

# *FDR nano* **NEW**

For image quality at the output



# For image quality at the output of *FDR nano*

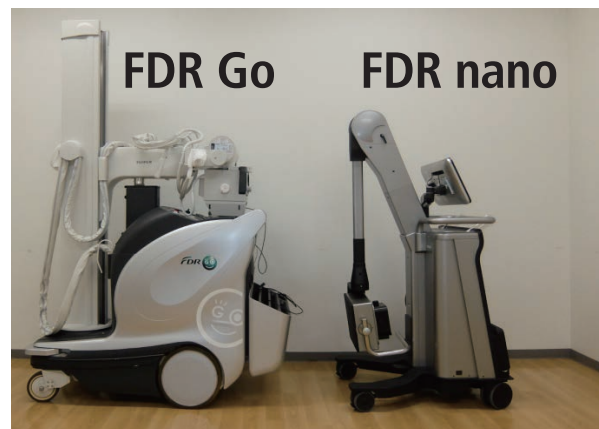
## General statement

- ◆ FDR nano has a low output in order to downsize, but it can be captured without any problems by D-EVOII and Virtual Grid.

Item	FDR nano spec (D-EVO II+VG)	Image concern	(Reference) FDR Go spec (D-EVO + mobile X-ray system)
Maximum mAs	25 mAs	(1)Sortage of dose	320 mAs
Tube current	25 to 35 mAs	(2)Mortion artifact	100 to 400 mAs
Minimum exposure time	10 ms	(3)Neonate radiography	1 ms
Focus size	1.2 mm	(4) Enlarged blur	0.7/1.3 mm

## Comparison with FDR Go

System	DR	X-ray equipment
FDR nano	D-EVO II VG	X-ray Cart(2.5 kW)
FDR Go	D-EVO	Mobile X-ray system(32 kW)



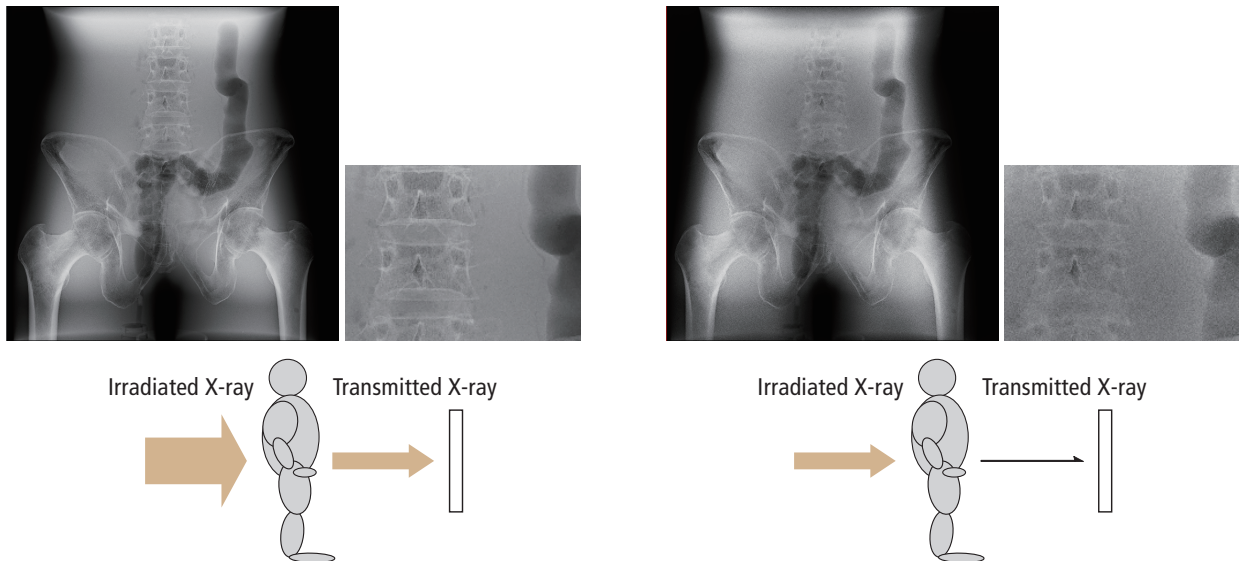
# For image quality at the output of *FDR nano*

Image concern(1) -1

Shortage of dose

## Concern

- ◆ For a low maximum mAs value, an insufficient dose is of concerned for body parts and obese bodies.

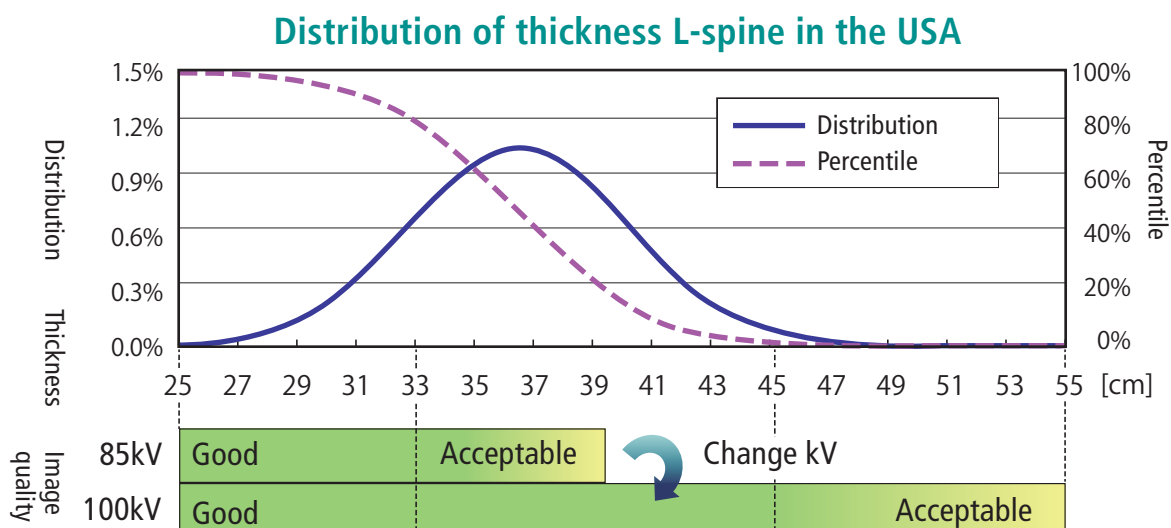


## Strong point

- ◆ Standard body thickness can be taken under the same conditions as FDR Go, and also can be taken wide body thickness by increasing kV.



The maximum mAs of FDR nano can capture wide body thickness.



# For image quality at the output of *FDR nano*

Image concern(1) -2

Shortage of dose

## Evidence

- ◆ For all body parts except the abdomen, the preset exposure conditions of FDR Go are within the output of FDR nano.

### Exposure conditions of FDR Go (Csl)

		mAs								
		0.25	0.5	1	2.5	3.2	10	25	32	32~
kV	40									~200
	50		Hand		Foot/Arm					~160
	60					Leg	Head			~125
	70									~125
	80			Chest			L-spine		Abdomen	~100
	90									~100
	100									~80
	110									~80
	120									~80
	130									~50

Only the abdomen is over the maximum mAs spec of FDR nano

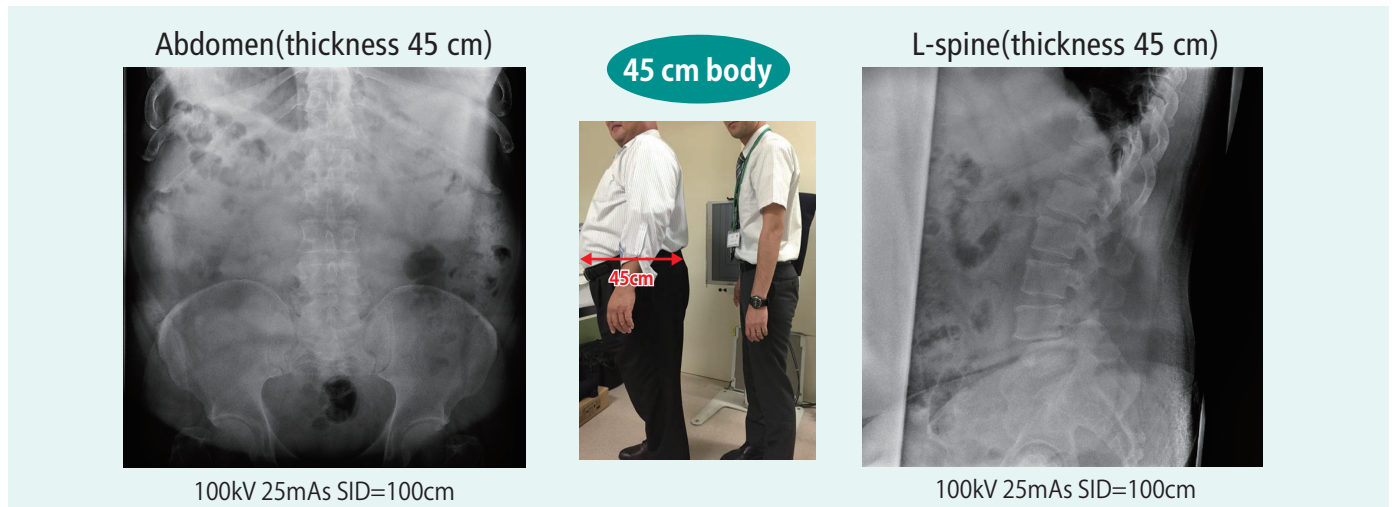
Output of FDR nano    Output of FDR Go

Only the abdomen is over the maximum mAs spec of FDR nano

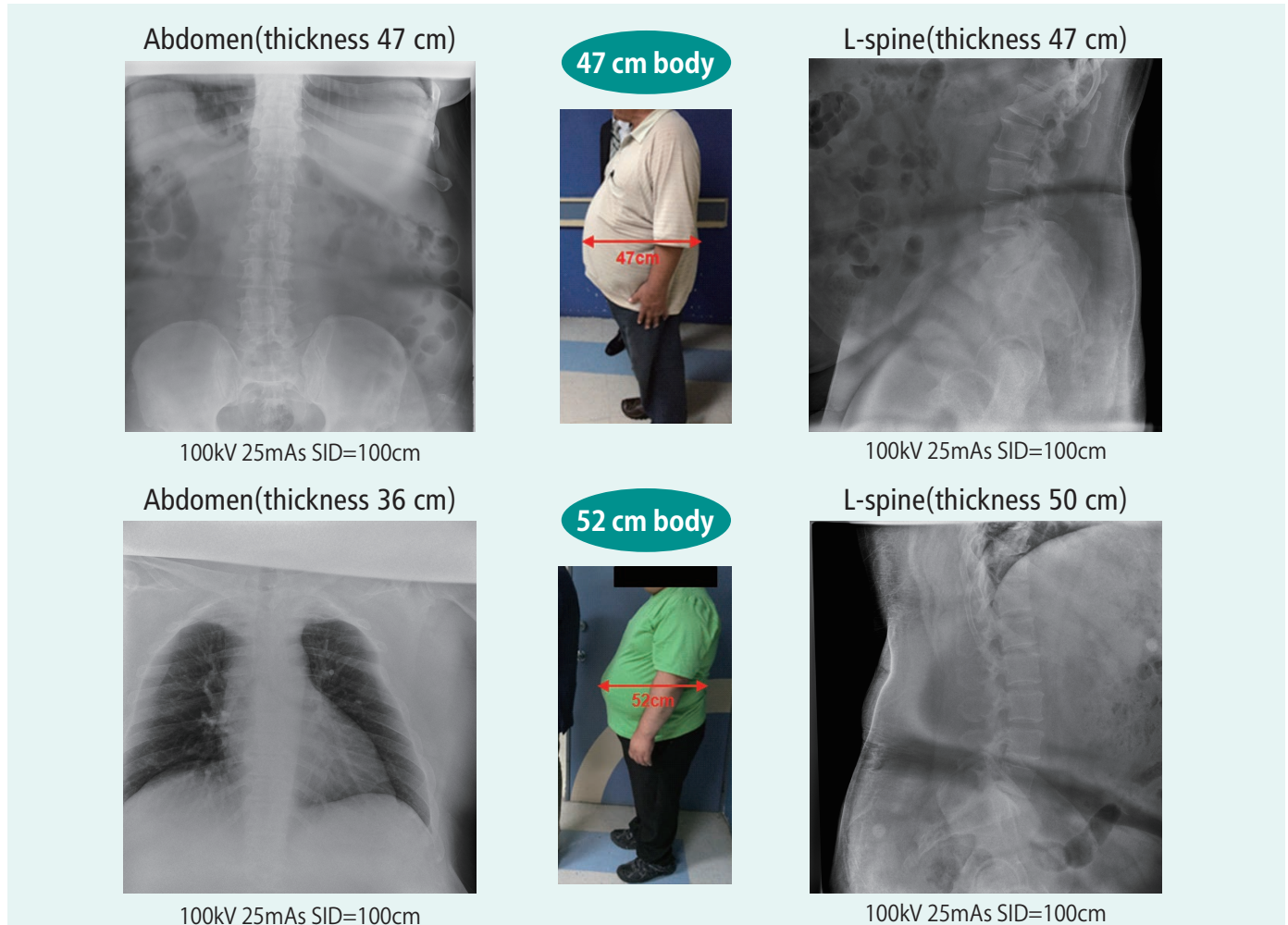


### Evidence

◆ FDR nano can capture a wide body thickness by increasing the kV condition.



◆ FDR nano can capture more of a wide body thickness by increasing the kV condition.



# For image quality at the output of *FDR nano*

Image concern(2) -1

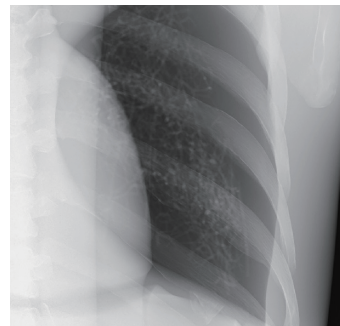
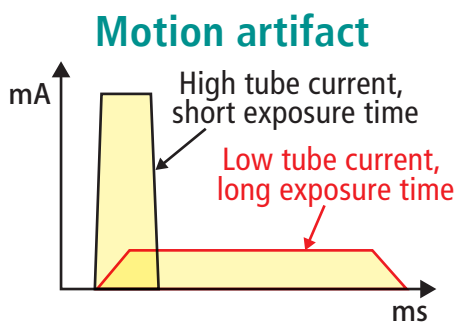
## Motion artifact

### Concern

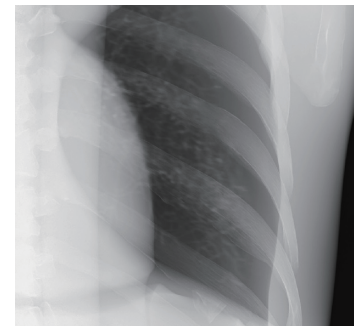
- ◆ Since the chest's movement is fast, generally it is taken with a high tube current and short exposure time in order to suppress the motion artifacts. But FDR nano's tube current is low, and exposure time is prolonged.

#### CALNEO AQROの管電圧と管電流

Tube voltage	Tube current	
	Exposure time < 100 ms	Exposure time ≥ 100 ms
76 to 85 kV	30mA	25mA
86 to 100 kV	25mA	



High tube current,  
short exposure time



Low tube current,  
long exposure time

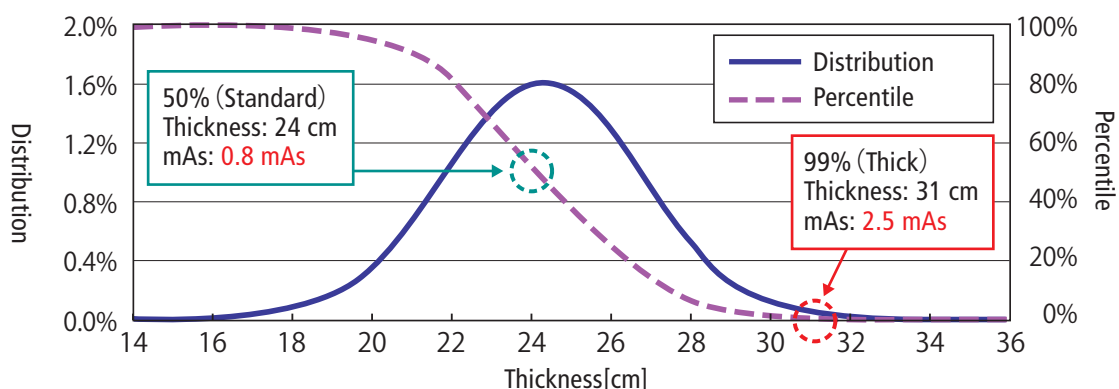
### Strong point

- ◆ For chest radiography in FDR nano, the current is 25 mA, and if the exposure time upper limit is 125 ms, the maximum value is 3.2 mAs.



The tube current of FDR nano can capture a wide body thickness.

#### Distribution of Chest Thickness in the USA



# For image quality at the output of *FDR nano*

Image concern(2) -2

## Motion artifact

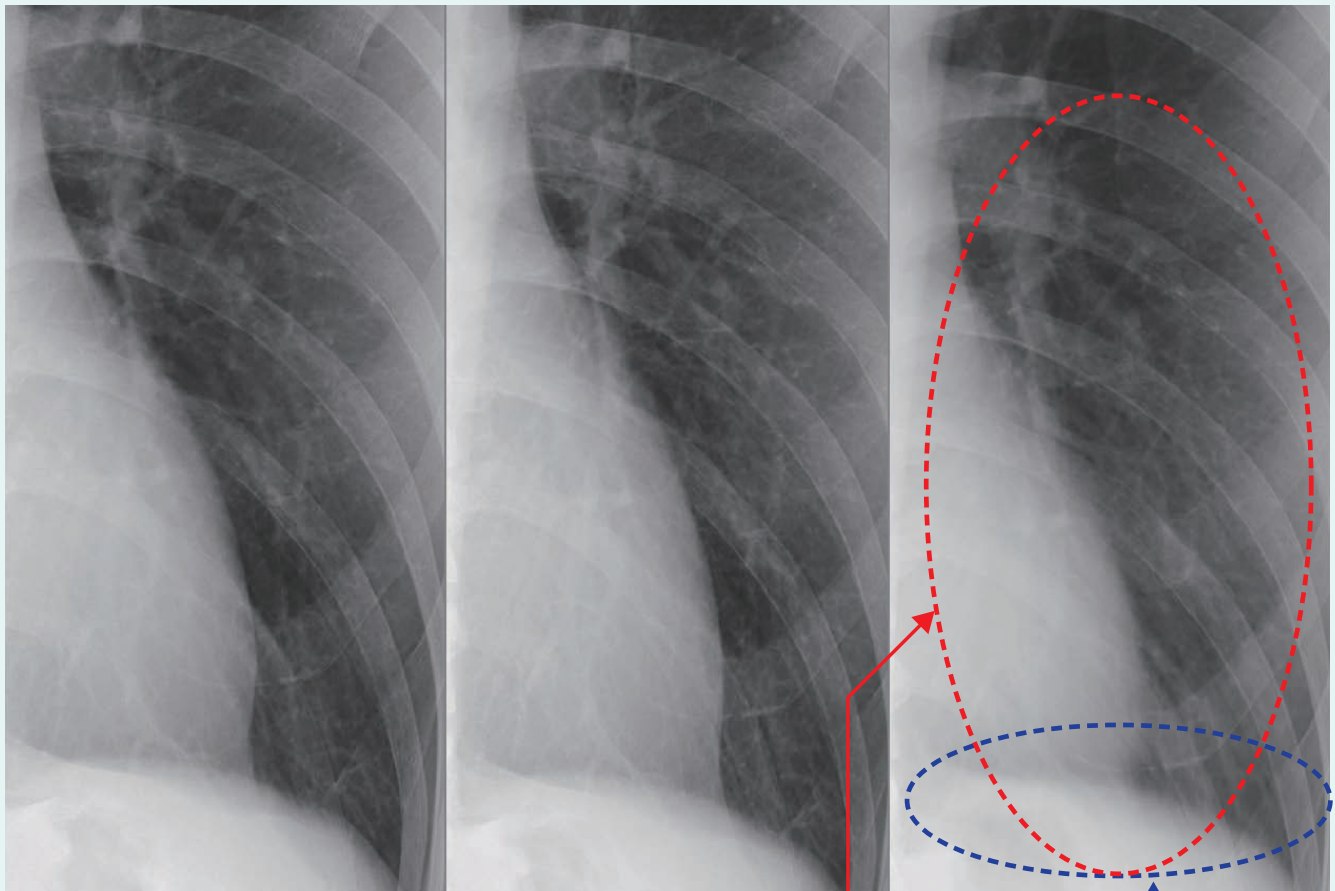
### Evidence

- ◆ If the exposure time is within 125 ms, motion artifact is not a problem, even for breathing.

**50 ms**  
(Reference)

**100 ms**  
(Motion artifact : OK)

**125 ms**  
(Motion artifact : Acceptable)



Lung blood  
vessels area little blurred.

Diaphragm is  
a little blurred.

## Concern

- ◆ Motion artifacts in neonate radiography may be captured with an exposure time of less than 10 ms. However, since the minimum exposure time of FDR nano is 10 ms, the exposure time becomes longer.

### Heart Rate and Breath Rate of Neonate

	Status	Neonate	Adult
Heart rate	Normal	110 to 140 bpm	50 to 100 bpm
	Breathing disorder	150 bpm	100 to 150 bpm
	After anaerobic exercise	—	150 bpm
Breath rate	Normal	30 to 60 bpm	12 to 24 bpm
	Hyperpnea	60 bpm	24 bpm

## Strong point

- ◆ If the X-ray output of FDR nano is low, it can be taken without any problems by the D-EVO II and Virtual Grid.

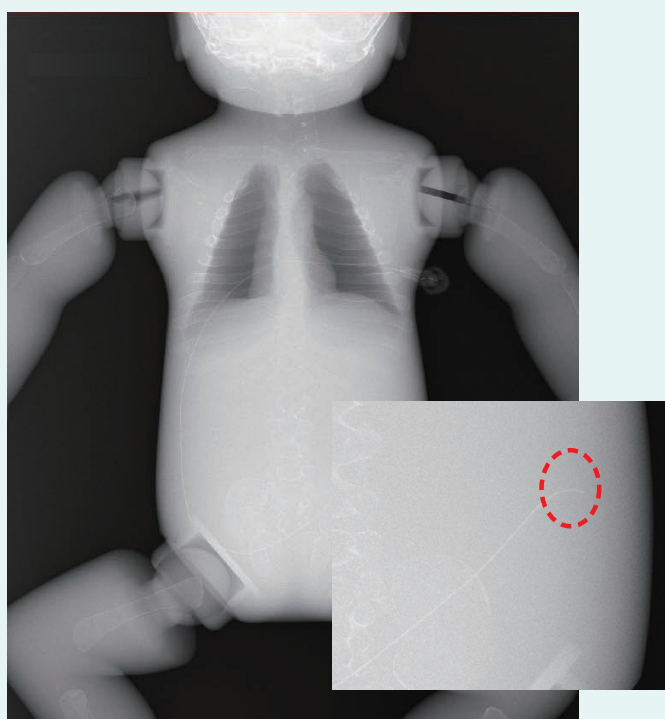
Item	POCX spec	Image quality performance
Minimum exposure time	1ms	FDR nano can capture a neonate without motion artifact in 10 ms.



### Evidence

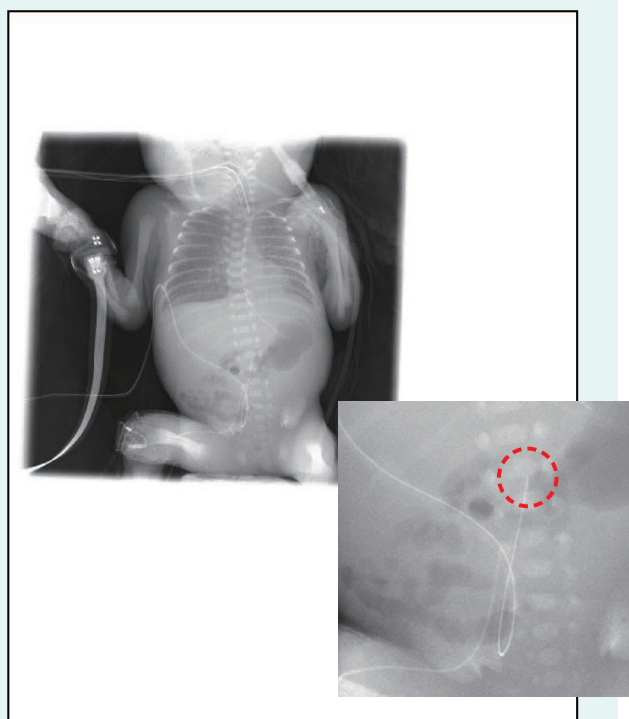
- ◆ If the exposure time is 10 ms, it can be irradiated with the dose required for neonate radiography, with no problem in the appearance of the catheter.

Phantom + catheter



73 kV 0.25 mAs Thickness: 10 cm

Clinical image

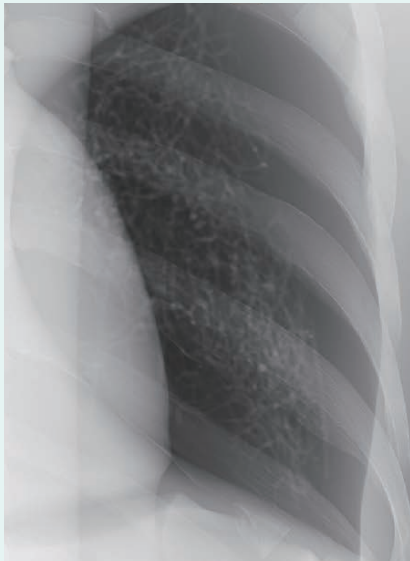


50 kV 0.8 mAs Thickness: 5 cm

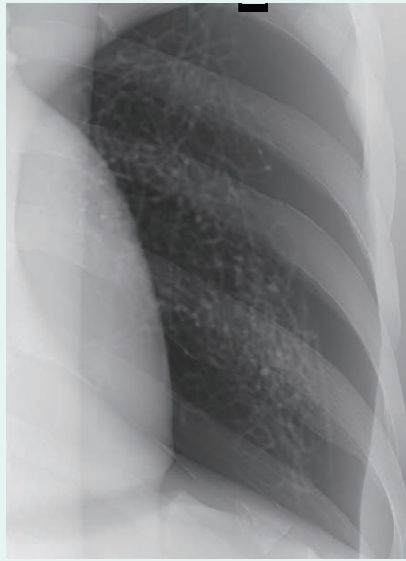
## Evidence

- ◆ If exposure time is 10 ms, the motion artifact for the heart rate of a neonate is not a problem (0.15 mm).

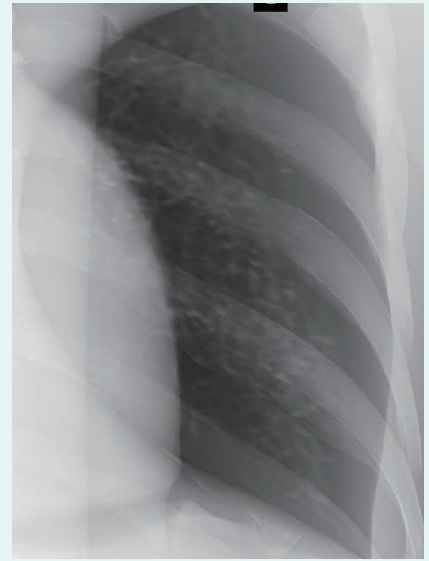
Image of Moving Phantom



10ms



30ms



50ms

- ◆ If exposure time is 10 ms, the motion artifact in the breath rate of a neonate is not a problem (0.15 mm).

Image of Moving Phantom



10ms



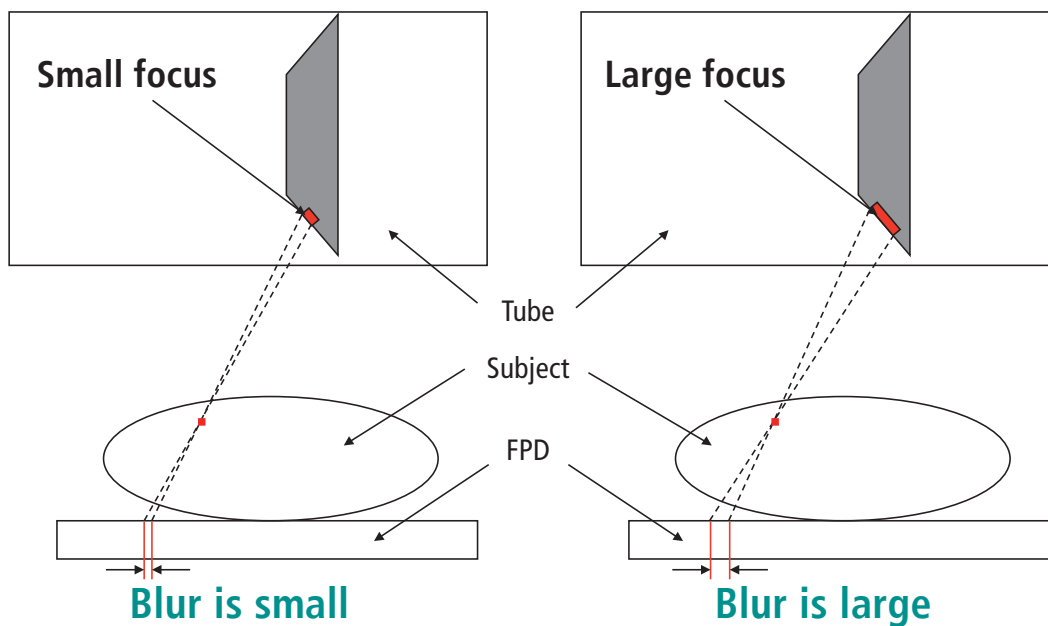
30ms



50ms

### Concern

- ◆ In radiography, in FDR nano is captured at large focus in conditions that had been captured at small focus in FDR Go. Therefore, the enlarged blur is increased.



### Strong point

- ◆ If the X-ray output of FDR nano is low, it can be taken without any problems by the D-EVO II and Virtual Grid.

Item	POCX spec	Image quality performance
Focus size	1.2mm	FDR nano can capture radiograph without enlarged blur.

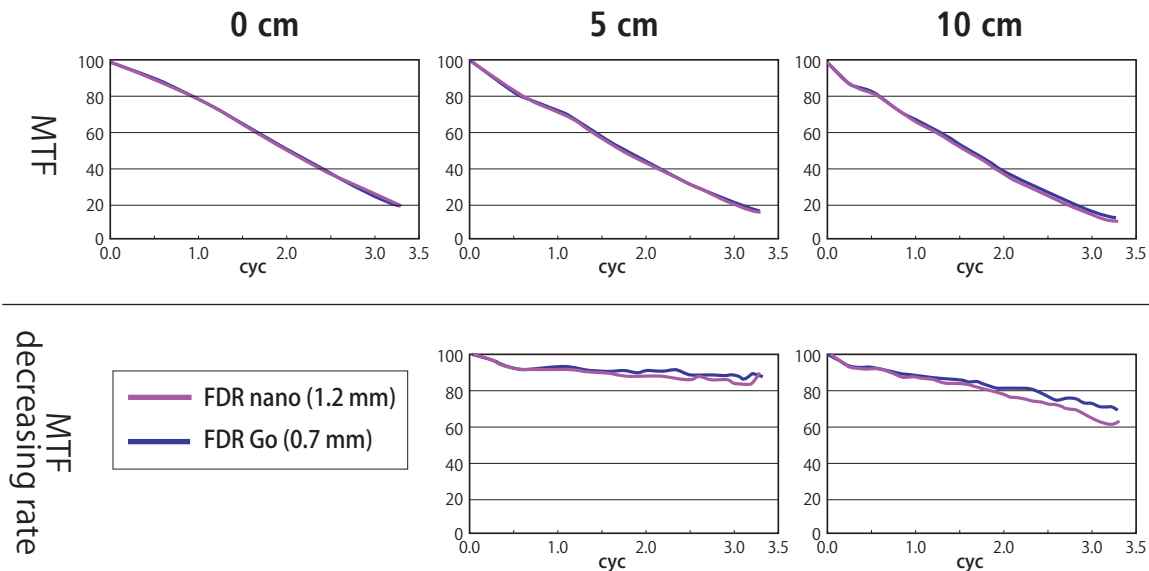
# For image quality at the output of *FDR nano*

Image concern(4) -2

Enlarged blur

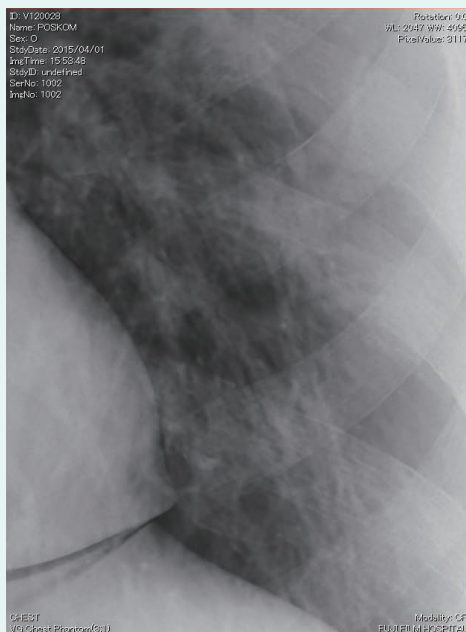
## Evidence

- ◆ If the physical value of FDR nano is almost equal to the small focus, there is no problem.



- ◆ If the chest image of FDR nano is almost equal to the small focus, there is no problem.

**FDR nano**  
(focal size: 1.2 mm)



**FDR Go**  
(focal size: 0.7 mm)

