EVALUATION OF COLONY-STIMULATING FACTOR 1 IN INVASIVE BREAST CARCINOMA AND ITS ASSOCIATION WITH PROGNOSTIC PARAMETERS



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Introduction

There were 2.1 million new cases of breast cancer in 2018 worldwide. About 60-75% of breast cancers are of invasive carcinoma of no special type (NST). Recent research has focused cancer on tumour microenvironment (TME) and the crosstalk between the cell constituents within the TME. Colony-stimulating factor 1 (CSF-1) is secreted by breast cancer cells and is the primary cytokine regulating tumour-associated macrophages (TAMs) in TME which provide protumorigenic milieu. This study aimed to evaluate the CSF-1 gene expression in invasive breast carcinoma and its association with pathological prognostic parameters.

Methodology

This study was a cross-sectional study involving 128 formalin-fixed paraffin-embedded mastectomy cases diagnosed as invasive breast carcinoma NST. The cancer cells were stained with anti-CSF-1 immunohistochemical antibody, and the staining intensity was evaluated and scored into low (score 0-1) and high expression (score 2-3) (Figure 1).

Results

All cases showed CSF-1 expression (Figure 2). Ninetythree cases expressed high CSF-1. High CSF-1 expression was significantly associated with tumour grade (p=0.008). High CSF-1 expression was seen in 58 (79.5%) tumours with histological grade 2 and 29 (72.5%) with histologic grade 3, respectively. High CSF-1 expression was significantly associated with positive HER-2 (40 cases (87%), p=0.007) (Table 1).

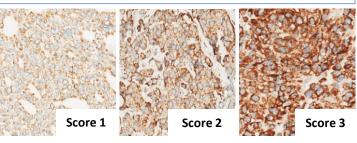


Figure 1: Intensity of CSF-1 staining in tumour cells.

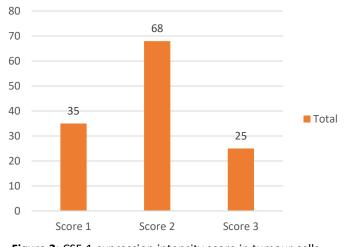


Figure 2: CSF-1 expression intensity score in tumour cells.

 Table 1: Association between CSF-1 expression and pathological prognostic factors.

	CSF-1 ex	CSF-1 expression p-value		
	Low; n (%)	High; n (%)		
Histological grade				
Grade 1	9 (60)	6 (40)	0.008	
Grade 2	15 (20.5)	58 (79.5)		
Grade 3	11 (27.5)	29 (72.5)		
HER2				
Positive	6 (13.0)	40 (87.0)	0.007	
Negative	29 (35.4)	53 (64.6)		

Discussion

Tumour cells secrete CSF-1 and is received by TAMs. In turn, TAMs secrete epidermal growth factor (EGF) which further promotes the expression of CSF-1 by tumour cells and thereby generating a positive feedback loop. The EGF/CSF-1 positive-feedback loop enhances the survival and proliferation of tumour cells as well as facilitate tumour cells to metastasize to secondary organs (Williams et al., 2016).

Our study findings demonstrated high level of CSF-1 expression is associated with poorer prognosis such as higher histological grade and HER2 positivity. The limitation of our current study is it focused on primary breast cancers and excluded the metastatic breast cancers. Future studies on metastatic breast cancers shall be conducted as metastatic tumours show higher CSF-1 expression of CSF-1 compared to non-metastatic cancers (Richardsen et al., 2015).

Conclusion

This research revealed that high CSF-1 expression is associated with poor prognostic parameters. Therefore, evaluation of CSF-1 expression will be a useful prognostic marker and may serve as potential cellular target for novel treatment modality in invasive breast cancers.

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Keywords: breast cancer; colony-stimulating factor 1, tumour microenvironment

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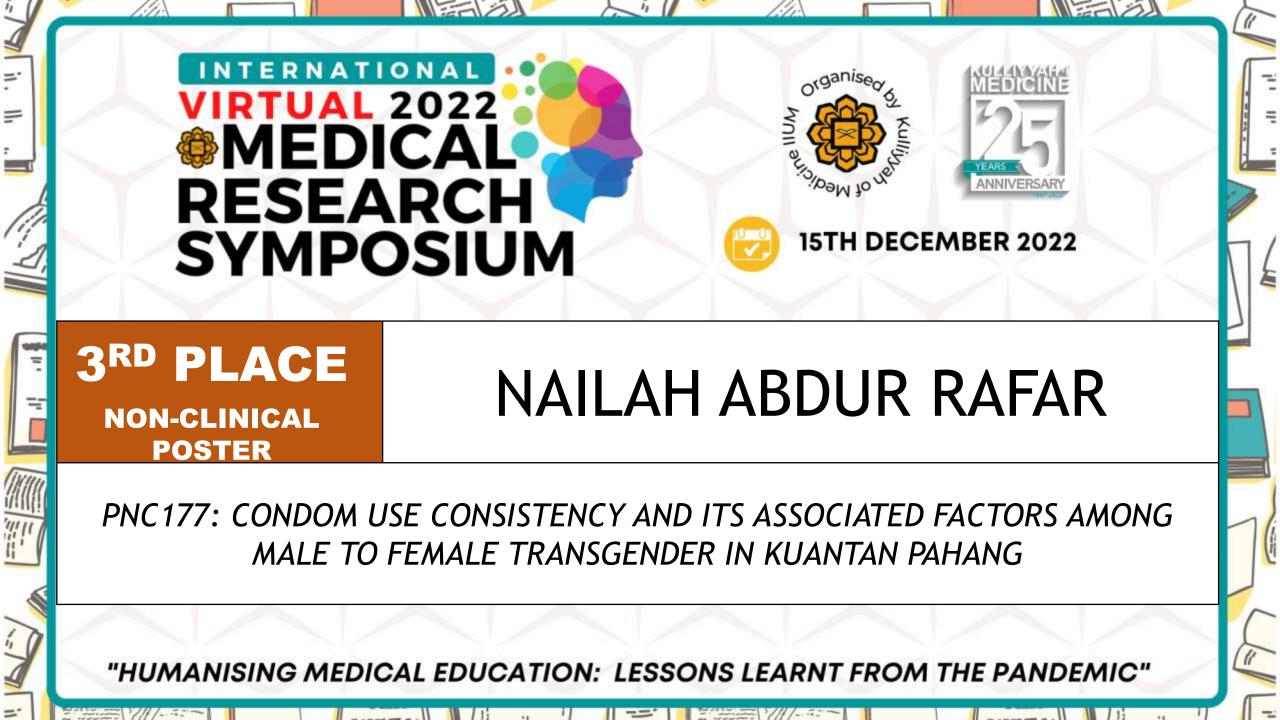


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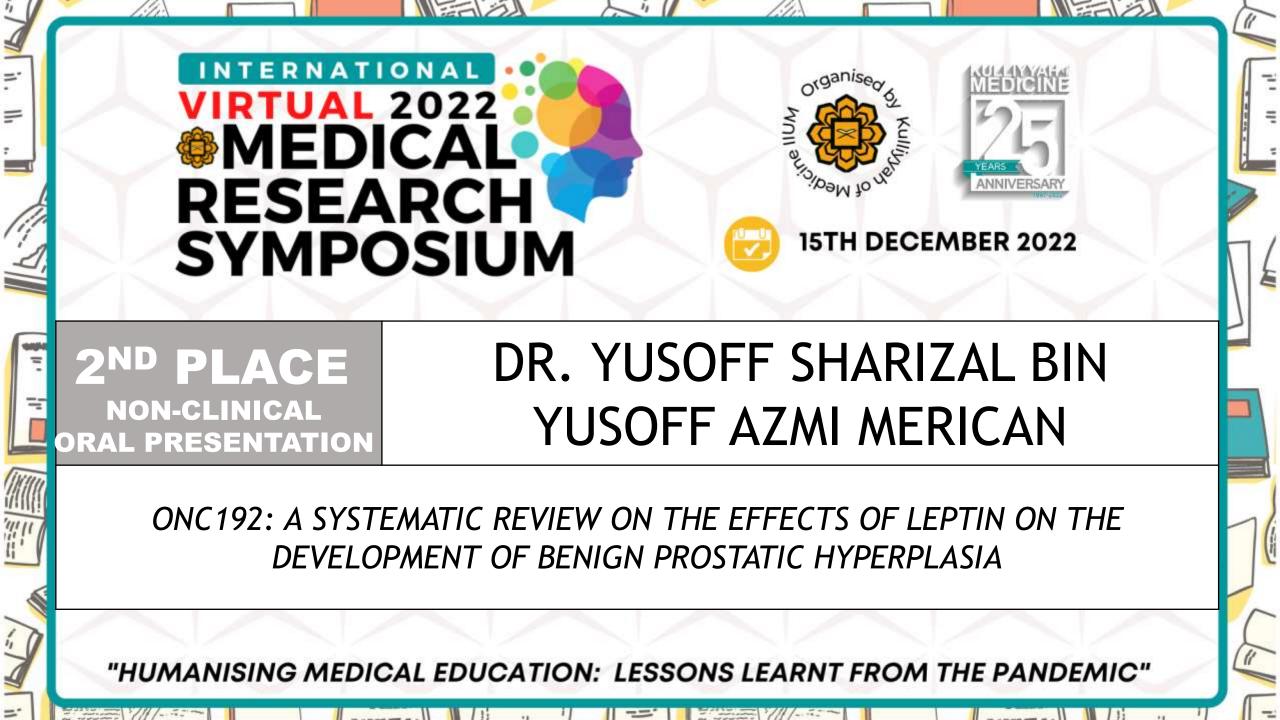
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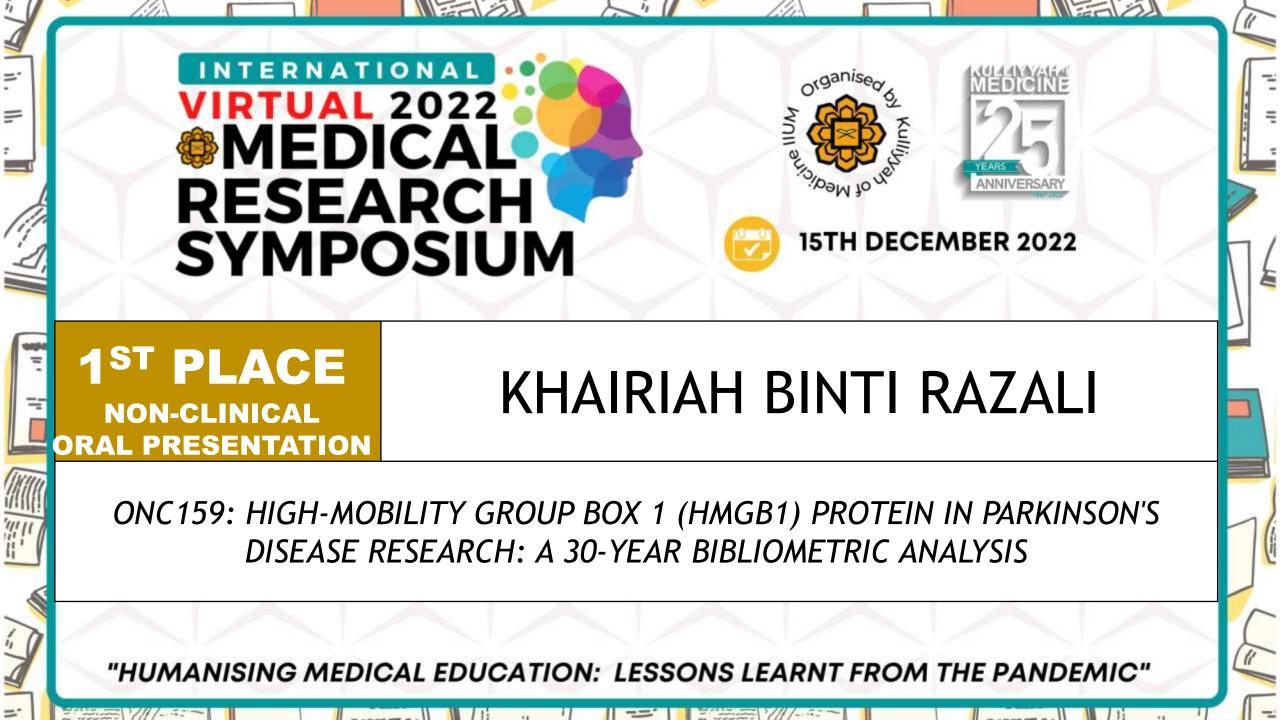
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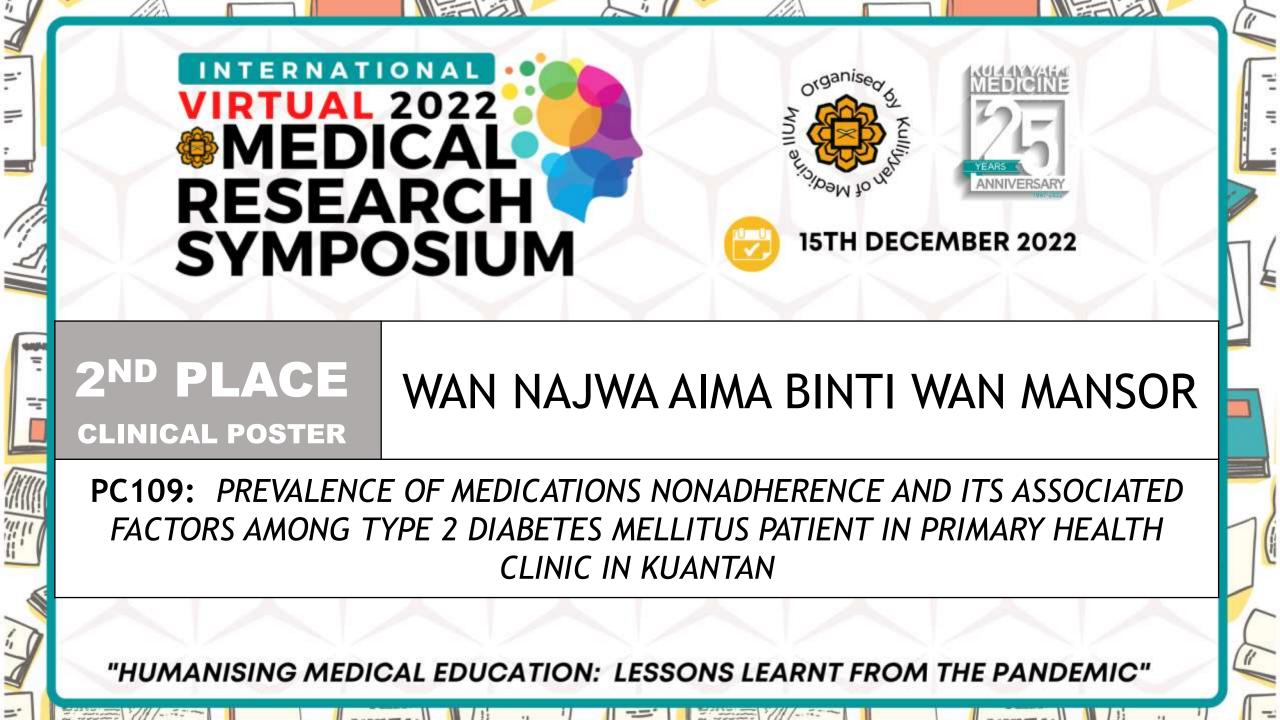


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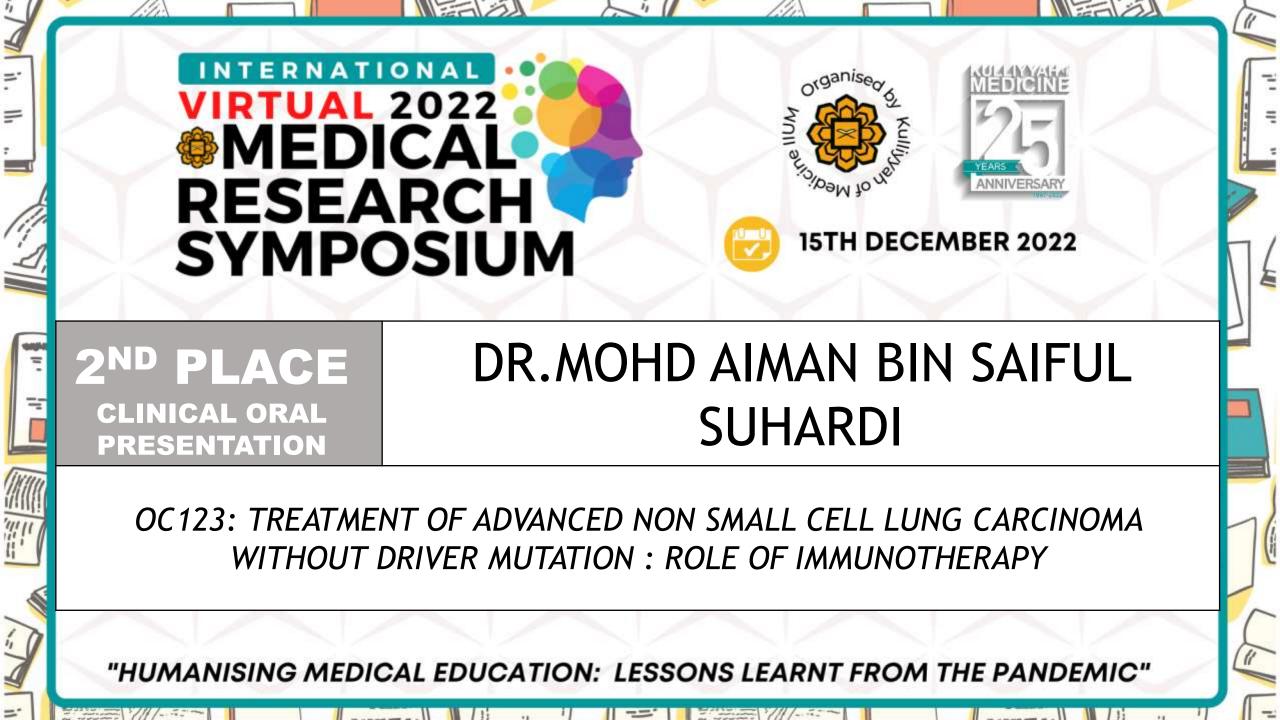
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