ELSEVIER

Blood 142 (2023) 6475–6476

The 65th ASH Annual Meeting Abstracts

ONLINE PUBLICATION ONLY

637.MYELODYSPLASTIC SYNDROMES - CLINICAL AND EPIDEMIOLOGICAL

Do We Still Need to Perform Bone Marrow Examination in All Subjects Suspected of MDS? Evaluation and Validation of Non-Invasive (Web-Based) Algorithm

Howard S Oster, MD PhD[1,2], *Ariel M Polakow, MD*[3], *Noa Goldschmidt, BSc*[4], *Moshe Mittelman, MD*[4,2]

[1] Department of Internal Medicine, Tel Aviv Sourasky Medical Center/Sackler Faculty of Medicine, Tel Aviv, Israel
[2] Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel
[3] Department of Internal Medicine, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel
[4] Department of Hematology, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

Background : The gold standard of diagnosing myelodysplastic syndromes (MDS) still requires a bone marrow examination (BME), an old invasive procedure, with possible associated pain and bleeding, and subjective interpretation with 20-25% inter-observer variability. We first developed a logistic regression formula [Oster HS et al., *Leuk Res* 2018], and then a non-invasive web-based diagnostic algorithm [Oster HS et al., *Bld Adv* 2021]. The app requires input of 10 readily available clinical and laboratory parameters (age, gender, Hb, MCV, WBC, ANC, monocytes, PLT, glucose, creatinine), resulting in diagnosing or excluding MDS, perhaps obviating the BME (Figure). Here, we performed external validation of the model, using data of MDS patients and non-MDS controls, who had not been included in the development of the model.
Methods: The BM registry of Tel Aviv Sourasky Medical Center (1/2017-12/2021) was reviewed. Inclusion criteria for the MDS group were BME diagnosis, and for the controls, age >50yr, and unexplained anemia requiring BME. We excluded patients with other causes of anemia (renal failure; B12/folic acid or iron deficiency), active malignancy and other hematologic diseases. The relevant parameters were entered into the online model (at https://shiny.york.ac.uk/mds/) and the results of both groups were compared. In a sub-analysis, the model performance was tested in patients with lower risk (LR, IPSS-R<3.5) and higher risk (HR, IPSS-R≥3.5) MDS.
Results: In total, 204 patients were included and compared, 103 with MDS, and 101 anemic non-MDS control patients, all with BME. The analysis of model performance (Table, upper portion) showed a sensitivity of 85.6%, specificity of 92.3%, positive predictive value (PPV) of 90.3% and a negative predictive value (NPV) of 88.4%. The algorithm was indeterminate in 26.2% of patients with MDS (BME proven), compared with 9.9% in the control group.
In the sub-analysis (Table, lower portion), the model performance in the patients with LR-MDS (n=61) demonstrated sensitivity 85.1%, specificity 92.3%, PPV 90.3% and NPV 88.1%. The performance in HR-MDS (n=32), was 89.3%, 92.3%, 90.6% and 91.1%, respectively.
Conclusions : This study validates the potential role of this non-invasive, easy-to-use model to assist in diagnosis, and mainly exclusion of MDS, perhaps allowing to avoid bone marrow examination in some patients. This might be especially relevant for patients suspected to have LR-MDS. Emerging technologies with data generated from peripheral blood (genetics, morphometrics) may be incorporated in the model in the future.

Disclosures Mittelman: *Geron:* Other: participated in clinical trials; *Janssen:* Research Funding; *Roche:* Research Funding; *Astellas:* Other: advisory boards; *Onconova:* Other: advisory boards; *Gilead:* Consultancy, Research Funding; *Novartis:* Other: participated in clinical trials, advisory boards, Research Funding, Speakers Bureau; *FibroGen:* Other: participated in clinical trials; *Silence:* Other: advisory boards; *Celgene/BMS:* Other: participated in clinical trials, Research Funding, Speakers Bureau; *Medison/Amgen:* Research Funding; *Takeda:* Other: participated in clinical trials, advisory boards; *AbbVie:* Other: participated in clinical trials, Research Funding; *MDS HUB:* Consultancy; *Media Digital:* Speakers Bureau.

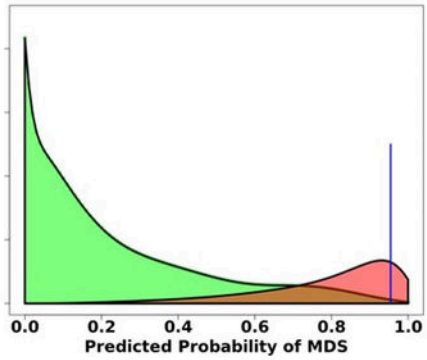

Figure: Example of model result.
When the blue line falls in the red region – probable MDS (as in this figure).
If the blue line falls in the green region – probably not MDS.
In the brown region – indeterminate.

Table

Model Performance, All Patients		
Parameter	**Calculation**	**Result (%)**
PPV	65/(65+7)	**90.3%**
NPV	84/(84+11)	**88.4%**
Sensitivity	65/(65+11)	**85.6%**
Specificity	84/(84+7)	**92.3%**
Risk Stratification, Lower vs Higher risk		
	Lower risk N = 62	**Higher risk N=37**
PPV	**90.3%**	**90.6%**
NPV	**88.1%**	**91.1%**
Sensitivity	**85.1%**	**89.3%**
Specificity	**92.3%**	**92.3%**

Note: The calculations presented in the table excluded indeterminate (IND) patients. If we include IND patients, sensitivity=63.1%; specificity=83.2% for "All Patients."

Figure 1

https://doi.org/10.1182/blood-2023-178713