

RADIOLOGY-1

Fourth Professional(NEW)

Dr. RAMESH TIWARY
ASSITANT PROFESSOR

Department of Veterinary Surgery & Radiology
BVC, PATNA-14

Reference books

- Textbook of Veterinary Diagnostic Radiology by- Thrall 6th Ed.
- Veterinary Radiology Basic Principles and Positioning by-A. P. Singh & Jeet Singh
- Carlson's Veterinary Radiology by-William Dwight Carlson, Edward Leroy Gillette, 3rd Ed.

INTRODUCTION

- **Dr. R. Eberlin – Father of Radiology**

- 8 Nov. 1895 W. C. Roentgen (German Physicist) discovered x-ray and received **first Noble Prize in Physics on 10th December 1901.**
- Roentgen called them '**x-rays**' because the rays were **unknown** to the scientific world.



General Terminology

- **Radiology (Roentgenology):** Science which deals with the diagnostic and therapeutic application of radiant energy.
- **Veterinary radiology:** Application of radiant energy for diagnostic and therapeutic purposes in domestic, zoo and laboratory animals.
- **Radiologist:** A person qualified in medical or veterinary science and radiological physics to use radiant energy in diagnostic, therapeutic and research field of medicine.
- **Radiographer:** Technically trained person who can obtain quality radiographs for radiologist.
- **Radiograph:** The radiographic record of exposed tissue part is called radiograph or ROENTGENOGRAM or SKIAGRAM.

APPLICATIONS OF VETERINARY RADIOLOGY

- As a diagnostic tool
- To select methods or techniques of treatment e.g., for fracture repair
- To detect previously unrecognized lesion
- To monitor efficacy of a treatment schedule
- To screen normal animal for morphological evaluation in an attempt to eradicate inherited disease by selective breeding



- To determine the age of animal
- To examine postmortem material
- For non-destructive examination of archeological specimens of animal origin
- As a teaching aid in anatomy
- In veterinary research e.g., osteomedullography to evaluate bone healing



Ionising Radiation :- Any type of energy or Matter energy combination capable of removing one or more orbital electrons from the atom.

- **Ionising Radiation**
- Particulate or corpuscular – alpha, beta particle, protons, electrons, neutrons, nuclear fragments.
- Electromagnetic radiation – Heat waves, light waves, infra-red rays, U/V-rays, x-rays, gamma rays.

Properties of X-rays

- Have no charge
- Have no mass
- Travel at the speed of light
- Are invisible
- Cannot be felt
- Travel in a straight line

- Cannot be deflected by magnetic fields.
- Penetrate all matter to some degree
- Cause certain substances to fluoresce
- Can expose photographic emulsions
- Can ionize atoms

-
- Wave length to x-ray – 0.1 to 0.5 A^0 ($1\text{A}^0 = 10^{-10} \text{ m}$)
 - Energy - 25 to 125 Kev.
 - Diagnostic x-ray: 30 – 150 kVp.

Terms Related to Image Production

- Primary Radiation
 - Refers to the x-ray beam after it exits the x-ray tube and before it interacts with the patient's body
- Remnant Radiation
 - The remainder of radiation after it passes through the patient's body.
 - This is what produces the image on the radiographic film
- Secondary Scatter Radiation
 - Radiation that may not be able to reach the film but does not carry any useful information

- Rontgen took an X-ray of his wife's hand, which clearly revealed her wedding ring and her bones.
- Images are produced due to differential absorption of X-rays.
- Calcium in bones absorbs X-rays the most, so bones look white on a film recording of the X-ray image , called a radiograph.
- Fat and other soft tissues absorb less, and look gray. Air absorbs the least, so lungs look black on a radiograph.
-

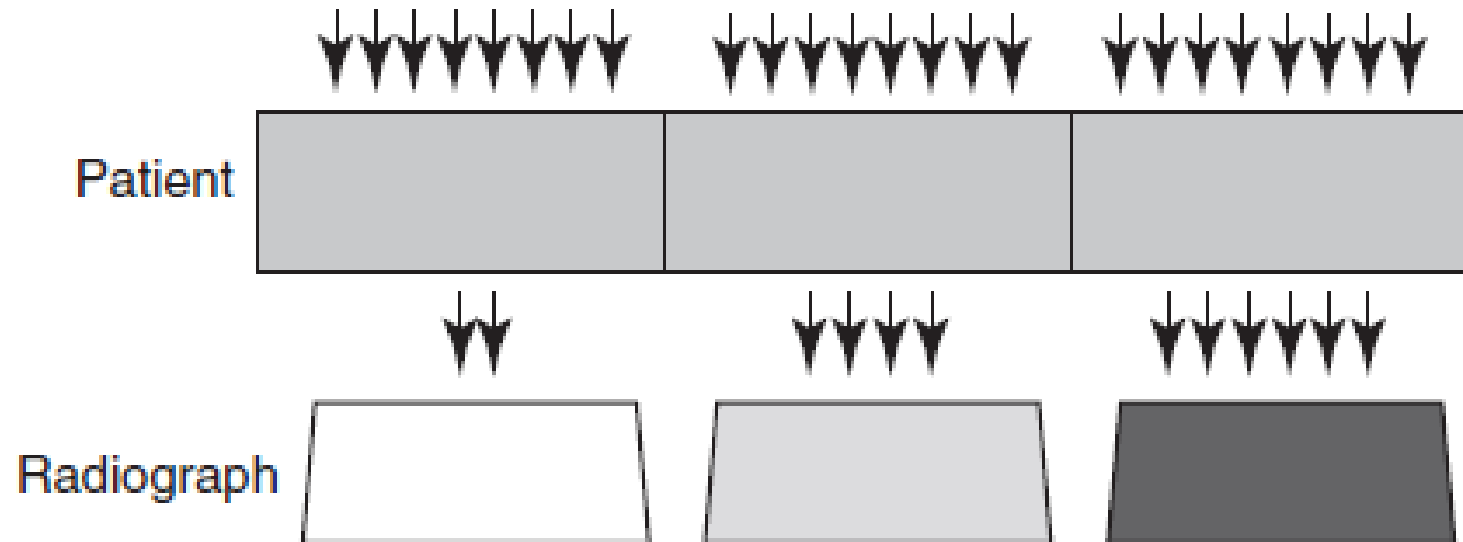


Mrs. Röntgen's hand, the first X-ray picture of the human body ever taken.

Terms Related to Image Production

- Attenuation

- The process by which primary radiation is changed or absorbed as it travels through the



- Radiolucent

- Material that allow x-ray photons to pass through easily (*air*)
-

- Radiopaque

- Materials that do not allow x-ray photons to pass through easily (*bone*)

Five Radiographic Opacities

Air

Fat

Soft tissue

Bone

Metal



Least opaque
Most lucent
Black

| Object | Z | Specific gravity |
|--------|-----|------------------|
| Gas | 1-2 | 0.001 |
| Fat | 6-7 | 0.9 |
| Fluid | 7-8 | 1 |
| Bone | 14 | 1.8 |
| Metal | 82 | 11.3 |

Most opaque
Least lucent
White

