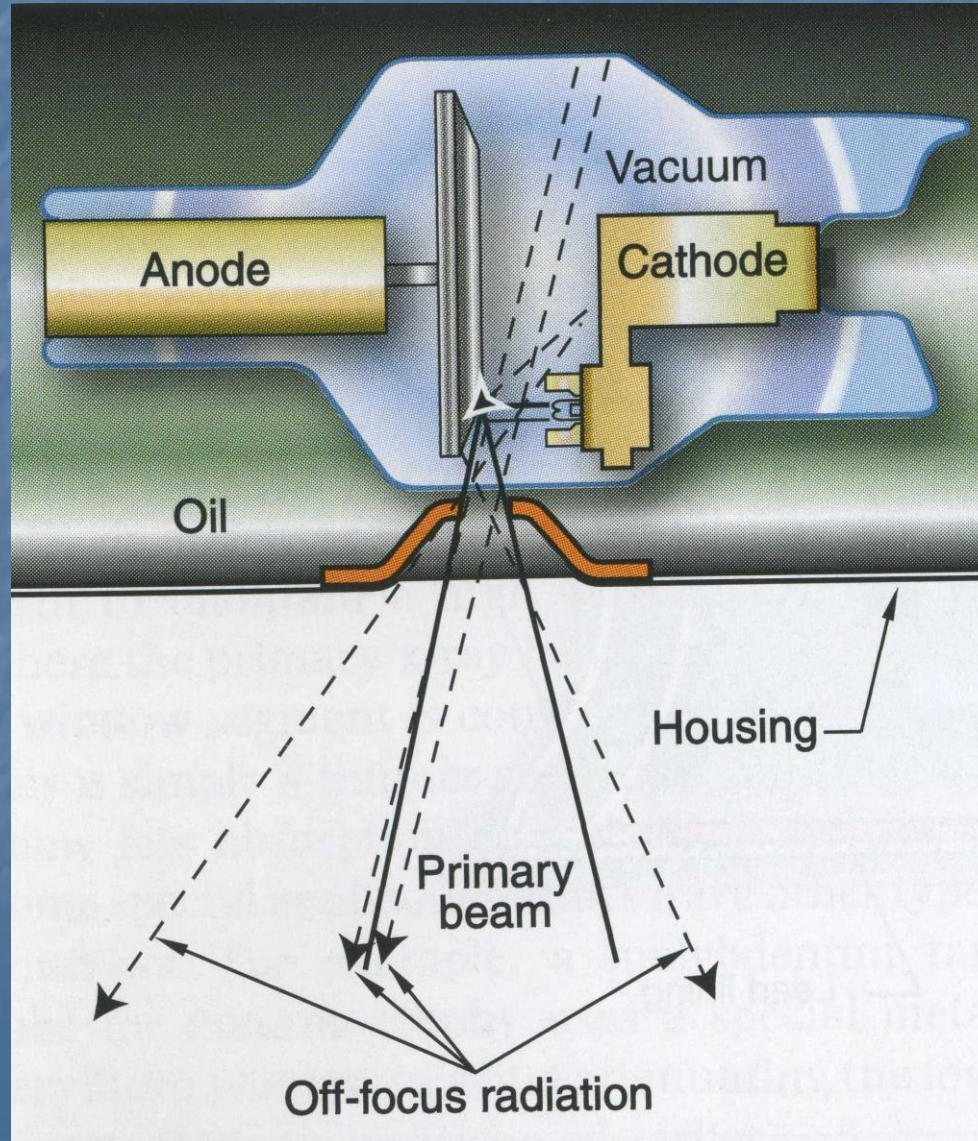


Off-Focus Radiation

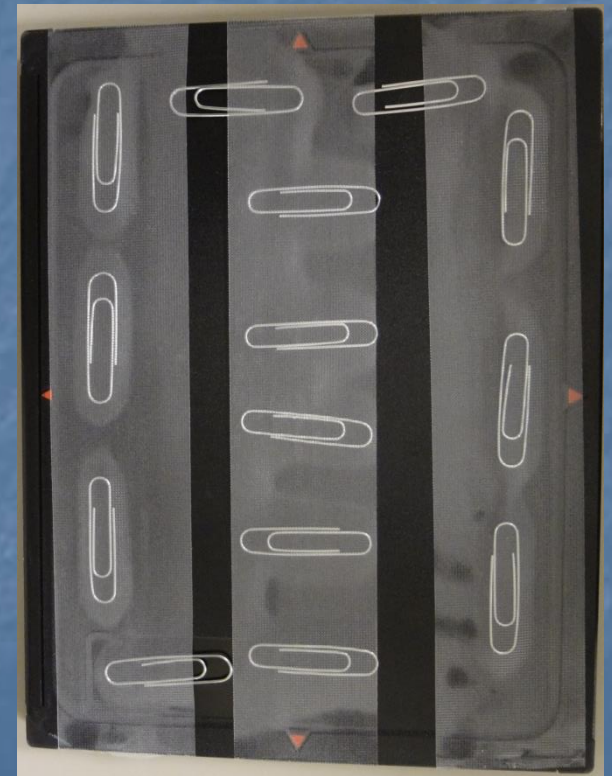
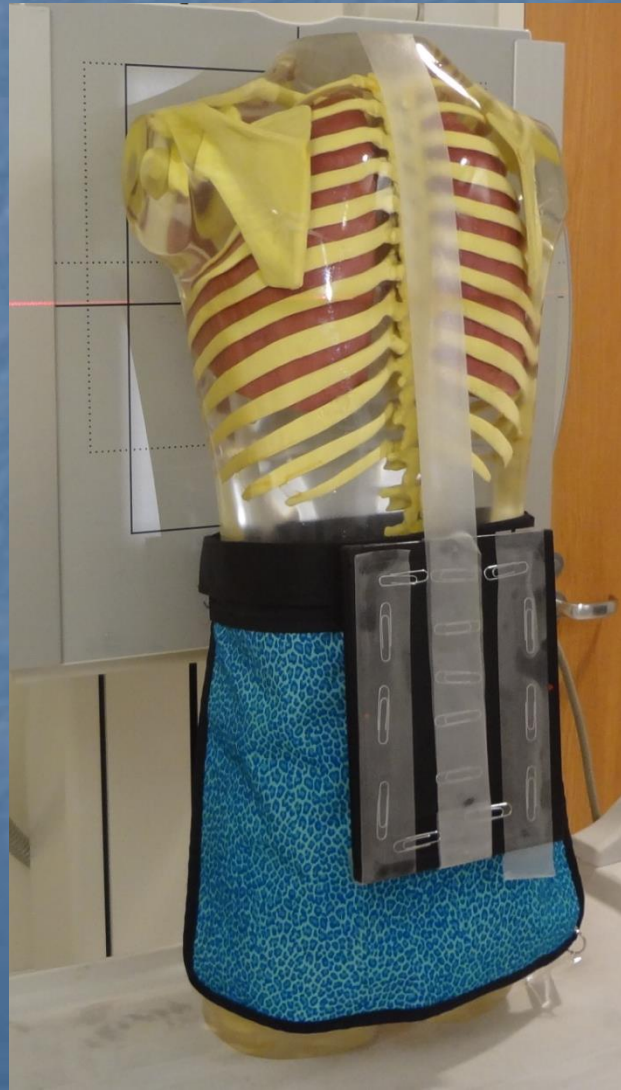
experiment that

Stewart Carlyle Bushong, ScD, FAAPM, FACR presented to the AAPM

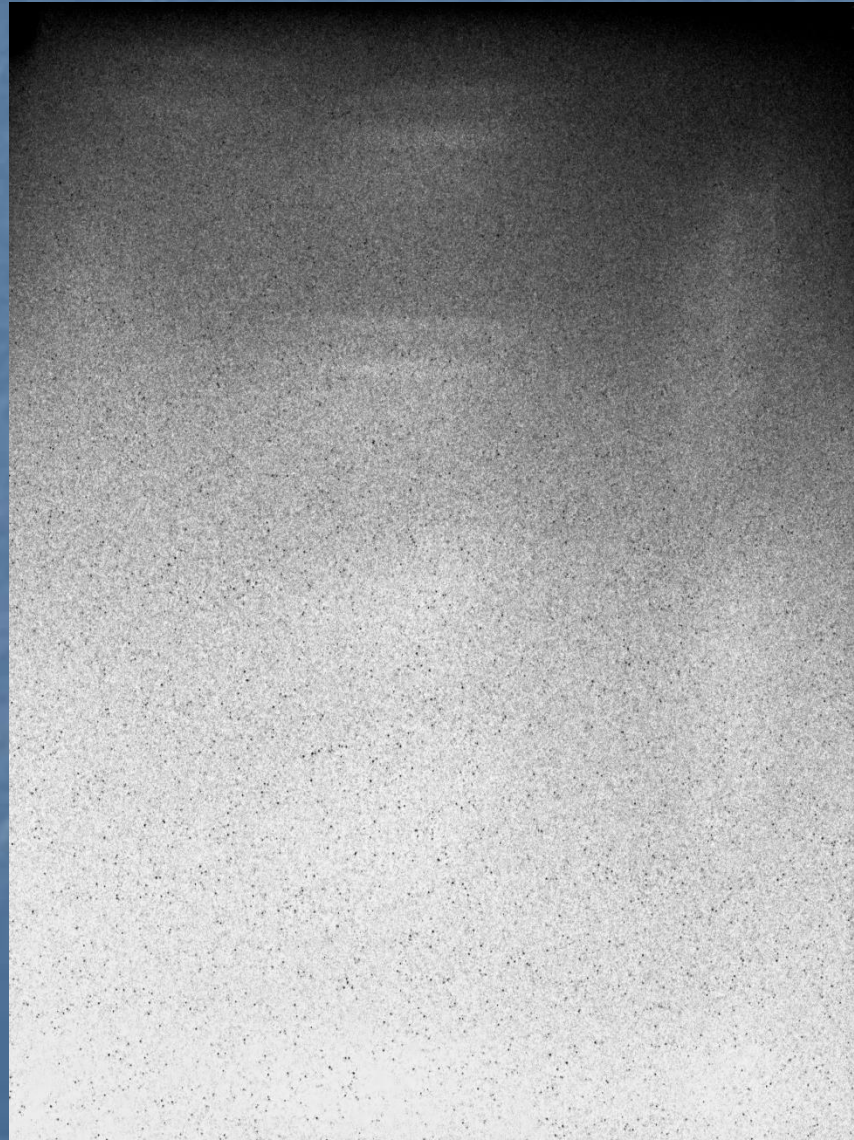
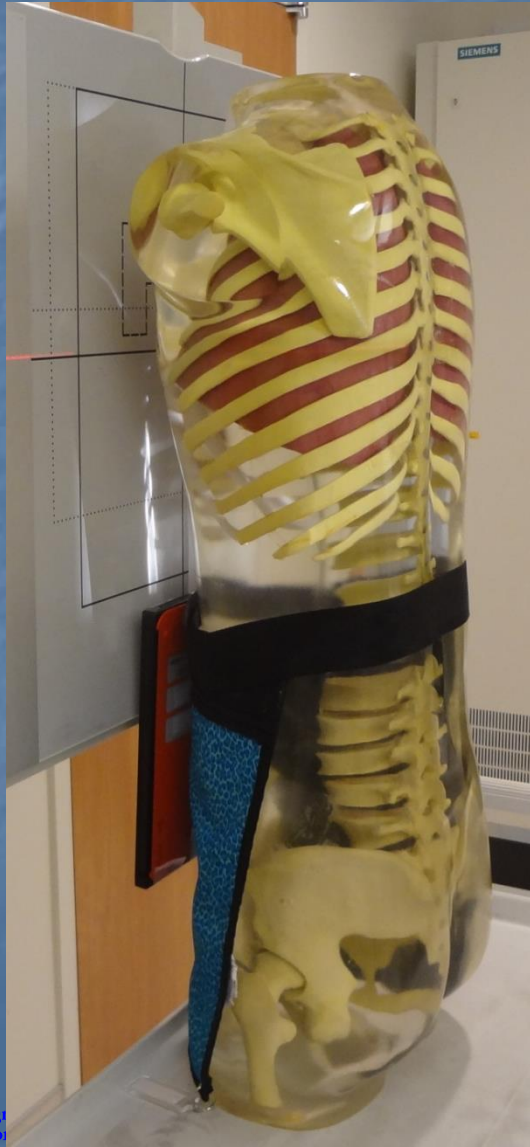


Art courtesy of
"Principles of
Radiographic
Imaging" by
Rick Carlton

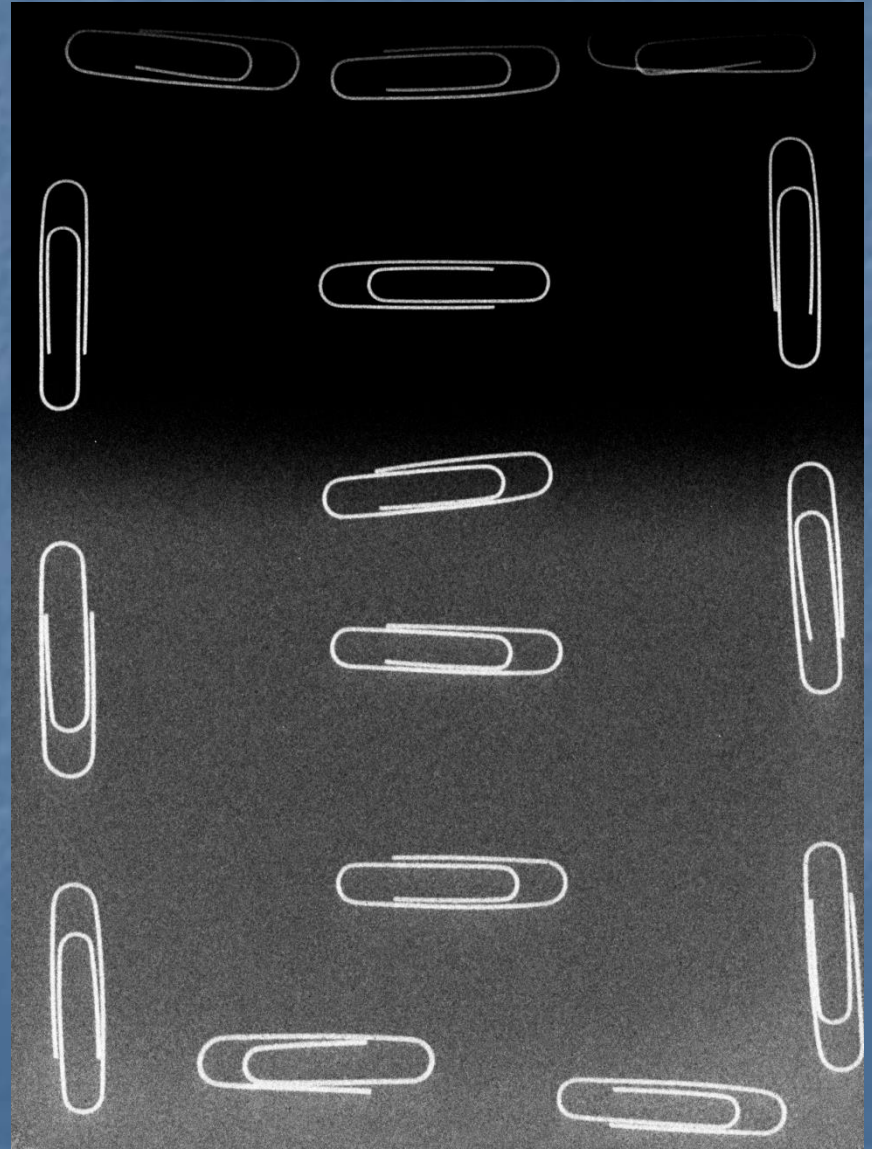
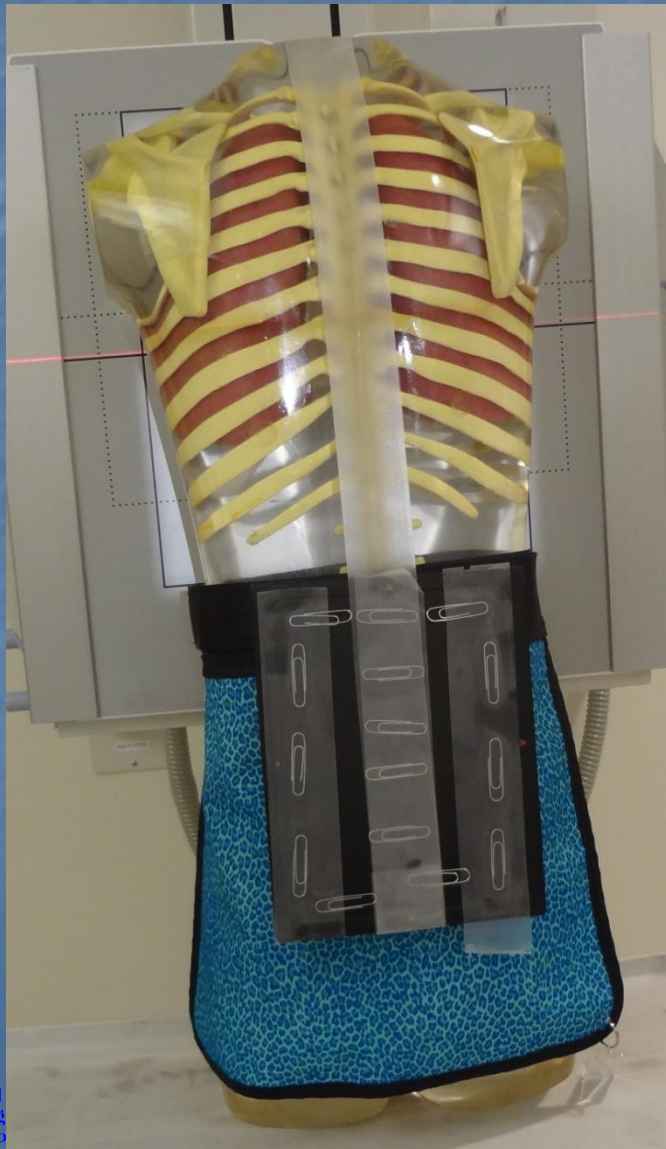
Checking to see if it's wiser to shield a patient in the front or the back for a PA chest x-ray. Collimated to 14x17, with shield and cassette below primary beam.



Shield and cassette in front.
117 kV @ 2.5 mAs LgM .540



Shield and cassette in back.
117 kV @ 2.5 mAs LgM 1.53



CR cassette with paper clips spaced every inch, bottom of 14x17 lightfield just above the cassette. None of the primary beam is exposing the cassette.



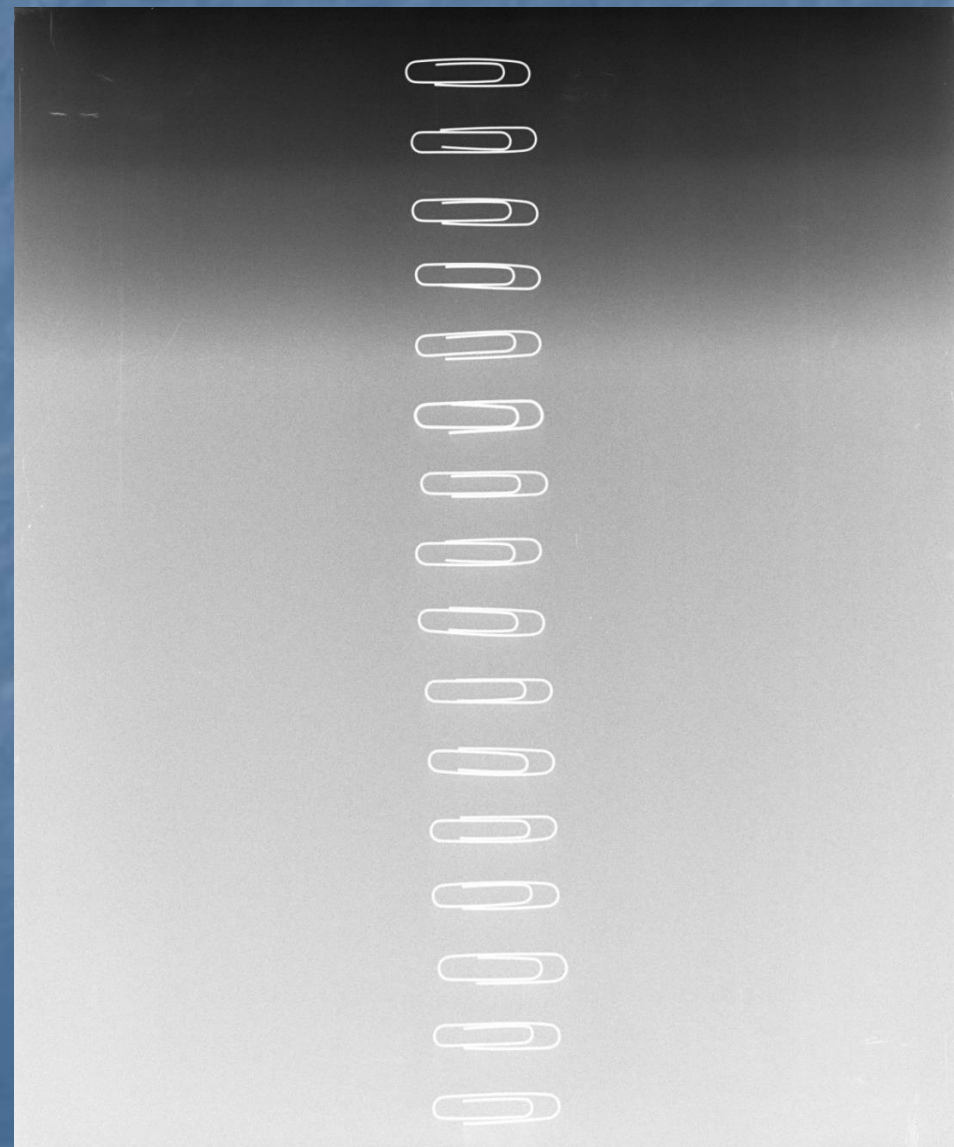
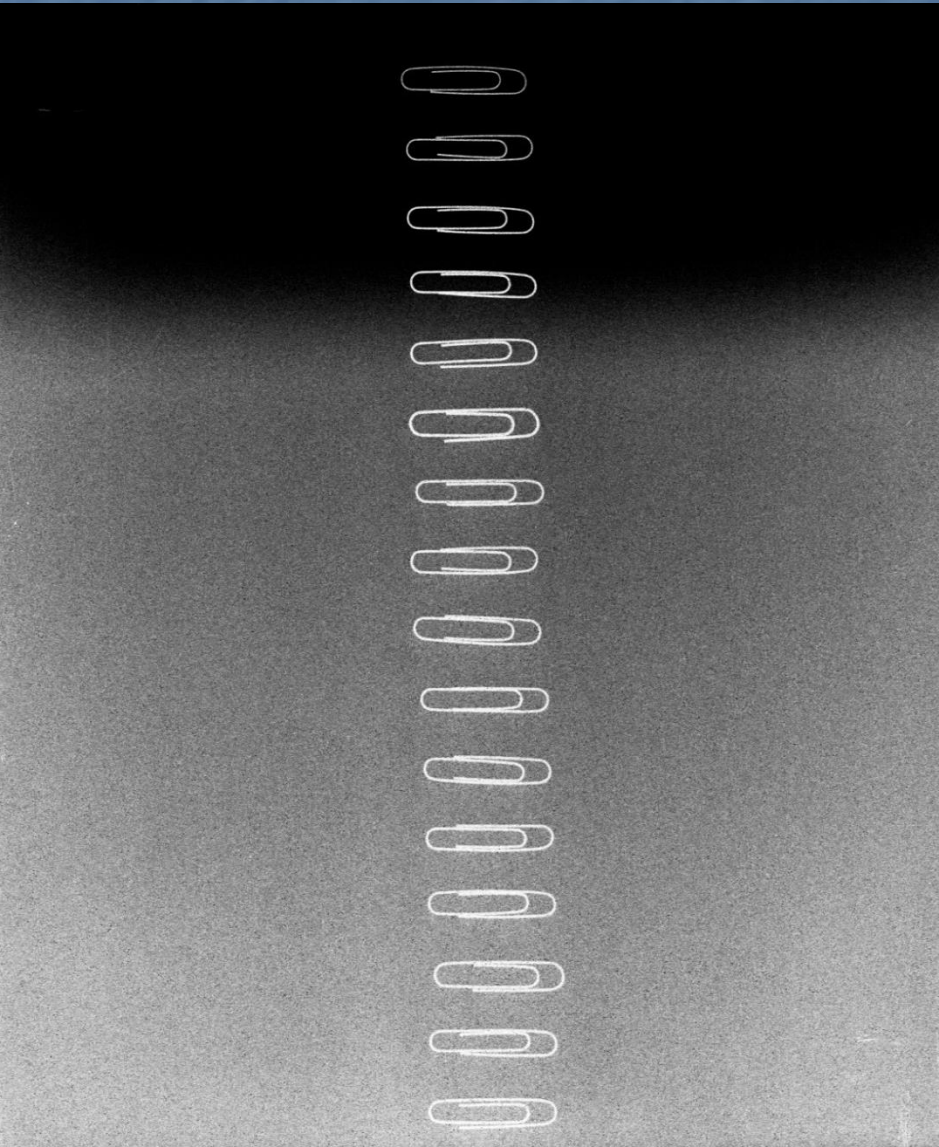
117 kV @ 2.5 mAs

LgM 1.23

(1200 Speed)

72 kV @ 20 mAs

LgM 1.69



Cassette blocked with a .5mm lead apron.
117 kV @ 2.5 mAs LgM 0.511
(Read at 1200 Speed)



Off-Focus experiment with the dosimeter.
Ion chamber 36" off floor.
Tube 40" and 72" SID. Collimated to 14"x17".



Started with bottom of light field
just above the top of the ion chamber.



Tube 27" higher (maxed out)



Here are the doses from all three experiments.

| Off Focus Radiation | | | |
|--|--|---|---|
| Height above ion chamber in inches | 85 kV@ 3.2 mAs 72" SID MicroR's (μR) | 115 kV@ 4 mAs 72" SID MicroR's (μR) | 85 kV@ 16 mAs 40" SID MicroR's (μR) |
| 0 | 96.0 | 239.0 | 1035.8 |
| 1 | 72.0 | 166.1 | 615.4 |
| 2 | 52.0 | 117.9 | 432.8 |
| 3 | 39.3 | 90.5 | 391.6 |
| 4 | 31.1 | 71.1 | 321 |
| 5 | 27.6 | 59.4 | 296.8 |
| 6 | 21.8 | 50.9 | 244.6 |
| 7 | 18.0 | 42.8 | 218.6 |
| 8 | 15.6 | 36.7 | 180.6 |
| 9 | 13.0 | 31.0 | 164.2 |
| 10 | 11.2 | 27.1 | 148.5 |
| 11 | 9.9 | 23.3 | 133.1 |
| 12 | 8.6 | 20.8 | 125 |
| 13 | 7.4 | 18.7 | 111.7 |
| 14 | 0.0 | 17.3 | 105.5 |
| 15 | 0.0 | 15.8 | 101.1 |
| 16 | 0.0 | 14.6 | 97.7 |
| 17 | 0.0 | 13.8 | 96.2 |
| 18 | 0.0 | 12.8 | 95.1 |
| 19 | 0.0 | 12.6 | 94.1 |
| 20 | 0.0 | 12.4 | 90.8 |
| 21 | 0.0 | 12.4 | 86.9 |
| 22 | 0.0 | 12.2 | 82.5 |
| 23 | 0.0 | 11.6 | 78 |
| 24 | 0.0 | 11.5 | 74.2 |
| 25 | 0.0 | 11.0 | 72.4 |
| 26 | 0.0 | 11.2 | 70.3 |
| 27 | 0.0 | 10.7 | 66.8 |

Because of Off-Focus Radiation, the shield needs to be placed on the side of the tube



If your patient is pregnant, you might consider double shielding on the tube side.



With our new “double lead” roller shield, we only need to put on a wrap-around apron in the front.



At CHOMP, because of the Off-Focus Radiation,
all of our upright abdomens are taken PA.

- From an Original Article in Radiologic Technology (“Reducing Pediatric Patients’ Dose by Manipulating Radiographic Projections” Nov/Dec 2021), Brennan and Madigan found that during a PA lumbar projection compared with the AP projection, the **absorbed dose was reduced by 39% .**

