

# “Dry Powder Inhaler (DPI) Design for Producing Aerosols with High Fine Particle Fractions” VCU #12-044 -045

## Applications

- Respiratory drug delivery (inhaled chemotherapies, antibiotics, and insulin)
- Dry powder pharmaceutical aerosols for inhalation

## Advantages

- Better dose control
- Minimized drug loss in the mouth-throat
- Submicrometer sized aerosol particles
- Improved powder deaggregation

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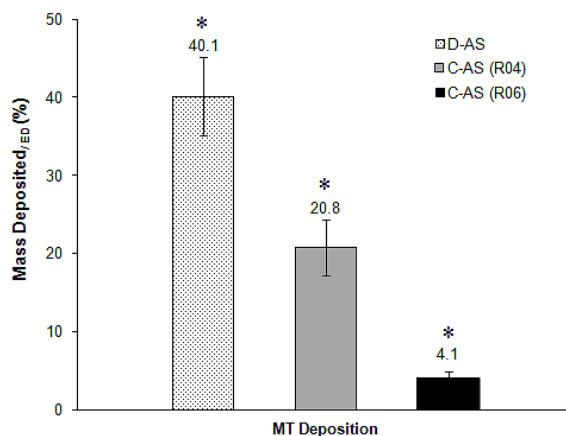
## Market Need

Dry powder inhalers (DPIs) are commonly used to treat respiratory diseases such as asthma, bronchitis, emphysema and COPD. Conventional DPIs are inefficient at delivering pharmaceutical aerosols to the lungs, resulting in large losses that typically occur in the device and extrathoracic airways. The deposition of drug aerosol in the mouth-throat region results in wasted medication and increased side effects. A combination of submicrometer aerosols and improved powder dispersion may allow the next generation of inhaled drug products to be delivered more efficiently.

## Technology Summary

Researchers at VCU have created a dry powder inhaler and formulations capable of creating submicrometer size aerosols (1 micrometer or below). The particles contain drug and excipients to enable efficient dispersion and subsequent hygroscopic growth in the airways for highly efficient deposition. By employing this invention, drug loss in the mouth-throat can be minimized (to approximately 1%) and deposition in the lung can be maximized to provide better dose control. The invention can be used to improve drug delivery to the lungs for local and systemic applications, including the delivery of chemotherapy, antibiotics or insulin, in which efficient and precise drug dose is required.

Mouth-throat deposition for the drug and excipient submicrometer combination particles (C-AS R06) is compared in the figure to micrometer particles containing the same excipients (C-AS R04) and drug only micrometer particles (D-AS). Mouth-throat (MT) deposition was observed to be 4.1% for this novel technology.



## Technology Status

Patent Pending: U.S. and foreign rights are available.

This technology is available for licensing to industry for further development and commercialization.