

Nitrous oxide (N₂O) is used as a propellant in food preparation apparatus. Recreational use or 'nanging' can lead to permanent neurological sequelae.

Toxicity / Risk Assessment

- Acute exposure: short-lived and reversible CNS effects
- Risk of neurological dysfunction appears to be higher with regular, high-volume chronic use (e.g. > 50 bulbs daily or multiple tanks per week)
- 1 nang = 8.4 g N₂O and a 3.3 L tank = 2000g N₂O

Investigations

- Total B₁₂ and active B₁₂ (holotranscobalamin): may be low-normal or normal. Homocysteine and methylmalonic acid (MMA) concentration may be elevated
- MRI: may demonstrate demyelination in either the central or peripheral nervous system

Clinical features

- Initial features are often consistent with sub-acute degeneration of the spinal cord with sensory changes, gait disturbance and impaired joint position sense, motor and bladder dysfunction may occur
- Chronic N₂O exposure has been associated with mental health conditions
- Haematology: macrocytic anaemia (rare), marrow suppression

Management

STOP N₂O EXPOSURE

Chronic exposure leads to inactivation of vitamin B₁₂ and reduction of available methionine, leading to demyelination in the peripheral +/- central nervous system
Reduction in tetrahydrofolate may lead to bone marrow suppression

Chronic Toxicity (neurological dysfunction associated with chronic high-volume N₂O use):

Vitamin B₁₂ and methionine should be administered even if B₁₂ concentration is normal

Vitamin B₁₂ (Hydroxocobalamin):

- Administer 1mg daily IM for 2 weeks, weekly for four weeks then monthly until recovery plateaus

Methionine:

- Administer 1g TDS orally for 2 weeks.

Folinic acid:

- Administer a single dose 30 mg of IV folinic acid if there is evidence of bone marrow suppression

There is no evidence to support the beneficial effect of B₁₂ supplementation in preventing neurologic dysfunction

Disposition

- If unable to safely mobilise or other significant N₂O related toxicity is present, admit for treatment until clinical improvement
- Referral to alcohol and drug service should be considered