

SOLVENT ABUSE



*Fragmentary statue of Queen, Hatshepsut quartz diorite, Egyptian, New Kingdom, early to mid-18<sup>th</sup> Dynasty; c. 1498–1483 BC. Accession number: 52.347*

*Museum of Fine Arts, Boston.*

*“I felt somewhat surprised at seeing here, as everywhere else throughout the temple, the renowned Moeris, (Tuthmosis III) adorned with all the insignia of royalty, giving place to Amenenthe, (Hatchepsut) for whose name we may search the royal lists in vain, still more astonished was I to find on reading the inscription that wherever they referred to this bearded king in the usual dress of the Pharaohs, (associated) nouns and verbs were in the feminine, as though a Queen were in question. I found the same peculiarity everywhere. Not only was there the prenomens of Amenenthe preceded by the title sovereign ruler of the world, with the feminine affix, but also his own name immediately following on the title of “Daughter of the Sun”. Finally, in all the bas-reliefs representing the gods speaking to this king, he is addressed as a Queen, as in the following formula, “Behold thus saith Amen-Re, Lord of the Thrones of the World, to his daughter whom he loves, sun devoted to the truth: the building which thou hast made is like to the divine dwelling”*

*Jean-Francois Champollion, 1828*

*In 1504 B.C the Egyptian Pharaoh Tuthmosis II suddenly died in his early thirties. His son, the future Tuthmosis III, was only an infant at the time of his father’s death, resulting in a crisis of succession to the throne of Egypt. Tuthmosis’s wife, his half-sister Queen Hatchepsut, stepped in and claimed the title of Pharaoh for herself until such time as her infant son could come of age. Against all expectation and defying long tradition and fierce opposition from powerful figures within the male dominated world of the 18<sup>th</sup> Dynasty of the New Kingdom, this remarkable woman then ruled over the most powerful kingdom of the second millennium BC for the next twenty - two years. She proved to be an immensely strong and great leader. She kept the peace within the kingdom as well as with its neighbours, sent out explorers to distant lands, and created some of ancient Egypt’s greatest monuments. Egypt was powerful and prospered under her reign. Her son Tuthmosis III succeeded her when she died and he in turn became a great Pharaoh. After Hatchepsut’s death however a serious attempt was made to annihilate her memory from history. Her monuments were either destroyed or usurped, her portraits vandalized, and for two and a half thousand years her name was forgotten, erased from the official lists of the Kings - and yet independent ancient sources left vague and tantalizingly obscure references to the existence a great female Pharaoh of the 18<sup>th</sup> Dynasty. Manetho, an historian writing in about 300 B.C referred to a female Pharaoh who ruled for twenty two years and nine months. A female Pharaoh was also attested to by the great Roman historian Josephus in the First century AD; yet no primary archaeological evidence could be found which definitively proved the existence of a female Pharaoh. The ancient hieroglyphics that contained the primary source material of the history of ancient Egypt were no help; they remained a complete mystery, long since lost to learning.*

*It would not be until the early Nineteenth century when a brilliant French linguist Jean-Francois Champollion, who had accompanied Napoleon Bonaparte’s invading army of Egypt in 1798, cracked the ancient hieroglyphic script. Suddenly history that had been lost to the world for two and a half millennia once again saw the light of day; Champollion wrote “...I have seen scroll in my hand the names of years whose history was totally forgotten; names of gods who have not had altars for fifteen centuries; and I have gathered, while scarcely breathing for fear of reducing them to powder, such little pieces of papyrus, the last and only memory of a king who in his lifetime perhaps found himself cramped in the immense palace of Karnak...”.*

*It would be Champollion who would be the first, although he did not initially realise it, to provide the proof of the rule of the female Pharaoh, Hatshepsut. Debate has since been intense among historians as to why Tuthmosis III wished to erase the memory of his aunt (and step-mother). Many theories have been passionately debated. Perhaps he simply hated her, but this seems unlikely. Perhaps a female Pharaoh had disturbed the "maat" - the Egyptian perception of the "natural order" of the universe - a male dominated one. As Hatshepsut was so successful as a ruler perhaps a dangerous precedent had been set, for which future Queens of Egypt would attempt to usurp the throne. Some historians believe that Tuthmosis III, who became a great ruler himself could not bear to be depicted as once being under the domination of a mere woman, this would not reflect the god-like image the Pharaoh wished to project to his people.*

*Whatever the reason for the erasure of Hatshepsut's memory, the means by which this was attempted provides a fascinating glimpse into the mind and religious beliefs of the ancient Egyptians. The ability to write was held by only a very few high-priests and this ability was held sacred. Whilst the power of the written word was self evident for the recorded history of its civilization, the high-priests believed that their hieroglyphs and images, especially when applied to the tombs of the dead, could do much more than merely record history - they could directly influence the afterlife of the deceased, these images were not just mere words - they held a supernaturally powerful connection to the gods and to the afterworld. Their depictions could influence the afterlife of the deceased - for the better or worse. Knowing this gives a renewed respect and insight into the inscriptions to be found in the tombs of the great kings. The removal of the name and image of a dead person served a dual purpose. Not only did it allow the re-writing of history; it was also a direct assault on the spirit of the deceased. In order for the spirit or soul of the deceased to live in the "Field of Reeds" in the afterlife, some image or at least the name of the deceased had to survive on Earth. If all memory of the dead person was lost or destroyed, the spirit too would perish from the afterworld, there would come the much feared "second death", total obliteration from which there would be no return. In this light it is fascinating that the attempts at erasure of the records of Hatshepsut appear somewhat half-hearted - even amateurish. Hatshepsut's cartouche in some places has been merely scratched out, replaced by that of Tuthmosis III - yet clear female images and statues exist intact but without direct reference to them being a female Pharaoh - some have false beards attached to them. Perhaps Tuthmosis did not hate his aunt at all - her name had to be erased from the official records of the kings for earthly male dominated political reasons - but he had no wish to obliterate her from the afterlife. Since Champollion's time, many images and inscriptions have subsequently been recognized by historians as being those of the Pharaoh Queen, Hatshepsut albeit disfigured, vandalized or subtly altered to represent Tuthmosis. Tuthmosis, perhaps rescued his aunt from death in the afterlife - thanks to the brilliant Champollion her memory on Earth has also been rescued after two and half thousand years of oblivion.*

*In the early Twentieth century extensive archeological excavations at Deir el Bahri uncovered numerous depictions of the female Pharaoh. One example shows Hatshepsut depicted as the noble high-priestess of Amen-Re, seen below left. However what are we to make of the image on the right?! Some unofficial images of Hatshepsut, away from the royal tombs in the workers quarters, were also discovered that were not quite so flattering. Knowing the ancient Egyptian's reverence for the power of the image over the deceased it seems that one of the workers on Queen Hatshepsut's tomb had his own ideas on how he wished to spend eternity in the afterlife! This worker clearly had a death wish (perhaps to speed his journey to the*

*afterlife) - his antisocial activities, had they been discovered, would have meant instant and fairly horrific execution!*



*Two differing viewpoints of Queen Hatshepsut as identified by the Uraeus headgear of a Pharaoh, 18<sup>th</sup> Dynasty, New Kingdom, Deir el Bahri.*

*Unfortunately over two and half thousand years after the death of Queen Hatshepsut society is still plagued by the antisocial graffiti artist. Punishment for this crime is no longer the death sentence - however those who inexplicably partake of the activity of “chroming” the graffiti artist’s medium of expression, appear, like the artist of Deir el Bahri, to also have a death wish!*

## SOLVENT ABUSE

### Introduction

Solvent abusers are those who inhale the vapors of volatile hydrocarbon based compounds, in order to attain euphoric affects similar to alcohol.

Spray paints are commonly used.

Inhalational solvent abuse is a major public health problem among young adolescents.

Toxic effects include cardiac irritability and central nervous systems effects.

The most serious complications are:

- Hypoxia
- Cardiac arrhythmias

Sudden death is possible from hypoxia, arrhythmias, or the complications of seizures.

### Terminology

“Street” terminology for solvent abuse is wide and varied, and will depend largely on local “culture”.

“Chroming” strictly means sniffing the fumes of a chrome based paint.

The term however has come to be used in Australia to cover all forms of inhalant abuse.

The inhalant is the vapors from a chemical solvent and will usually be a hydrocarbon based compound.

“Street” terminology is extensive but also includes:

- Sniffing or snorting:
  - ♥ Directly inhaling vapors from container
- Huffing:
  - ♥ Placing a saturated rag over the mouth and nose and inhaling)
- Bagging:
  - ♥ Placing the HC in a plastic bag which is placed over the head and repeatedly inhaling the vapors. Many users “chrome” by spraying the paint from an aerosol can into a plastic bag and then putting their face or entire head into the bag to inhale the vapors.

## Chemistry

A solvent is defined as a liquid that has the ability to dissolve, suspend, or extract another material without chemical change to either to the material or the solvent itself.

Chemically most solvents are hydrocarbon based substances that include aliphatic, cyclic, aromatic, and halogenated hydrocarbons.

Further solvents include, various ethers, esters, glycols, ketones, aldehydes and amines.

Organic solvents are widely available in the form of, glues, aerosol spray cans, lighter fluids (butane), paint thinners, chrome based paints or even petrol.

## Pharmacokinetics

### Absorption

- All organic solvents are volatile substances, and are well absorbed by the inhalational route.

Because of this high volatility, there is great potential for inhalation pneumonitis.

- Peak concentrations are generally seen at about 15 - 30 minutes.

### Distribution

- Organic solvents are highly lipophilic and so readily penetrate the CNS and the liver.

### Metabolism and excretion

- Excretion is largely via the lungs.
- There is also some metabolism by the liver, with elimination half-lives varying from 15 - 72 hours.

## Toxicological Effects

These may include the following:

1. Asphyxia
  - Secondary to the plastic bag being placed over the head.
2. Hypoxia:
  - Secondary to the hydrocarbon gas displacing oxygen from the lungs.

- Secondary to aspiration due to altered conscious states and/ or chemical pneumonitis.
3. CNS effects:
- These may be due to the effects of hypoxia or to the direct effects of the hydrocarbon itself.
  - Certain volatile agents, such as **butane, benzene, toluene, and xylene** are acute CNS depressants and have a disinhibiting euphoric effect.
  - The initial presentation may mimic alcohol intoxication with euphoria, dysphoria, slurring of speech and ataxia.
  - In some patients, an initial component of CNS stimulation may occur and present as agitation, tremor or seizure.
  - Higher concentrations may result in **confusion, coma and seizures.**
4. CVS effects:
- The **halogenated** hydrocarbons in particular may cause arrhythmias due to a **sensitizing effect on the myocardium to the effects of catecholamines.**
  - This is thought to be the cause of sudden deaths, which may occur when abusers suddenly exert themselves following HC intoxication.
5. **Chronic users**
- Chronic abusers may suffer long term neurotoxicity.
  - There may also be long term pulmonary, liver and kidney damage.
  - **Toluene** in particular has been associated with detrimental long term effects.
  - Neuropsychiatric assessments reveal deficits in cognition and memory.
6. Fetal effects:
- A “fetal solvent syndrome” has been described, with effects similar to that of fetal alcohol syndrome.

### Risk Assessment

Sudden death has been particularly associated with **butane** and **propane.**

## Clinical Features

“Chroming” or more generically “solvent abuse” is most commonly seen in **young adolescents**, of lower socio-economic situations.

Most effects pass within an hour of use.

Evidence of chrome paint inhalation may include chrome paint on fingers, mouth or clothing and empty plastic bags sprayed with chrome paint.

Signs may include:

1. CNS:

CNS features are most commonly seen, including:

- Euphoria and dysphoria similar to the effects of alcohol.
- Confusion
- Occasionally more serious complications such as seizures, drowsiness and coma.

2. CVS:

- Arrhythmias may occur.

3. Mucosal affects:

- Injected eyes
- Epistaxis

4. Pulmonary effect:

A chemical pneumonitis may occurs with:

- Cough
- Wheeze
- Dyspnea
- Hemoptysis
- An ARDS type picture, (rare)

### Identifying inhalant users:

Without a clear history, this may not be possible, however the following have been identified as possible (but non-specific) indicators:

- Possession of unusual amounts of glues, solvents or aerosol containers.
- Chemical smells on their clothes or breath.
- Circumoral paint stains
- Unexpected and rapid “drunken” behavior
- Injected eyes and/ or mucosal lesions around the nose and mouth.

### Dependence

- A psychological dependence may develop and lead to chronic use.
- Physical dependence does not occur.

### Withdrawal syndrome

A physical solvent withdrawal syndrome has been described.

The syndrome is generally mild, with non-specific constitutional type symptoms.

### Investigations

- ECG

*Others as clinically indicated:*

- CXR, (aspiration)
- Consider possible Co-ingestants; alcohol/ paracetamol

### Management

1. ABC
  - Immediate attention to any ABC issues and treat as appropriate.
2. Arrhythmias:
  - ECG /monitoring to look for possible arrhythmias.
  - 12 lead ECG

- Arrhythmias are treated along conventional lines, but **beta blockers** may also be useful for tachyarrhythmias in view of the myocardial sensitization to catecholamine effects of volatile hydrocarbons.
  - Arrhythmias, if they occur, are usually seen early, and do not characteristically develop as a later complication.
3. Seizures:
- Seizures are treated along conventional lines.
4. Agitation:
- Associated behavioral problems are frequently seen.
  - Titrated oral or IV benzodiazepines may be required.
5. Supportive:
- Treatment is otherwise supportive.

*Disposition:*

A period of hours is required for medical observation, however behavioral issues may require ongoing observation or admission to hospital to address complex psychiatric and social issues.

Most established users inhale to escape underlying problems such as low self esteem, domestic violence at home, alcoholism or drug abuse amongst parents, homelessness, relationship difficulties, boredom and peer pressure.

These individuals are most at risk and need help from professional agencies to overcome their habit.

Referrals that should be considered include:

- Social Work
- CATT/ psychiatry
- Drug and alcohol counseling



*“The Valley Of The Kings - The Temple of Hatshepsut”, Augustus Osborne Lamplough, (1877-1930), watercolor on Paper.*

### References

1. Inhalant Abuse: DrugInfo Clearinghouse Website: [www.druginfo.adf.org.au/](http://www.druginfo.adf.org.au/)
2. Solvent Abuse in L. Murray et al. Toxicology Handbook 2nd ed 2011.

Further reading:

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