

Methanol poisoning



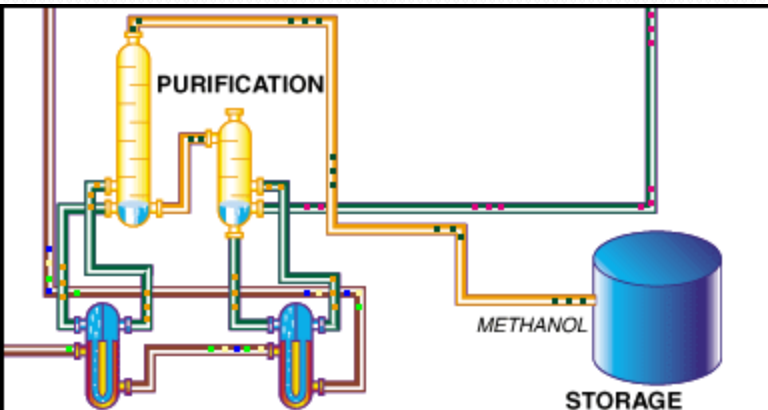
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Methanol is methyl alcohol also known as wood-alcohol or wood naphtha.

Synthesized from

Coke and water



STEP 4 : METHANOL PURIFICATION

The 68% methanol solution is purified in two distinct steps in tall distillation columns called the topping column and refining column to yield a refined product with a purity of 99.99% methanol classified as Grade AA refined methanol.

The methanol process is tested at various stages and the finished product is stored in a large secured tankage area off the plant until such time that it is ready to be delivered to customers. Since 99% of our product is sold on the overseas market, it is shipped by ocean going tankers while local sales are made via pipelines and drums.

Frequently found in high concentration

- Automotive antifreeze or De-icing solution
- Windshield wiper fluid
- Solvents
- Perfumes
- Cleaners
- Fuels

Common traditional/indigenous beverages in the SEA Region

Country	Local brew
Bangladesh	Bangla Mad, Cholai, Tari
Bhutan	Ara
India	Tari, Tharra, Fenni, Toddy Chaang, Raksi, Mahua
Indonesia	Palm Wine
Myanmar	Tin Lei Phyu
Nepal	Raksi, Tadi, Chayang, Tomb
Sri Lanka	Toddy, Arrack, Kasippu
Thailand	Oou, Krachae, Namtanmao, Sa-tho

Toddy is obtained from the flowers of the coconut or palm tree. A white liquid, with a sweetish taste, oozes out of these flowers. When consumed fresh, this juice has no intoxicating effect. This liquid is collected and allowed to ferment. At times, yeast is added to hasten the process. The fermented juice has an alcohol content of approximately 5–10%.

Is methanol Toxic ?

- Relatively nontoxic.
- Toxicity can occur when parent alcohols is oxidized (primarily by alcohol dehydrogenase and aldehyde dehydrogenase) to **formic acid**.

Who are at risk ?

- Children
- Persons with alcoholism
- Populations of developing countries
- Industrial workers

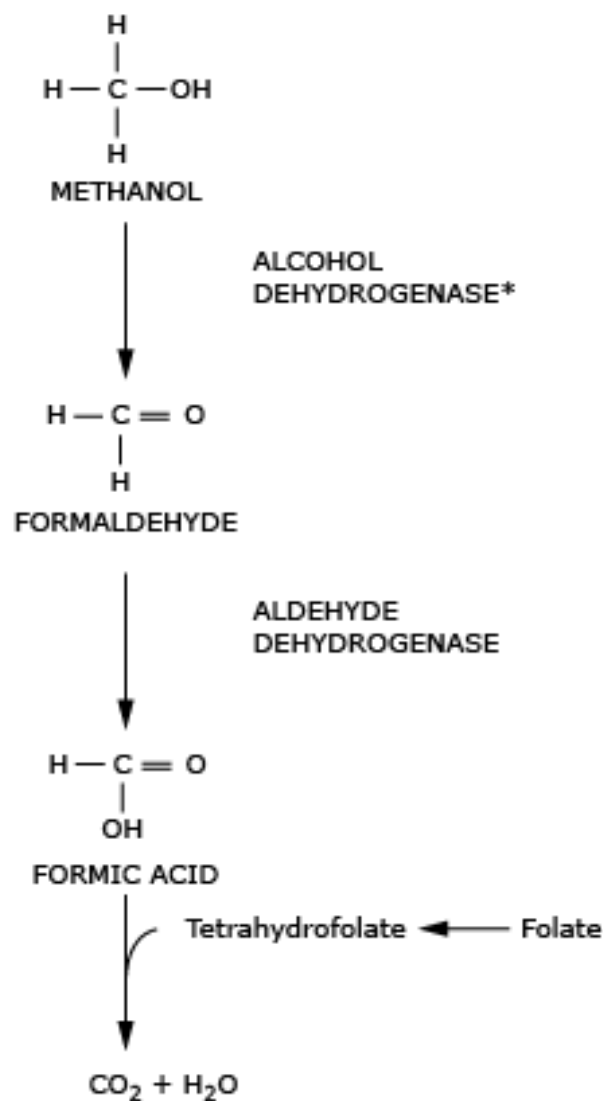
Lethal dose

- Ingestion of 1 g/kg BWt
- Serious toxicity has been reported following ingestions of as little as 8 g

KINETICS

- Rapidly and completely absorbed after oral ingestion.
- Peak serum level 1 to 2 hours.
- Two-step metabolism via alcohol dehydrogenase (ADH) and aldehyde dehydrogenase leads to the production of toxic species.
- Elimination Methanol follows **zero-order** kinetics in the absence of treatment

Methanol metabolism



* Blocked by ethanol and fomepizole.

CELLULAR TOXICOLOGY

- Formate causes
 - retinal injury with
 - Optic disc hyperemia,
 - Edema, and
 - Permanent blindness,
 - Ischemic or hemorrhagic injury to the basal ganglia

Sivilotti ML, Burns MJ, Aaron CK, et al.

Reversal of severe methanol-induced visual impairment:

no evidence of retinal toxicity due to fomepizole. J Toxicol Clin Toxicol 2001; 39:627.

Case fatality rate in Bangladesh

- Death rate of methanol intoxication in Bangladesh is 75.9%.

Methyl alcohol consumption and mass tragedies

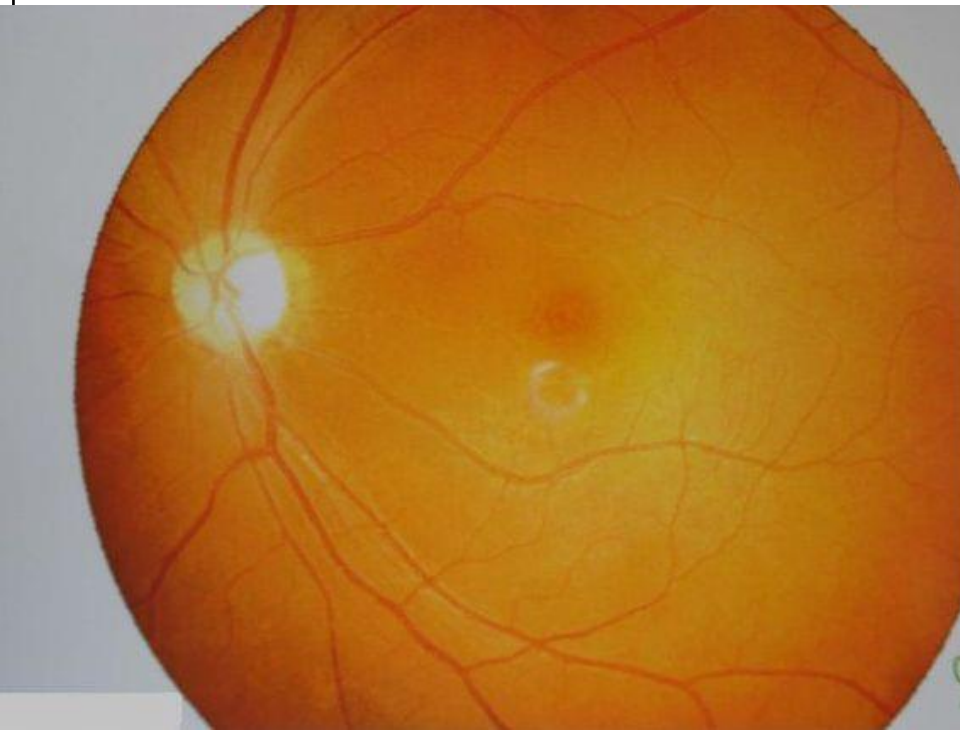
- 90 Bangladeshis died in 1998, including 70 in Gaibandha,
- In Narsingdi, about 50 miles from the capital Dhaka, 96 people reportedly died and more than 100 were hospitalized.
- In 2009 : 143 reported deaths in the state of Gujarat , India

Hooch Tragedies in India. India Today Online New Delhi, December 16, 2011 (<http://indiatoday.intoday.in/story/hooch-tragedies-inindia/1/164473.html>, accessed 1 August 2012)

CLINICAL FEATURES OF OVERDOSE

- Visual blurring,
- Scotomata, and
- Blindness
- inebriation and
- sedation,
- Coma, seizures, hyperpnea (Kussmaul-Kien respirations), and hypotension..
- Eye examination :
 - Mydriasis,
 - Retinal edema,
 - Hyperemia of the optic disk.

Rapidly developing optic atrophy in a patient with methanol poisoning



Diagnosis

- History
- High index of suspicion: Acidosis with high anion gap.

Laboratory evaluation

- Fingertick glucose, to rule out hypoglycemia
- Acetaminophen and salicylate levels, to rule out these common coingestions
- Electrocardiogram (ECG), to rule out conduction system poisoning by drugs that effect the QRS or QTc intervals;
- Pregnancy test in women of childbearing age

Additional tests

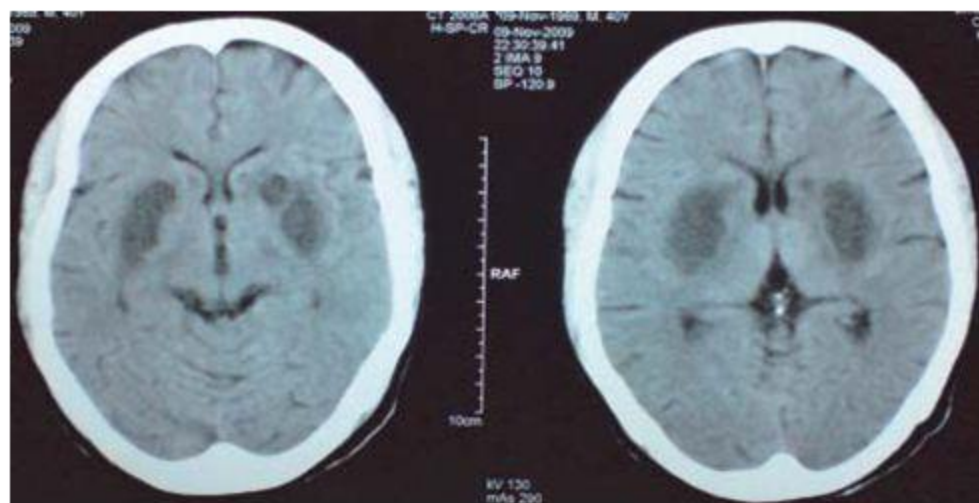
- Basic electrolytes with **Anion gap determination**
- Serum calcium
- BUN and creatinine
- Arterial or venous blood gas analysis
- Serum osmolality
- **Serum methanol**
- Serum Amylase
- CT scan and MRI of brain

Severe anion gap acidosis is the hallmark of methanol poisoning

Methanol Poisoning

- A 35-year-old previously healthy business executive admitted in an ICU with coma, respiratory distress and features of anion gap acidosis having HO social drinking followed by death of a mate and serious disability in the case with permanent blindness.

Non contrast axial CT scan of the Head showing bilateral symmetrical hypodense shadows in the regions of putamen.



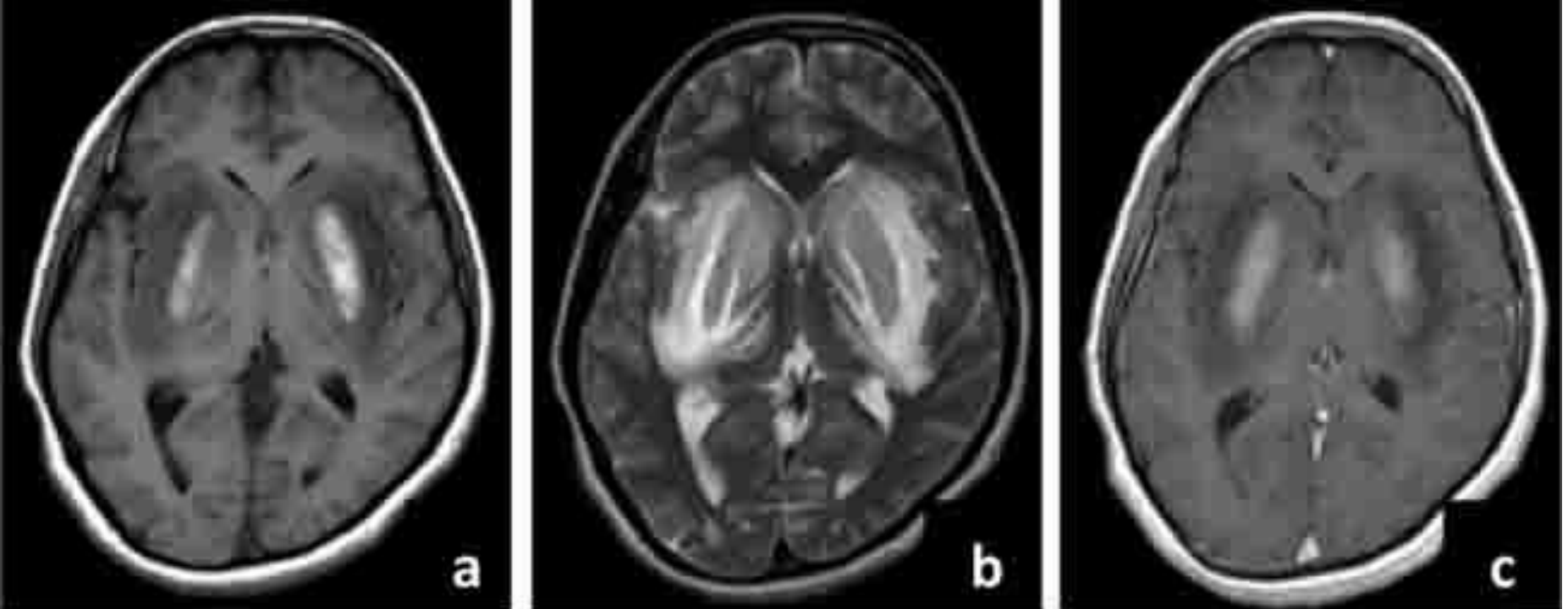
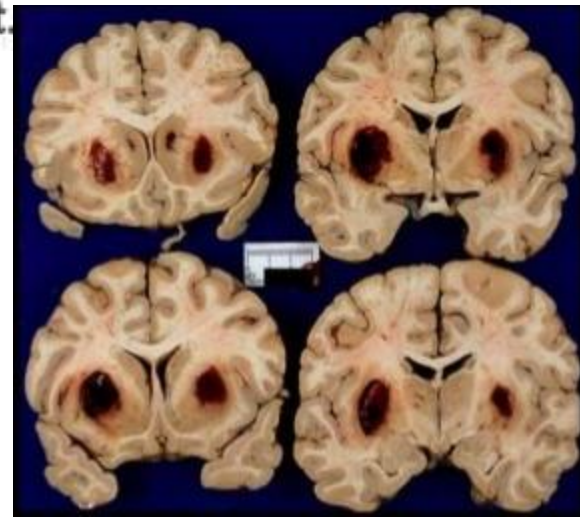


Figure-2: Methanol Intoxication. Haemorrhagic necrosis of the putamina bilaterally. These are associated with surrounding oedema. (a) T1-W Axial Image shows hyperintense signal in putamina bilaterally. (b) T2-W Axial Image show isointense signal. (c) T1-Post contrast Axial Image shows no enhancement.



TREATMENT AND MANAGEMENT

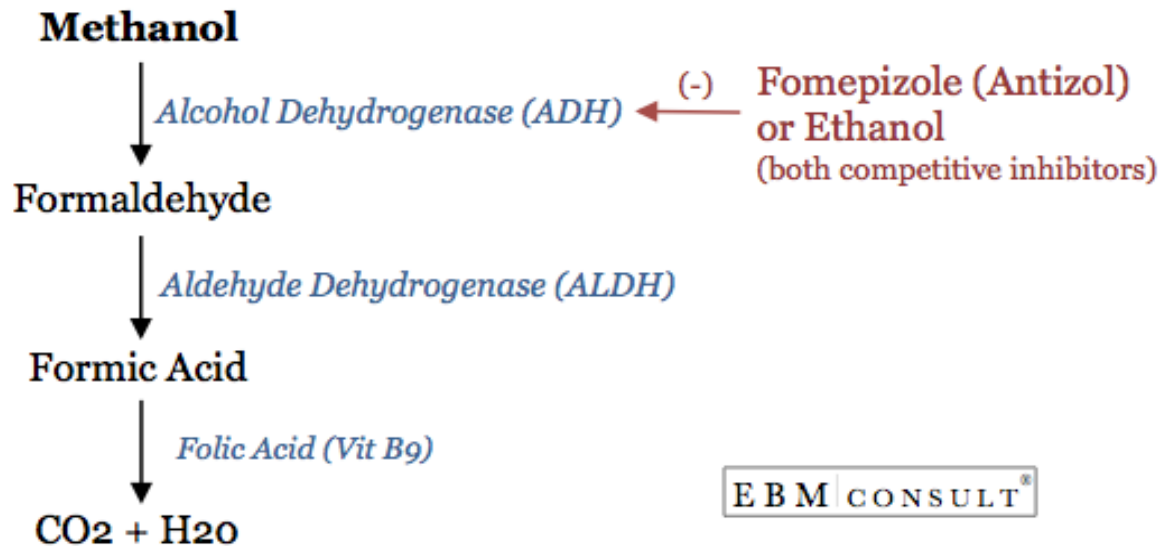
- Rapid recognition and early treatment are crucial.
- **Activated charcoal** , **gastric lavage**, and **syrup of ipecac** have **no role** in the management of toxic alcohol exposures
- First assess and secure the patient's airway, breathing, and circulation.
- Large minute ventilations may be needed to prevent profound acidemia (pH <7.1).
- **sodium bicarbonate** (1 to 2 meq/kg IV bolus infusion) is recommend if serum pH < 7.3.

TREATMENT AND MANAGEMENT

- Antidote (ADH inhibition) fomepizole or ethanol
- Cofactor therapy
- Emergency hemodialysis in patients who present with acidosis accompanied by visual or renal impairment.

Cofactor therapy

Folinic acid (leucovorin) 50 mg IV or folic acid 50 mg IV every six hours



[Barceloux DG, Bond GR, Krenzelok EP, et al](#)
[Ghosh A, Boyd R.](#)
[McMartin KE, Martin-Amat G, Makar AB, et al](#)

Indications of Hemodialysis

- Ingestion of > 30 ml of methanol
- Serum methanol level >20 mg/dl
- Visual complications
- No improvement in acidosis despite repeated sodium bicarbonate infusion

Prognosis

- Depends on amount of methanol consumed and the degree of metabolic acidosis
- More severe acidosis → poorer prognosis
- Little long term improvement → patients with neurological complications.

*Thank
you*

