MESSER
Gases for Life

SERYNOX® / PLACYNOX®

Inhaled Analgesia to Reduce Childbirth Pain

Nitrous oxide / Oxygen 50 % / 50 %, medicinal gas, compressed

Pain during childbirth

Giving birth is a life changing event. Women described this physiologically process as an **intense and transformative experience** that gave them a sense of empowerment.[1]

In the period of intensified labor women desire to be in a safe, protective environment with a supportive companion.[1]

For the majority of women labor and childbirth are associated with the experience of pain.[2]

Women's perception of pain is influenced by[3]:

- Physiological factors (e.g., birth position)
- Psychological factors (e.g., anxiety, fear)
- Quality of the relationship between the woman and the obstetrician

Studies have shown that labor **pain is the main reason women tend to have a cesarean section** despite the higher complication rate.[4]

So, labor pain, and likewise the methods to alleviate it, are major concerns for women, health care workers, and the general public.[5] A lot of attempts are made to reduce labor pain.[4]

Many **women want the choice** in pain relief during labor and also **want to avoid invasive methods** of pain management during labor.[5]

Other important factors women identified for pain relief are the preservation of bodily sensations of labor, mobility, and strength.[6]

Labor pain is among the most significant and acute pain women experience in their lives.[2,3]

Nitrous oxide (50 %) / Oxygen (50 %) mixture for labor analgesia

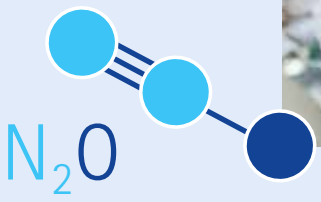
There are various pharmaceutical and nonpharmaceutical methods to control labor pain.[4]

One option is an inhaled analgesia. Inhalation analgesia during labor **involves the self-administered inhalation** of gaseous agents in sub-anesthetic concentrations. During this process, the mother remains awake and protective laryngeal reflexes remain intact.[5]

The most common methods of labor analgesia include inhalation of a **mixture of nitrous oxide (50 %) and oxygen (50 %).**[4]

Nitrous oxide can also be used before epidural placement if not immediately available or as supplement for epidural that is not working very well.[7]

Nitrous Oxide



Commonly used

Used in greater than 50 % of birth in[7]:
- Finland
- Norway
- England
- Australia
- New Zealand
- United Kingdom
- Sweden

Reasons for use

The reasons for use include[4]:
- Ease of administration
- Lack of flammability
- Minimal toxicity
- Lack of effect on uterine contractility
- Safety for mother and fetal

Pain relief

Nitrous oxide can show efficacy in **89,8 %** of women using the gas on labor pain.[4]

Satisfaction with use

The satisfaction rate of pregnant women using nitrous oxide on labor pain can reach **98 %**.[4]

Advantages of inhaled nitrous oxide

Three crucial pharmacodynamics

Analgesia

The analgesic effect of N_2O appears to be triggered by stimulated neuronal release of endogenous opioid peptides.[8]

Anxiolysis

The anxiolytic effect of N_2O involves activation of the $GABA_A$ receptor via the benzodiazepine binding site.[8]

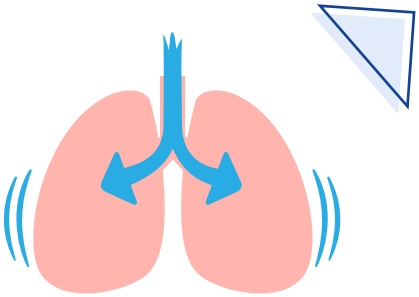
Amnesia

The technique provides excellent amnesia.[9]

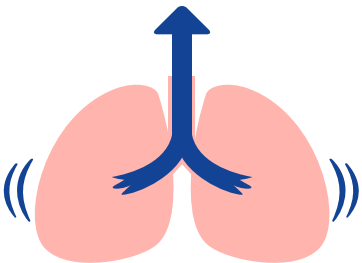
Pharmacokinetic properties

The full potency of the drug is achieved after 3 to 10 minutes of inhalation (first effects can be seen after 1 minute) and effects wear-off few minutes after the end of inhalation.[10]

- Uptake and elimination exclusively via the lung[11]
- Saturation of blood and the target organ (CNS) is achieved rapidly[11]
- Eliminated exclusively by respiration[11]
- Not metabolized in the human body[11]



First effect after 1 minute of inhalation[12]



Short duration of action (35–45 seconds) after discontinuation[12]

SERYNOX® / PLACYNOX®

SERYNOX® / PLACYNOX® is a medicinal gas with a fixed 50% / 50% mixture of oxygen and nitrous oxide.[11]

Indication[11]
SERYNOX® / PLACYNOX® is indicated in adults, adolescents and children older than 1 month for:
- Short-term analgesia for painful procedures or conditions of mild to moderate pain intensity and sedation during dental surgery, when rapid analgesic onset and offset effects are wanted.

Benefits of N_2O[13]
- "Non-invasive, easy to administer analgesic/ anesthetic agent
- Rapid onset and cessation of action
- Second gas effect: increases speed of uptake/ washout of companion anesthetics
- Well characterized safety profile"

Posology and method of administration[11]

Special precautions should be taken when working with nitrous oxide. Nitrous oxide should be administered **according to local guidelines.**

Administration of SERYNOX®/PLACYNOX® should only occur **under supervision** of, and **with instruction** from, **personnel familiar with the equipment** and its effects.

The flow rate of SERYNOX® / PLACYNOX® is governed by the patient's breathing via a full-face mask, nosemouth mask or nose-mask.

The flow rate of SERYNOX® / PLACYNOX® is adapted to the breathing capacity of the patient. Two delivery options are available:

- **Continuous flow:** flow adjustment according to patient's intake, observed through a balloon reservoir in the gas supply line, a continuous flow fills the balloon reservoir during the patient's exhalation phases
- **On-demand-controlled flow:** automatically regulated amount of gas delivered to the patient, flow interruption during the patient`s exhalation phases

2 delivery options:
Continuous flow/
On-demand
controlled flow

The Mobile Destruction Unit (MDU)[14]

The MDU is an innovative solution which collects residual nitrous oxide from exhaled air and subsequently destroys the gas. The system purifies more than 99 % of nitrous oxide entering the unit which helps to facilitate a healthy work environment for healthcare professionals and a safer space for patients.

- Safe N_2O handling for users demanding mobility.
- The MDU mitigates greenhouse gas emissions and provides a safe work environment for N_2O users.
- Cracks more than 99 % of scavenged N_2O into harmless nitrogen and oxygen.
- Unit is a self-supporting system with low noise level and minimum energy consumption.
- The mobility combined with its ease of use makes it suitable for various healthcare settings.
- MDU is made with sustainability in mind and a high degree of energy recycling.

SERYNOX® / PLACYNOX® – available in different sizes

SERYNOX®	2 liters	5 liters	10 liters	15 liters	20 liters
Pressure	170 bars	170 bars	170 bars	170 bars	170 bars
Capacity	560	1,400	2,800	4,200	5,600
Weight (empty)	4 kg	8 kg	17 kg	20.5 kg	24 kg
Weight (full)	4.95 kg	10.4 kg	21.7 kg	27.6 kg	33.5 kg
Quick coupling	✓	✓	✓	✓	✓

MARKETING AUTHORIZATION HOLDER:

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Messer offers global solutions for control of pain during childbirth

SERYNOX®/PLACYNOX®

Nitrous Oxide (50 %)/Oxygen (50 %) mixture is an effective method for reducing the amount of childbirth pain and anxious[4,7], and in addition to reducing pain, has the positive impact of women's satisfaction.[4]

- **Non-invasive solution[13]**
- **Fast onset of effects[13]**
- **Easy to use[13]**

Any questions or desires?
Get in contact with your counterpart!

SERYNOX®/ PLACYNOX®
Active Substance: Medicinal gas, compressed, colourless gas: Nitrous oxide 50% and Oxygen 50% **Composition:** Each gas cylinder contains: Nitrous oxide 50% (v/v) and Oxygen 50% (v/v) (at a pressure of 170 bar at 15°C) **Therapeutic Indication:** Serynox is indicated in adults, adolescents and children older than 1 month for: short-term analgesia for painful procedures or conditions of mild to moderate pain intensity and sedation during dental surgery, when rapid analgesic onset and offset effects are wanted. **Contraindications:** Patients, who require ventilation with 100% O_2; Intracranial hypertension; Any altered state of consciousness that prevents the patient from cooperating; In patients with untreated vitamin B12- or folic acid deficiency; Recently occurring, unexplained neurological disorders; Patients with heart failure or cardiac dysfunction (e.g. after cardiac surgery) in order to avoid the risk of further deterioration in heart function. When Serynox is inhaled, gas bubbles (gas emboli) and gas-filled cavities may expand due to the increased ability of nitrous oxide to diffuse. Consequently, it is contraindicated in the following conditions: Maxillofacial- and facial injuries; Head injuries; Pneumothorax; Severe emphysema; Gas embolism; Following deep sea diving with risk of decompression sickness; Following air encephalography; During middle ear, inner ear and sinus surgery; Severely dilated gastrointestinal tract; If air has been injected into the epidural space to determine the placement of the needle for epidural anaesthesia; In patients recently having undergone intraocular injection of gas (e.g. SF_6, C_3F_8, C_2F_6) until the gas in question is fully absorbed, or within 3 months after the last injection of an intraocular gas. Severe postoperative complications may occur due to increased intraocular pressure. **Undesirable effects:** Nitrous oxide passes into all gas containing spaces in the body faster than nitrogen passes out. Use of nitrous oxide may result in expansion of non-vented gas containing cavities. Megaloblastic anaemia and leukopenia have been reported following prolonged or repeated exposure to Serynox. Neurological effects such as neuropathy and myeloneuropathy have been reported with exceptionally high and frequent exposure. **Description of selected adverse reactions:** Common adverse reactions (≥1/100 to <1/10) Nervous system disorder: Dizziness, lightheadedness. Gastrointestinal disorders: Nausea, vomiting **Special warnings:** Reduced fertility in medical and paramedical personnel has been reported after repeated exposure to nitrous oxide in inadequately ventilated rooms. It is not currently possible to confirm or exclude the existence of any causal connection between these cases and exposure to nitrous oxide. Areas in which Serynox is used should be adequately ventilated and/or equipped with scavenging equipment in order that the concentration of nitrous oxide in ambient air is as low as possible and below the occupational exposure limits. The gas mixture should be stored and used only in areas/rooms where the temperature exceeds 0°C. At lower temperatures the gas mixture can separate and result in administration of a hypoxic gas mixture. **Description of selected precautions for use:** Serynox should only be administered by competent personnel. Hyperventilation should be avoided as this may lead to abnormal movements. Self-administration should be preferred to allow the assessment of the level of consciousness. Attentive monitoring is required in patients taking central nervous system depressant medicinal products and in particular opiates and benzodiazepines, because of the increased risk of deep sedation, possible drowsiness, oxygen desaturation, vomiting and hypotension. Following discontinuation of the administration of Serynox, the patient should recover under proper supervision until the potential risks resulting from use of Serynox have subsided and the patient has recovered satisfactorily. Recovery of the patient should be assessed by healthcare personnel. Repeated administration or exposure to nitrous oxide may lead to addiction. Caution should be exercised in patients with a known history of substance abuse or in healthcare professionals with occupational exposure to nitrous oxide. The neonate should be checked for possible respiratory depression when Serynox is administered to the mother during childbirth. **For further information, please see Summary of Product Characteristics (SmPC).** Only available by prescription.

Pictures are for illustration. Images of persons show photo models. Product images may differ from the original.
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