

Inhalation agents	GASES	For local or systemic therapeutic effects	NO, CO, Xe
		Carriers for enhancing drug delivery	HeO2/Bronchodilator
		For Heat exchange	Rapid Cooling Airway heating
	AEROSOLS and/or NANO-PARTICLES	For local pulmonary effects	Bronchodilator Local Anti-inflammatory agents Antibiotics Surfactant Stem/progenitor cells
		For systemic effects	Anesthetics Organ protection Anti-inflammatory
Technology	THERAPEUTIC PRODUCTION	Liposome encapsulation Nano-particles Highly porous macro particles	
		Aerosol Generators	
	DELIVERY DEVICES	Multi-breath Aerosol Single Metered dose inhalers	For mechanical ventilation Spontaneous Breathing
	OPTIMIZATION OF DELIVERY	Intrapulmonary targeting based on: Individualized Lung Structure and Function Particle size Breathing pattern Breathing history	Serial targeting (delivery to central or peripheral airways)
			Parallel targeting (delivery to spatially heterogeneous lungs)
		Maximizing net drug delivery	Reducing drug entrapment in equipment Maximizing intrapulmonary drug deposition
	MONITORING	Safety Compliance Effectiveness Frequency of Use	
	DIAGNOSTICS	Global lung behavior	Oscillatory Mechanics Lung volumes and flows
Local lung function		Imaging	

Clinical Category	Clinical Need	Clinical Setting
I. ORGAN PROTECTION and CRITICAL CARE		ACUTE
	Cerebral Ischemia Sepsis/Inflammation/ARDS Suspended Animation Traumatic Injury/TBI Hypertension Emergencies Intra-operative organ protection ICU sedation*	
II. RESPIRATORY DISEASES*		ACUTE or Ambulatory (TX or prevent)
	Obstructive - COPD Obstructive - Asthma Pulmonary Hypertension	
III. ONCOLOGY*		ACUTE & Ambulatory
	Pain Relief Diagnose early disease Improve Treatment Efficacy Reduce Treatment Toxicity	
IV. NEUROLOGIC		CHRONIC
	Block PTSD attacks Prevent Seizures Treat Addiction & Detox Prevent cognitive decline Prevent/treat pain	
V. INFECTIOUS DISEASE		Ambulatory
	Antibiotics/vaccine Delivery	
VI. TRANSPLANT/REGENERATIVE		ACUTE
	Cell/growth factor delivery Prevent rejection	

* 2009 priority areas