temperance organizations mounted extensive information campaigns citing research findings from early investigations on the adverse effects of alcohol, including those related to adverse fetal outcome, in their effort to legislate Alcohol Prohibition.
- Much literature including brochures and posters were published by these organizations conveying findings from early epidemiologic studies of alcohol on pregnancy

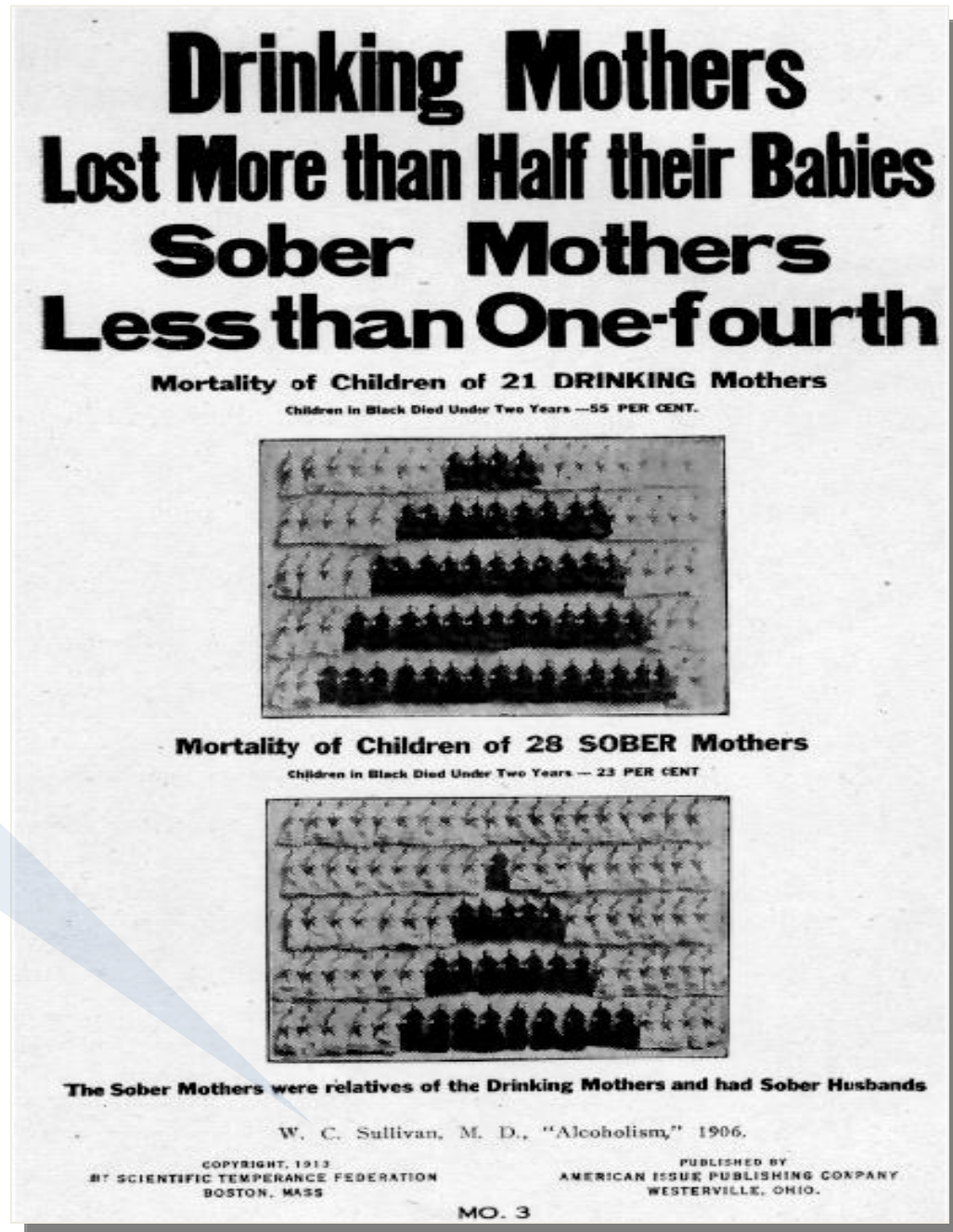


FOR EXAMPLE.....

W.C. Sullivan, M.D.
1906

“Alcoholism”

The poster presents findings from William Sullivan's Liverpool Jail study comparing offspring of Alcoholic Women to their non-Drinking Relatives, and improved infant Survival with forced abstinence due to incarceration



W.C. Sullivan, M.D.
1906

“Alcoholism”

Deaths of Babies Increased as Mothers Became More Alcoholized

Studies of 444 Children of 120 Alcoholic Mothers

First Born 80 Children

33.7% Died

Second Born 80 Children

50% Died

Third Born 80 Children

52.6% Died

Fourth and Fifth Born 111 Children

65.7% Died

Sixth to Tenth Born 93 Children

72% Died

*Of the Living Children 4.1% were Epileptic
Others were Mentally Defective*

W. C. Sullivan, M. D. "Alcoholism" 1906

BY ALBERT E. KENNEDY
BOSTON, MASS.

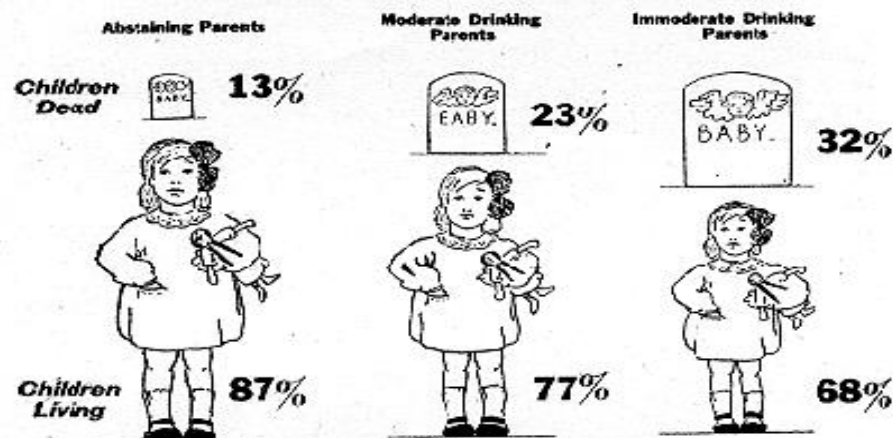
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NO. 4

Laitinen XII
International Congress
on Alcoholism, 1909

"Statistics of 19,519
children in 5,735
families"

Child Death Rate Higher IN Drinkers' Families



Abstaining parents had never drunk alcoholic liquors, or at least since marriage.
"Moderates" drank no more daily than corresponded to one glass of 4% beer.
"Immoderates" drank daily more than the above-named amount.

Excessive Death-Rate in Drinking Homes Cost 2,407 Children Their Lives

Statistics of 19,519 children in 5,735 families. Laitinen XII, International Congress on Alcoholism, 1909. Abstaining families lost 13 per cent of children by death. At the same rate drinking parents would have lost 2,156 children. They actually lost 4,543, an excess of 2,407.

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NO. 2

Austria,
1914

WHY AMERICA WENT DRY

Beer Doubled The Child Death-Rate

IN THE FIRST FIVE YEARS OF LIFE

All in the same village. Beer practically the only drink used by the parents and not always immoderately.



Children of Sober Parents
23% DIED

(18.6% in first year.)



**Children of
Beer Drinkers**
45% DIED

(36% in first year.)

**Alcohol whether in Beer or in Whisky
is an Enemy to Child Life.**

120 Sober Families with 650 Children.
18 Beer-Drinking Families with 125 Children.
All strictly comparable and free from hereditary disease.

Adolph Kieck: Alcohol and Child Mortality in Duggenborg, Austria.
Scientific Temperance Journal, Dec. 1914.

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THE AMERICAN ISSUE PUBLISHING CO.
WESTERVILLE, OHIO

**Study from Berne, Switzerland
Influence of Alcohol on the Child
1878-1879**

**Compared children of 10
Temperant and 10 Intemperant
Families**

Saint Vitus Dance) is a disease characterized by rapid, uncoordinated jerking movements affecting primarily the face, feet and hands. Sydenham's chorea (SC) results from childhood infection with Group A beta-hemolytic *Streptococci*.

ALCOHOLISM AND DEGENERACY

61 Children in 10 Very Temperate Families

5 Died in Infancy



2 Had St. Vitus Dance



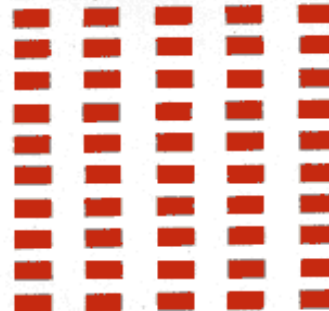
2 Were Backward, not Idiotic



2 were Deformed



50 were Normal



Temperate Parents Had Defective Children 18%
Normal Children 82%

57 Children in 10 Intemperate Families

25 Died in Infancy



1 Had St. Vitus Dance — Idiotic



5 Were Idiotic



5 Were Deformed



5 Were Dwarfed



5 Were Epileptic



10 Were Normal



Alcoholic Parents Had Defective Children 82.5%
Normal Children 17.5%

Figure: The Influence of Alcohol on the Child. Investigations in Berne, Switzerland, 1878-1889. Families lived in same section and were similarly situated except as regards intemperance.

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No. 9

University of
Helsingfors,
Finland

XII International
Congress on
Alcoholism 1909

Parents' Drinking Weakens Children's Vitality

Comparison of Children in 50 Abstaining and 59 Drinking Families
in One Village in Finland

WEAKLY CHILDREN

In Abstaining Families

13%

In Drinking Families

8.2%

CHILDREN WHO DIED

In Abstaining Families

18.5%

In Drinking Families

24.8%

DRINK MENACES VIGOR AND LIVES OF CHILDREN

Prof. Toiv. Laitinen, University of Helsingfors, Report XII. International
Congress vs. Alcoholism, 1909.

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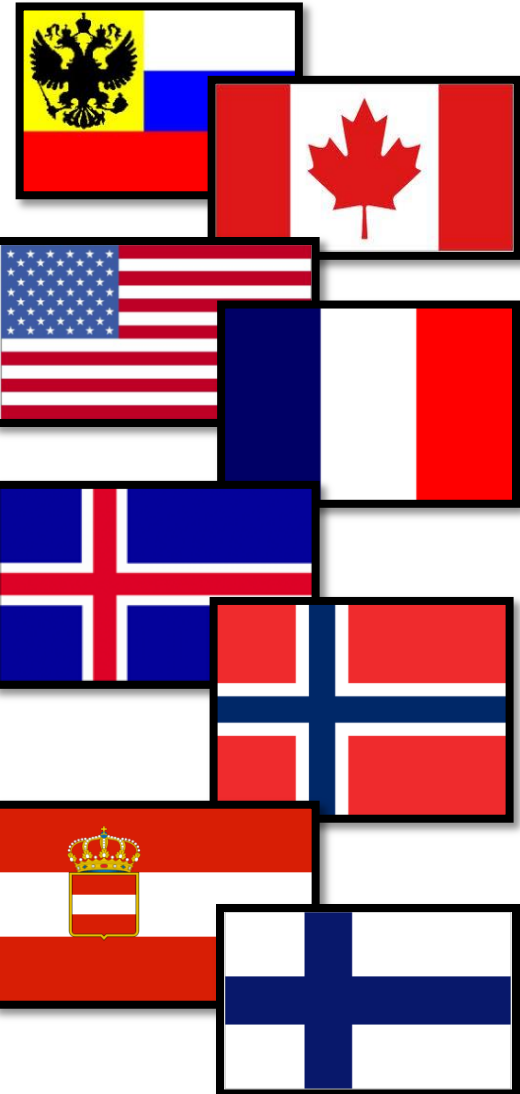
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NO. 1

Alcohol Prohibition

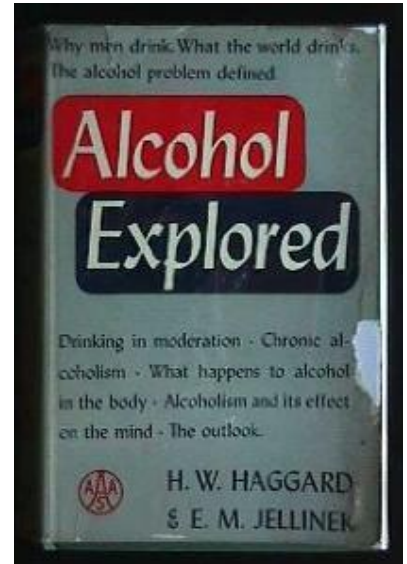
In many American and European Countries these efforts resulted in the establishment of Prohibition for a period of time:

- Russia (1914 – 1927)
- Canada (1917 – 1927)
- United States (1919 – 1933)
- France (1916)
- Iceland (1915-1922) – beer was still prohibited until 1989
- Norway (1916–1927)–fortified wine and beer also prohibited from 1917-1923
- Hungary (1919)
- Finland (1919-1932)



Alcohol and Pregnancy Attitude After Prohibition

- In the post-Prohibition period there was a scholarly rejection of any information that had been used earlier to argue for Prohibition:
- “...the idea of germ poisoning by alcohol in humans may be safely dismissed..., Jellinek, E.M., and Jolliffe, N.
Journal of Studies on Alcohol. Vol. 1, Number 1, pg 110-181 (1940)
- ...mental deficiencies are due to “poor stock” of alcoholic families. *Alcohol Explored*, Haggard and Jellinek, 1942
- Mark Keller (1955) “the old notions about children of drunken parents being born defective can be cast aside...”*



* *Popular Pamphlet #3, Rutgers Centers for the Study of Alcohol*

Alcohol Enters Obstetric Practice

- Given the accepted safety of alcohol with respect to pregnancy, it is not surprising that the danger of using alcohol in a new obstetric procedure would be missed.
- In the mid-1960s the use of very high dose alcohol to treat threatening pre-mature labor – the “alcohol drip” was introduced.

❖ First report — Fuchs, F., et al., *Am. J. Obstet. Gynecol.*, 99:627 (1967)



The medical acceptance of alcohol use in obstetric likely contributed to the delayed recognition of FAS and FASD -- with the first health advisory on FAS not appearing until June 1977– following the 1968 reports from **Paul Lemoine** in France, and **Ken Jones** and **David Smith** in 1973 – and their **confirmation by animal and human epidemiologic research**

Health Advisory: Fetal Alcohol Syndrome

“Recent research reports indicate that heavy use of alcohol... during pregnancy may result in... The Fetal Alcohol Syndrome.”

“Given the... evidence available... pregnant women should be particularly conscious of the extent of their drinking. While safe limits are not known... risk is established... above 6 drinks per day....”

Recommended not more than 2 drinks per day.

June 1, 1977

1981 Surgeon General's Advisory on Alcohol and Pregnancy



By 1981, the U.S. government position was strengthened in an updated advisory issued by the U.S. Surgeon General.

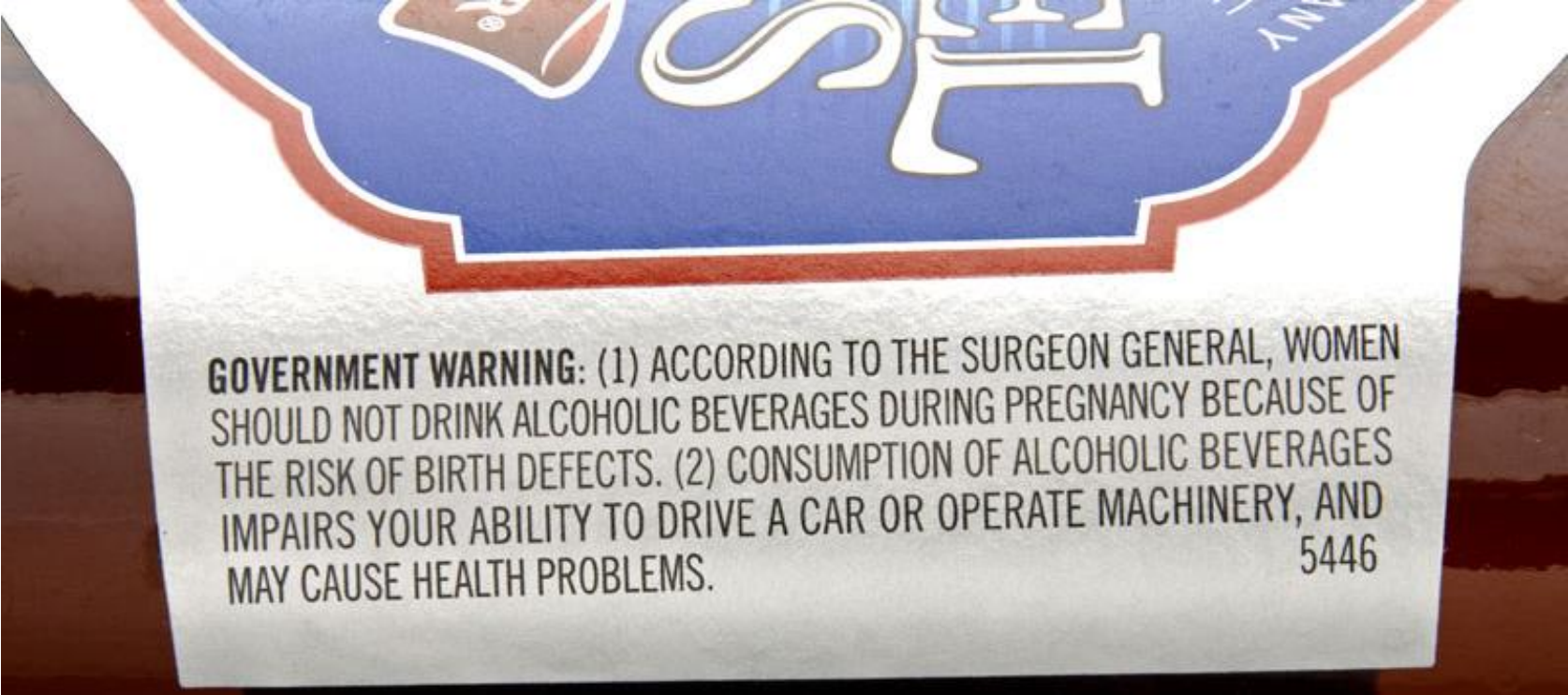


This time, the perspective had changed from “safe until proven dangerous, to advise caution until proven safe.”

“The Surgeon General advises women who are pregnant (or considering pregnancy) not to drink alcoholic beverages and to be aware of the alcoholic contents of food and drugs....”

May 1981

The Bottle Label Issue



GOVERNMENT WARNING: (1) ACCORDING TO THE SURGEON GENERAL, WOMEN SHOULD NOT DRINK ALCOHOLIC BEVERAGES DURING PREGNANCY BECAUSE OF THE RISK OF BIRTH DEFECTS. (2) CONSUMPTION OF ALCOHOLIC BEVERAGES IMPAIRS YOUR ABILITY TO DRIVE A CAR OR OPERATE MACHINERY, AND MAY CAUSE HEALTH PROBLEMS.

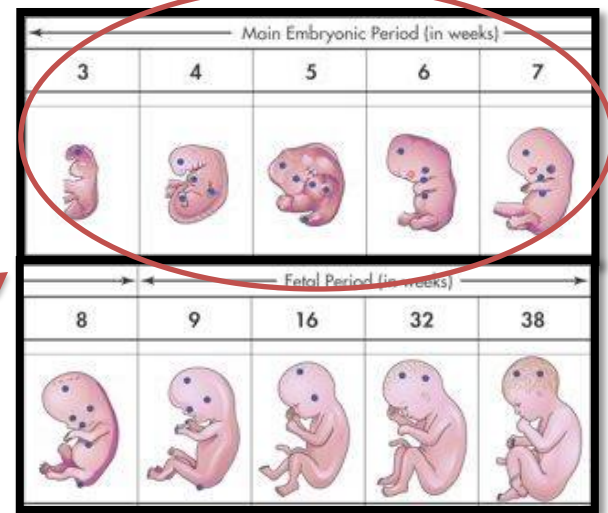
5446



French Bottle Warning Icon

What We Now Know About FASD of Importance for Prevention

- The agent responsible for FASD is alcohol
- Alcohol has a diversity of toxic (teratologic) effects on the developing embryo and fetus, and these adverse effects can occur across the total embryonic and gestational course of pregnancy
- Some of the most serious adverse effects can occur in the early phase of pregnancy often before a woman's self-awareness that a pregnancy has commenced



Some Challenges in FASD Prevention

- Complicating this health issue are two further facts:
 1. First, that the consumption of alcoholic beverages is an accepted and widely practiced social behavior, for both men and women, throughout a great part of the world
 2. And next, that at least 50% of pregnancies in the developed world are unplanned
- Thereby, even among women who would have otherwise chosen to not drink, lack of awareness of being pregnant (especially in early pregnancy) results in many women continuing to drink and exposing their fetus to risk.



FASD Prevention

- Further, far too many women are not aware the risks associated with drinking in pregnancy, and this varies very much by country.
- In some countries consuming alcohol while pregnant is now often recognized by **a good part of the population** as an unaccepted social behavior.
- But unfortunately this is not the case in every country with the medical establishment not yet fully accepting the nature and magnitude of this issue
- In still other countries, frequent high alcohol intake among pregnant women continues despite major public campaigns targeted at changing this behavior (for example, South Africa).



Some Challenges in FASD Prevention

- Consequently, many fetuses are exposed to the teratologic actions of alcohol because of either:
 - lack of knowledge by the woman,
 - or
 - non-acceptance of the knowledge that alcohol is not safe in pregnancy.



The Challenge for Prevention

- Increase understanding in the general public of the risks of alcohol in pregnancy (especially in countries where this knowledge is not common)
- Encourage avoidance of alcohol anytime whenever there is a risk of pregnancy (sexually active without birth control)
- If early pregnancy drinking has occurred, encourage no alcohol for the remainder of pregnancy to minimize the adverse impact.
 - ❖ It is important to recognize that the extent to which recovery from prenatal alcohol insult may occur when there is no further alcohol exposure is, as yet, unknown.



Remaining Research Challenges

Research Challenge I

Improve Diagnostic Capabilities to:

- Determine the full Prevalence of FASD which is necessary to mount an effective public health prevention effort.
- Identify Women and Children in Need of Care and Services



Research Challenge II

Prevention of drinking in pregnancy through detection of risk drinking

- Though self-reports of drinking can be informative – biomarkers of alcohol use disclose far greater levels of risk
- A number of biomarkers are showing evidence of utility in clinical settings including **ethyl glucuronide**, **ethyl sulfate** and the non-oxidative alcohol metabolite – **fatty acid ethyl ester (FAEE)** obtained from newborn meconium

Research Challenge III

Improving the acumen for FAS facial
recognition through 3-D photography
and computer analysis

Advantages:

- The 3-D image is suitable for **telemedicine**
- Computer is free of human eye bias
- The computer can see more subtle facial feature signatures and recognize prenatal alcohol features short of FAS and pFAS



Research Challenge IV

Refining our understanding of the complexities in the **neurobehavioral phenotype** associated with FASD

- So as to achieve more facility in the recognition of these disorders
- And more appropriate clinical interventions

Research Challenge V

Prevention of FASD through nutritional supplementations, pharmacology, or enhanced CNS stimulation

- Animal model research has shown promise with respect to:
 - Stimulation through physical exercise – particularly for cerebellum related deficits
 - Pre- or postnatal nutritional supplementation



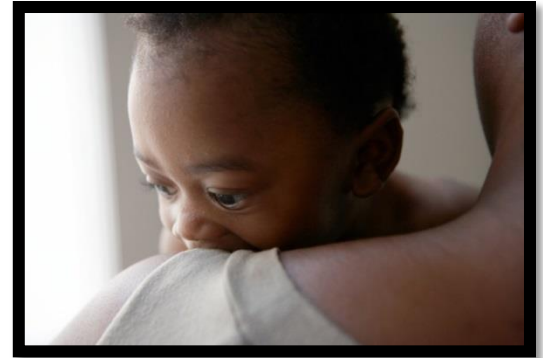
Other Challenges

- Determining the most effective approaches to incorporate **interventions for at-risk drinking** into pre-pregnancy and prenatal care.
- Improving the effectiveness of **Community Prevention Approaches** to reduce risk drinking in pregnancy – including enhancing the **public's understanding of the risks of alcohol use in pregnancy** –



The Key Public Health Challenge

- Recognizing that 50% of pregnancies are unplanned so that substantial prenatal alcohol exposure may have occurred before pregnancy recognition
- Working to change the **social norms** surrounding drinking behavior whenever there is a risk of a pregnancy –



Thank You!

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