1st EUROPEAN CONGRESS OF MEDICAL PHYSICS
EFOMP
September 1-4, 2016
Eugenides Foundation
Athens-Greece

'DOGS CHEST HOMOGENEOUS PHANTOM FOR IMAGE OPTIMIZATION'

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INTRODUCTION:

- 35 years since adaptation of radiology to veterinary;

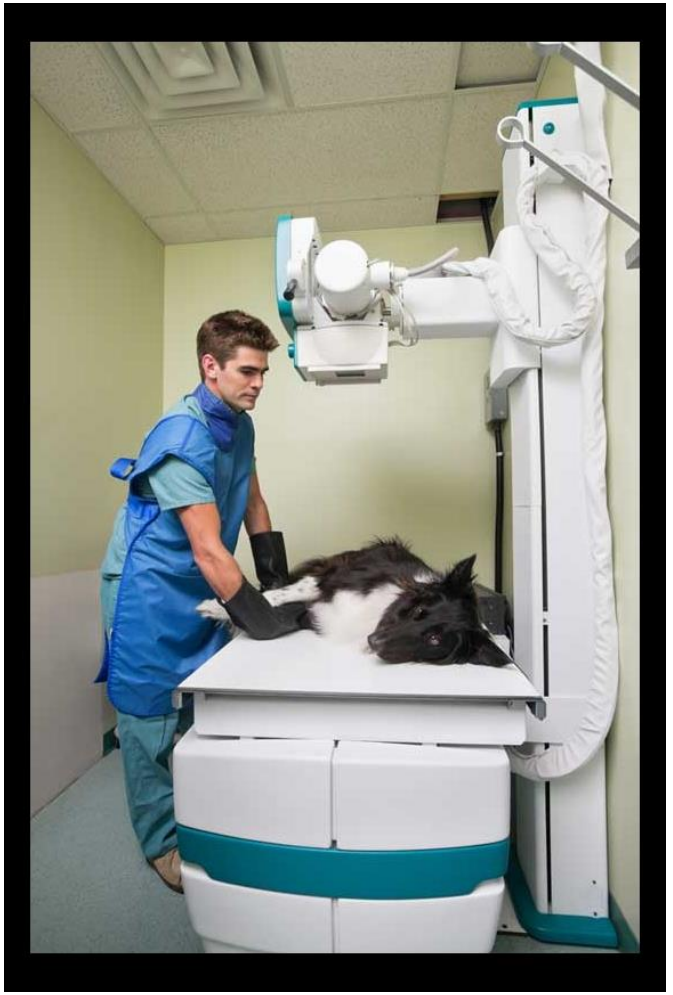
(Barber and McNulty, 2012)

- 70 % cases make use of radiological approach;

(Barber and McNulty, 2012)

- **Animal restrain**;

(Copple et al., 2013)



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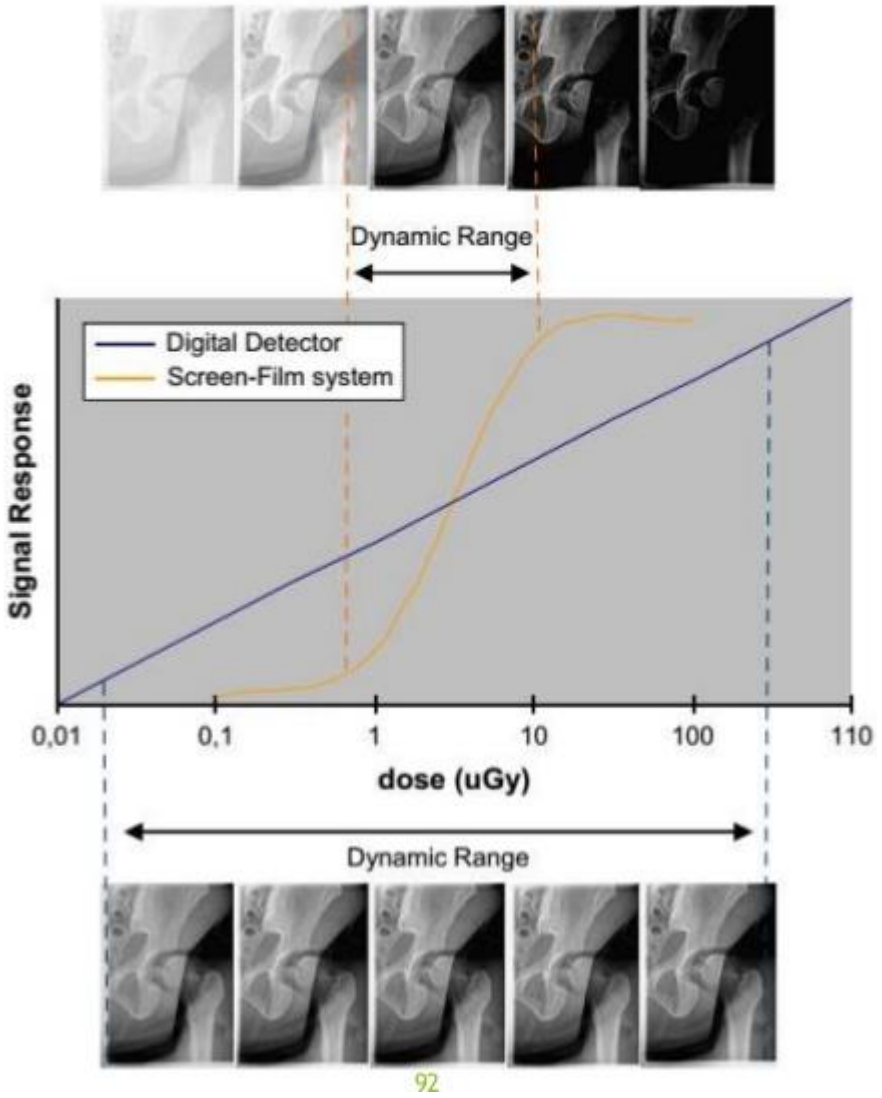
INTRODUCTION:

- With the growing availability of digital radiography equipment, there is a transition from acquisition screen-film systems to DR **without adequacy of technical charts**;

(Armbrust, 2009)



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INTRODUCTION:

- Phantom is a structure that contains one or more replacements of biological tissues and this should **simulate conditions of absorption and scattering** of X-rays.

(Pina et al., 2006)

- The optimum techniques charts constructions are carried out with application of **homogeneous phantom**.

(Gray, 1983; Pina et al., 2004)

- **Scarce literature** in relation to veterinary phantoms.

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PURPOSE:

- The aim of this work was develop homogeneous canine chest phantoms, of small sizes (S), medium (M), large (L) and giant (G) dogs, to be applied in optimization process of digital radiography.

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METHODS:

- Algorithm application (Matlab) in retrospective computed tomography exams from dog's chest;

- Four different phantons developed (one to each animal size);

Animal Size	Weight (Kg)
Small (S)	≥9,5
Medium (M)	9,6≥ M ≥23
Large (L)	23,1≥ L ≥40
Giant (GG)	≤40

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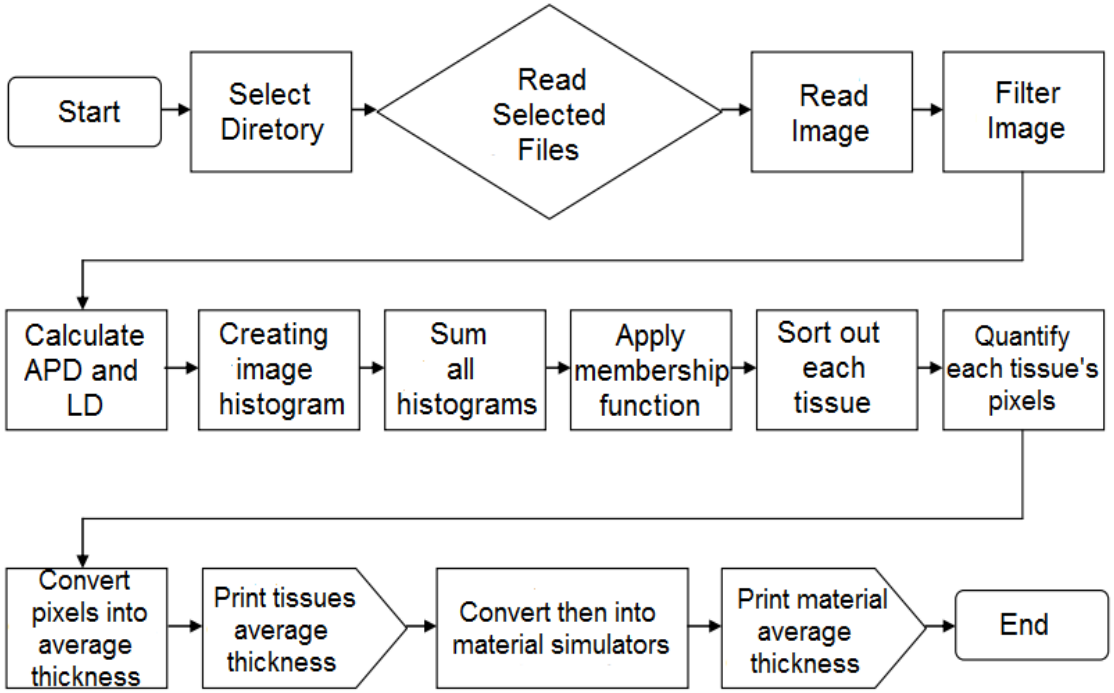
METHODS:

Matlab algorithm

- Classify and separate tissues
- Quantify thickness of tissues
- Convert thickness of biological tissues in simulators materials



Algorithm flowchart

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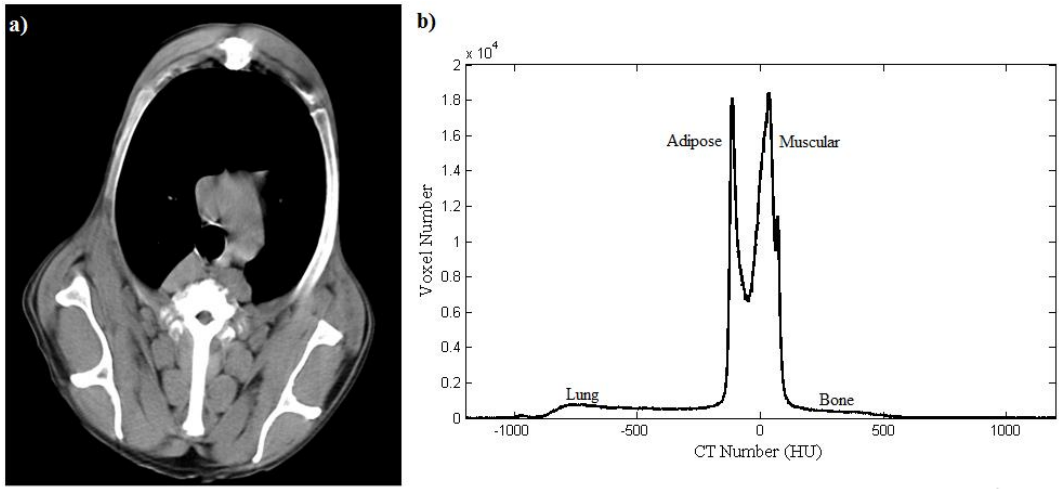
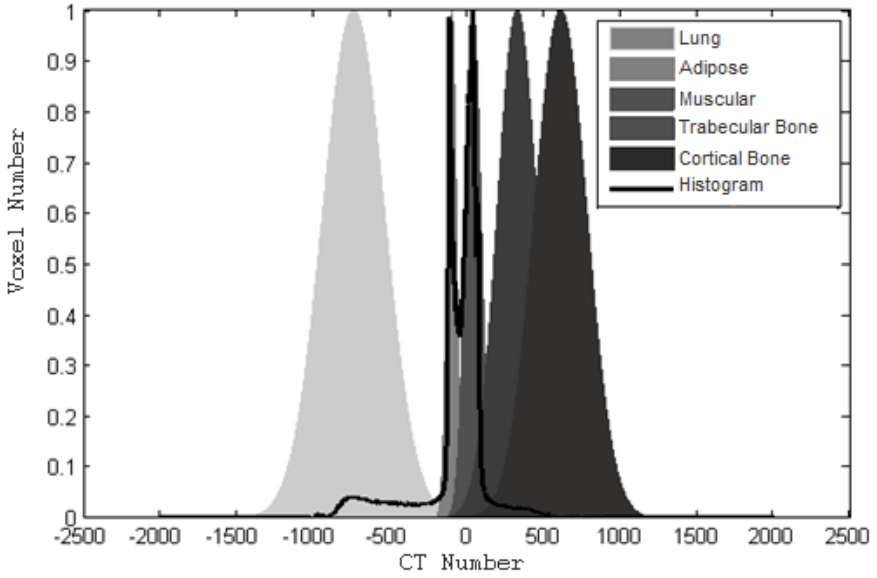
METHODS:



a) Slice from chest canine CT exam and b) CT number distribution histogram.



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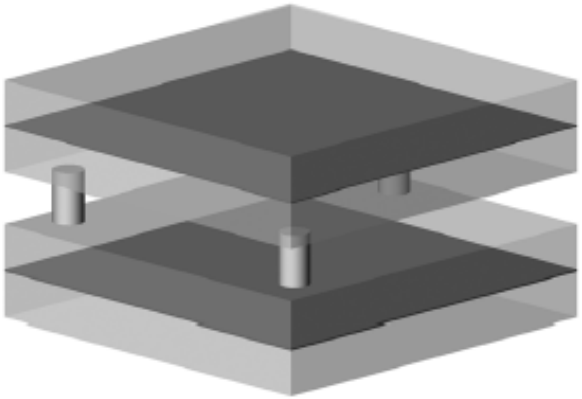
RESULTS:



Homogeneous canine chest phantom configuration for dorsoventral view.

GROUP	TISSUE	TI (MM)	SIMULATOR MATERIAL	TS (MM)	PHANTOM MEAN SIZE (CM)
SMALL	Lung	20.61	Air	20.61	
	Total Soft	50.26	Lucite	63.25	15x15
	Total Bone	8.93	Aluminum	1.55	
MEDIUM	Lung	28.61	Air	28.61	
	Total Soft	77.36	Lucite	97.34	20x20
	Total Bone	14.47	Aluminum	2.47	
LARGE	Lung	34.14	Air	34.14	
	Total Soft	98.43	Lucite	123.86	25x25
	Total Bone	17.19	Aluminum	2.99	
GIANT	Lung	36.52	Air	36.52	
	Total Soft	123.86	Lucite	155.86	30x30
	Total Bone	20.05	Aluminum	3.49	

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CONCLUSIONS:

- Four phantoms was developed, one for each animal size, which enable optimization techniques in radiography CR systems;

- Membership functions minimize tissue classification errors when compared to another existing methods in the literature;

(Pina et al., 2012)