High-Dose Inhaled Nitric Oxide for Drug-Resistant Pneumonia

Prelims: *Current events of national and international importance | Health*

Why in News?

Recently, researchers reported that high-dose inhaled nitric oxide reduced drug-resistant bacteria in a large-animal ICU model and was found safe in early human testing.

Pneumonia

- It is an ***infection of the lungs that causes inflammation of air sacs*** (alveoli) and accumulation of fluid or pus in the lungs.
    - **Type –** It can range from mild to severe and may be life-threatening, and can affect one or both lungs.
- **Causes – Bacterial causes –** *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Legionella pneumophila*, *Mycoplasma pneumoniae.*
- **Viral causes –** Influenza, COVID-19, respiratory syncytial virus, human metapneumovirus.
- **Fungal cause –** *Pneumocystis jirovecii* (PCP), especially in immunocompromised (weakened immune system) individuals.
- **Symptoms –** Fever, chills, cough with mucus, breathlessness, chest pain, fatigue, loss of appetite, bluish lips/nails, nausea/vomiting in children, and confusion in the elderly.
- **Risk factors –** Chronic diseases, weak immunity, smoking, pollutant exposure, indoor biomass fuel use, crowded living conditions, parental smoking.
- **Transmission –** Community-acquired, hospital/ventilator-associated, or aspiration of food/liquids into lungs.
- **Diagnosis –** Clinical exam, imaging, blood tests, sputum test, pulse oximetry.
- **Treatment –** Antibiotics/other drugs, pain and fever medicines, oxygen or IV fluids in severe cases, hospitalisation if needed, rest and hydration.

Nitric Oxide Therapy for Drug-Resistant Pneumonia

- **Caused by – *Drug-resistant Pseudomonas aeruginosa.***
  - Causes about one in five hospital pneumonias and resists multiple drugs.
- **Nitric oxide –** Naturally produced by the human body.
- **Medical use –** Low doses are used to widen blood vessels in acute respiratory failure.
- **Key Findings – *High-dose inhaled nitric oxide (300 ppm) reduced lung bacterial counts by 99%*** in ventilated pigs with multidrug-resistant pneumonia.
- Improved oxygenation and lung function and reduced need for blood pressure drugs.
- **Human Testing –** Phase-1 human study showed no serious adverse effects in healthy volunteers.
- Feasibility tested in critically ill ICU patients without immediate serious complications.
- **Risk and Limitations – Potential toxic effects –** Elevated methemoglobin and direct lung injury.
- Bacterial rebound is possible after stopping treatment.
- Long-term benefits are not proven and require clinical efficacy trials.
- **Practical barriers –** Requires specialised equipment, trained staff, and continuous monitoring for high-dose delivery.

Reference

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