

# Comparison of X-ray radiation exposure during digital subtraction angiography (DSA) and multislice CT angiography (CTA)

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## **Abstract**

### **Purpose:**

To compare radiation risk during digital subtraction angiography (DSA) and CT angiography (CTA).

### **Materials and methods:**

Eighty patients randomly divided into two groups of 40 patients each, were evaluated for coronary atherosclerotic heart disease with 64-slice spiral CT angiography and DSA respectively. For CTA group we divided patients into two subgroups: regular mode and ECG modulation mode. Matrix of thermoluminescent dosimeters (TLDs) were placed on patients' skin surface during each examination to assess peak skin dose (PSD). A male ART phantom was equipped with TLDs in six different positions to assess achievable organ dose. Effective dose was calculated by commercially available computer programs.

### **Results:**

For DSA, PSD was 64mGy. Phantom organ dose for lung, heart, stomach, liver, kidney and brain were 11.07mGy , 5.87mGy, 1.42mGy, 2.11mGy , 6.76mGy and 0.001mGy respectively, and effective dose was 4mSv. For regular mode CTA, PSD was 74.5mGy, and  $CTDI_{vol}$  was 37.9mGy. Phantom organ dose for lung, heart, stomach, liver, kidney and brain were 58mGy , 64.2mGy ,6.6mGy ,9.9mGy ,2.7mGy ,0.072mGy respectively, and effective dose was 16mSv. For ECG modulation mode, PSD was 50.9mGy, and  $CTDI_{vol}$  was 26.3mGy.

### **Conclusion:**

According to measured PSD value, deterministic radiation risk for regular mode CTA was little higher than DSA. However for stochastic radiation risk which can be indicated by organ dose and effective dose, regular mode CTA was much higher than DSA. Comparing with regular mode, ECG modulation mode can effectively reduce both stochastic and deterministic radiation risk.

**Keywords:** *radiation exposure; digital subtraction angiography; multislice CT angiography*