Thermography use as a predictive tool in early diagnosis of breast cancer
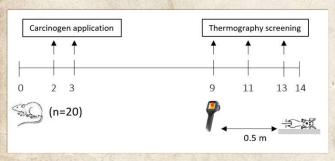
Kiskova T [1], Karasova M [2]

1.   University of P .J. Safarik in Kosice, Faculty of Sciences, Institute of Biology and Ecology, Srobarova 2, 040 01 Kosice, Slovak Republic
2.   University of Veterinary Medicine and Pharmacy, Clinic of Small Animals, Komenskeho 73, 041 81 Kosice, Slovak Republic

Introduction

- Breast cancer is the most frequently diagnosed cancer of women worldwide. Despite advances in treatment that have reduced mortality, breast cancer remains the second leading cause of cancer induced death.
- Despite of standard methods used to screen for breast cancer, there are some nonstandard diagnostic methods adding to these standard ones, f. e. thermography (TG) (1).
- TG in breast cancer early diagnosis has reached excellent results (2).
- TG in breast cancer PREDICTION has not been used before.

Methods

Experimental design: Animals were maintained in temperature-controlled room (22°C) for 15 minutes and then imaged using digital infrared camera (FLIR E40, FLIR Systems OÜ, Estonia). Anesthetized rats (isoflurane, 2ml/L of induction chamber volume) were positioned in front of uniform pad. Images were analyzed by software program (FLIR Tools version 2.0, FLIR Systems, Inc., Wilsonville, USA). Symmetrical body areas were monitored to detect temperature patterns of intact breast in compare to potential affected one. Only tumors developing non-parallel were further evaluated.

Literature Cited

1.   Kennedy DA, Lee T, Seely D. A comparative review of thermography as a breast cancer screening technique. Integr Cancer Ther 2009; 8(1):9- 16.
2.   Arora N, Martins D, Ruggerio D, et al. Effectiveness of a noninvasive digital infrared thermal imaging system in the detection of breast cancer. Am J Surg 2008; 196(4):523-526.

Results

The predictive role of TG has been monitored and evaluated two weeks before tumor appearance.

Rats developed 30 evaluable breast tumors – ductal forms (20), papillary forms (9), and hyperplasia (1). Hyperplasia was accompanied by the raising temperature up to 0.2°C two weeks before the palpation.

	Ductal carcinomas		Papillary forms	
	T increase	T decrease	T increase	T decrease
min-max (°C)	0.1 – 1.1	0 – 0.8	0.2 - 1.1	0.3
0°C (n=)	0	2	0	0
0.1-0.2°C (n=)	1	1	1	0
0.3-0.5°C (n=)	5	3	6	1
> 0.5°C (n=)	6	2	1	0
n total	12	8	8	1

Table: Ductal carcinomas include ductal cribriform, ductal cribriform solid forms, comedo carcinomas and invasive ductal cancer. Papillary forms of ductal cancer include papillary and papillary cystic forms of cancer.

Conclusions

Thermography could be used as an effective noninvasive predictive tool in breast cancer diagnosis. However, more studies are required to describe the potential of this predictive method.