

# COMPARISON OF AEROSOL DELIVERY USING THE AEROGEN MICROPUMP AND JET NEBULIZER IN A CLOSED-SYSTEM VENTILATOR CIRCUIT

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## abstract

### COMPARISON OF AEROSOL DELIVERY USING THE AEROGEN MICROPUMP AND JET NEBULIZER IN A CLOSED-SYSTEM VENTILATOR CIRCUIT.

#### Background

There has been discussion on the efficacy of aerosolized medication devices given through closed-system ventilator circuits. The jet nebulizer and the micro pump aerosol generator have been an acceptable method of aerosolized medication delivery systems in the hospital setting. However, little is known about how much aerosolized medication is actually delivered to the patient when using the jet nebulizer and the micro pump in-line through a closed-system ventilator circuit.

#### Methods

Testing was performed through an Airlife Care fusion Infant Respiratory (RT4851-12) closed-system circuit connected to an Avea Ventilator utilizing a Bio-med™ device test lung. Each test disbursed a 3 ml of TC 99mTC DTDA as our aerosol. The Aerogen micro pump and Misty-Neb™ jet nebulizer were placed in line at the temperature probe on the inspiratory limb of the circuit approximately 18 inches from the patient wye and patient effort was simulated at a 0.45 minute volume. The built in nebulizer function of the Avea ventilator was used to drive the Misty-Neb™ jet nebulizer. All nebulizer sessions were performed over the duration of medication. All circuits were then placed under a GE Infinia Hawkeye Gamma Camera.

#### Results

Data was analyzed from 15 sessions. The average medication delivery toward the patient with the micro pump was 3.45% ±2.13 (n=9). The average medication delivery toward the patient with the jet nebulizer was 0.78% ±0.53 (n=6). Single factor analysis of variation (ANOVA) yielded a P= 0.008 between the micro pump and the jet nebulizer.

#### Conclusion

With the intubated patient there was a statistically significant difference in delivery of the aerosolized medication toward the patient using the Aerogen Micropump at the temperature probe compared to the Misty-Net™.

## introduction

The purpose of this study was to evaluate aerosol particle deposition using two different devices, the jet nebulizer and the micro pump aerosol generator. Based on the supposition that aerosol delivery is dependent on the patient's respiratory pattern, we controlled the patient's minute volume and focused on the amount of deposition to various circuit components. We surmise that based on the findings we will see that the micro pump aerosol generator delivers a more effective distribution of medication towards the patient as compared to the jet nebulizer, thus possible improving the overall efficacy of the treatment.



## methods

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## disclosure

Disclosure of Presenter conflict of interest: NONE  
Disclosure of any research funding, sponsorship, or financial support: NONE

## results

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Total Count	ROL 1	ROL 2	ROL 3
366112	650(.17%)	268631(73.3%)	28439(7.7%)
430973	553(.12%)	334626(77.6%)	34511(8%)
336972	91(.02%)	209549(62.1%)	10242(3.03%)
2417260	5281(.21%)	1804218(74.65)	302688(12.5%)
2629980	6758(.25%)	1543126(58.6%)	361751(13.7%)
2709429	12023(.44%)	1814813(66.98%)	579200(21.37%)
2686664	92694(3.45%)	1091954(40.64%)	1166886(43.43%)
2464189	162572(6.60%)	473411(19.21%)	966858(39.24%)
2280989	326075(14.29%)	675933(29.63%)	1049183(45.99%)
1988234	98286(4.94%)	596251(29.99%)	926015(46.57%)
2755170	15495(.56%)	1051230(38.15%)	11158984(40.5%)
2446290	42893(1.75%)	1043285(42.64%)	791825(32.36%)
2755170	15495(.56%)	1051230(38.15%)	11158984(40.5%)
2632330	1062968(40.38%)	176241(6.69%)	930098(35.33%)
2417097	101591(4.20%)	1080830(44.71%)	896354(37.08%)
2362909	127879(5.41%)	832632(35.23%)	940275(39.79%)
2311926	83242(3.60%)	864582(37.39%)	736346(31.84%)

## conclusion

The purpose of this study was to evaluate aerosol particle deposition using two different devices, the jet nebulizer and the micro pump aerosol generator. We wanted to control the patient variables and focus on the amount of deposition on the various circuit components.

By utilizing the various circuit components, we found that the Aerogen Micropump at the temperature probe delivered statistically significant more aerosolized medication toward the patient compared to the Misty-Neb™

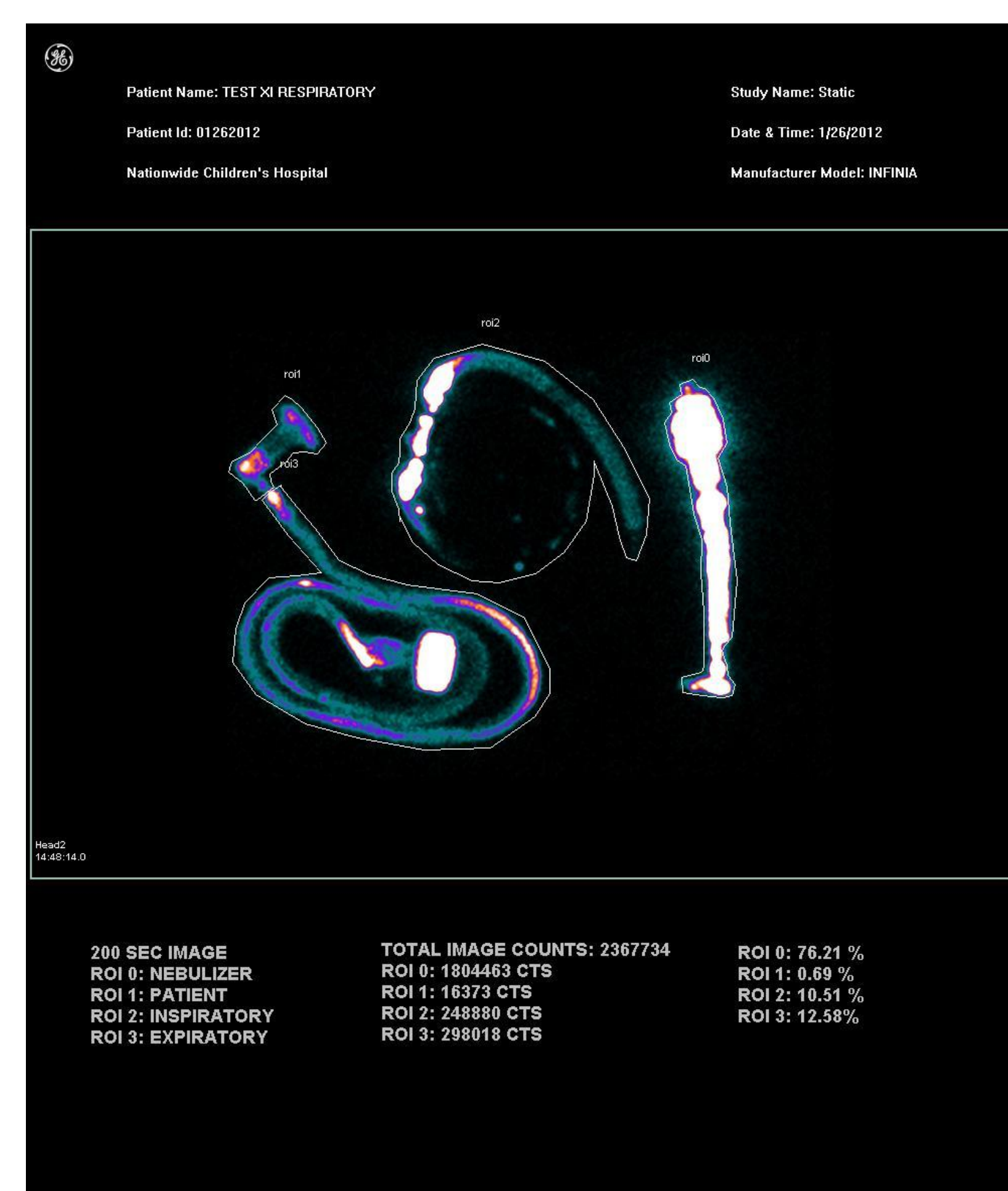


Fig. 1 Misty-Neb™ jet nebulizer placed in line at temperature probe

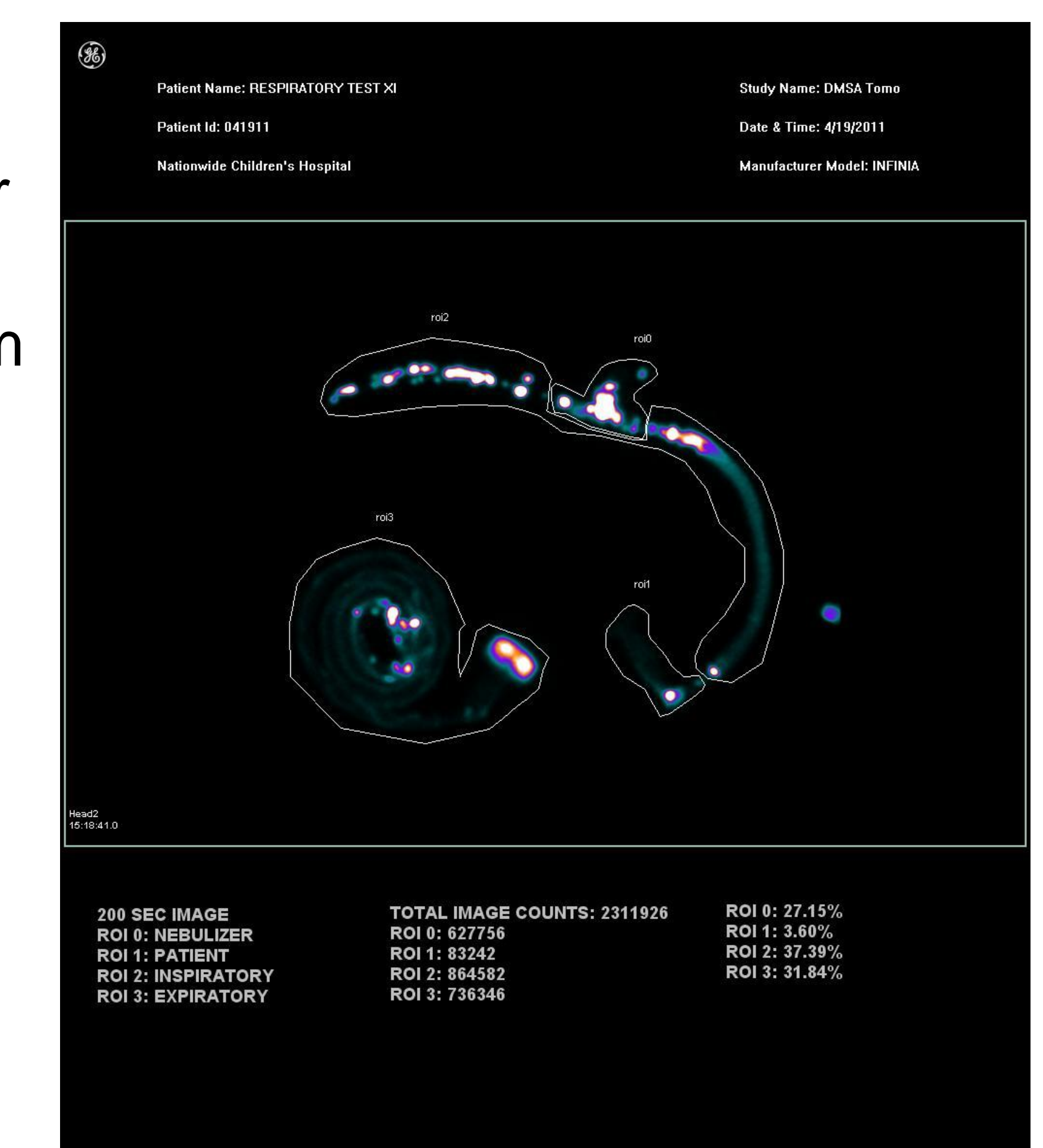


Fig. 2 infant ventilator circuit with aerogen placed 18 inches from the patient