

## Noble Life Sciences Offers Exceptional Technology for Aerosol Inhalation Research.

The PneumoDose Aerosol Inhalation System is designed as a flexible, modular inhalation exposure system capable of delivering accurate, conditioned, respirable aerosols within whole-body, head-only, nose-only, and oralnasal aerosol exposure chambers. The customizable technology platform fully complies with GLP standards and provides precise control of the aerosol exposure.

### MEASURED, ACCURATE DOSING

Accurate, precise and reproducible aerosol delivery is achieved through unmatched control of aerosol conditions, particle counting and real-time plethysmography (breathing measurement).

### DIRECT DELIVERY AND TARGETING

This ground breaking inhalation delivery system, coupled with nanoparticulation of the applied treatment, delivers increased localized concentration and bioavailability of the intervention directly to the alveoli, avoiding both first liver pass and renal excretion.

### Physical Characteristics of a Micronized Antibiotic

	Ceftazidime (as received)	Ceftazidime NC 6 hr SSM	Ceftazidime NC 15 min LSM
Solubility (mg/mL)	0.936	9.704	5.100
Water content (%)	4 ± 0.3	3 ± 0.2	3 ± 0.4
Bulk density (g/mL)	0.700	0.025	0.042
Surface area (m <sup>2</sup> /g)	<Detectable Limit	33.210	19.948
Emitted Dose (% , Mean ± SD)	73 ± 15	92 ± 3.0	90 ± 3.0

NC: Nanoclustering; SSM: Small Scale Milling; LSM: Large Scale Milling

### SMALL ANIMAL AND RODENT RESEARCH MODELS

Ideally suited for pharmaceutical testing in rodents and small animal models, the NasalDose Module includes a nose-only exposure manifold. Nose-only exposure routes the aerosol directly to the breathing zone and prevents the negative effects from huddling and avoidance behavior observed in whole-body chambers. This delivery method reduces the amount of test article required compared to other exposure methods.

### LARGE ANIMAL RESEARCH MODELS

Employing a novel inhalation system suitable for exposure in large animal models, the proprietary challenge plethysmography and sample collection masks deliver aerosol directly to the breathing zone of the test animal and sample collection probes. This system reduces dermal contamination, eliminates whole body and ocular contamination, and enables multiple, simultaneous challenges of test subjects.



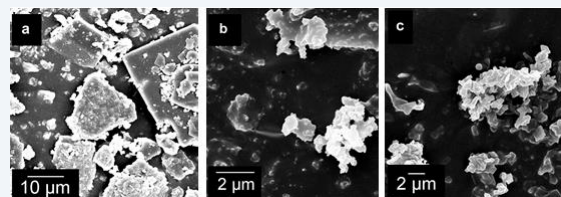
The future of aerosol drug research technology.

### INDUCE A PULMONARY DISEASE STATE OR ADMINISTER TREATMENT

A superior tool for delivering biological agents to effect or replicate a pulmonary disease state. In addition, this device presents new opportunities to develop pharmaceutical vehicles for countering biological or chemical insults, with the potential to revolutionize the management of COPD, asthma, pneumonia, other respiratory diseases or disorders.

### MICRONIZATION YIELDS INCREASED SOLUBILITY

Wet milling techniques generates pharmaceutical grade aerosol micro-particles and nanoclustering products with increase surface area for improved solubility after optimal delivery into the lungs.



SEM images of (a) as received antibiotic, (b) NanoClusters after 6 hours of small-scale milling, and (c) NanoClusters after 15 minutes of large-scale milling.

### MULTIPLE AND SIMULTANEOUS DELIVERY

The technology allows for multiple, simultaneous challenges of rodent, small and large research animal test subjects ensuring reproducibility while reducing waste.

Noble Life Sciences is a full-service, preclinical contract research organization offering GLP and non-GLP research assistance for the development of drugs, vaccines and medical devices. From proof-of-concept studies to preclinical safety and efficacy studies, Noble has a wide range of services to meet your needs. **For more information about Noble Life Sciences, please visit [www.noblelifesci.com](http://www.noblelifesci.com).**