

Can inflammatory markers be included into models predicting survival after treatment for metastatic lesions in the extremities?

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Background: Prediction of survival is considered valuable for surgeons treating metastatic bone disease in the extremities. Different models have been developed, none including inflammatory markers.

Purpose: We sought to 1) develop a model that can estimate the likelihood of survival at 3, 6 and 12 months after surgery, based on variables that are easily accessible from patient records including inflammatory markers. 2) Investigate its accuracy using the receiver operator characteristic (ROC) analysis and decision curve analysis (DCA)

Patients and Methods: A consecutive cohort of 130 patients having joint replacement surgery due to metastatic lesions at Rigshospitalet during the period 2003-2008 was included. Demographics, clinical and biochemical variables preoperatively was included into the model (see table 1). Primary cancer group was grouped as proposed by Katagiri. A Bayesian belief network (BBN) for survival status at 3, 6 and 12 months were developed and internally validated and area under the ROC curves calculated. Net benefit of the model was evaluated with DCA.

Results: BBN for survival status at 3, 6 and 12 months was developed (see figure 1) and internal validation showed AUC of ROC curves of 0.77 (CI: 0.66;0.87), 0.83 (CI: 0.74;0.91) and 0.87 (CI: 0.81;0.94) respectively. DCA showed a clinical net benefit using these models (see figure 1).

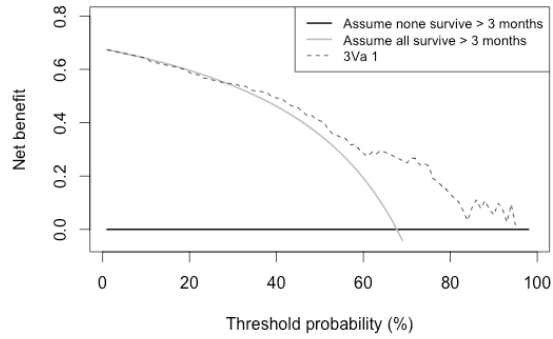
Conclusions: We successfully developed a BBN for predicting survival status at 3, 6 and 12 months based on various parameters including C-reactive protein. Though these results are encouraging, each of these models should be externally validated prior to being used clinically.

Table 1:

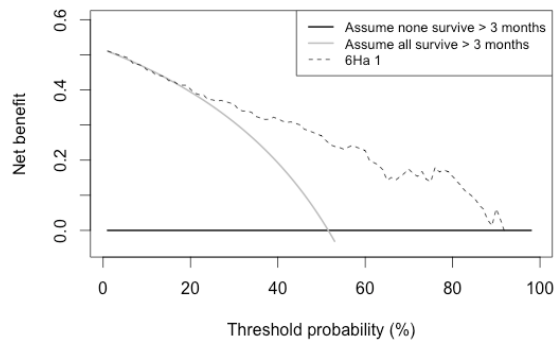
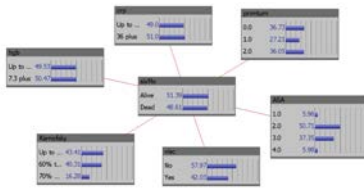
Consecutive cohort of 130 patients	
Female/male	76/54
Age at surgery (n=130)	
Mean (range)	64 years (30-85)
ASA (n=126)	
Group 1	6
Group 2	66
Group 3	48
Group 4	6
Karnofsky score (n=126)	
≥ 70	73
< 70	53
Primary Tumor Site (n=130)	
Breast	31
Lung	20
Kidney	16
Prostate	15
Myeloma	12
Unknown	9
Lymphoma	5
Malignant melanoma	4
Bladder	4
Sarcoma	4
Other	10
Haemoglobin (n=121)	
Mean (range)	7.14 mM (5.0-9.7)
C-reactive protein (n=108)	
Mean (range)	67.4 mg/l (0-266)
Fracture/impending (n=130)	
Fracture	95
Impending fracture	35
Number of bone metastasis (n=127)	
Solitary	36
Multiple lesions	91
Visceral metastasis (n=123)	
Yes	52
No	71

Figure 1:

3 months model:



6 months model:



12 months model:

