Common inflammatory biomarkers of cancer prognosis

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Introduction

- Biomarkers have the potential to act as important tools in predicting prognosis of cancer patients.
- Blood is one of the most readily available sources of biomarkers. In addition to being easy to obtain, levels of the protein and cell constituents in blood provide valuable information regarding the degree of inflammation.
- Inflammatory proteins, leukocyte levels, and platelet levels may be able to predict survival in many cancer types.

Objective

To summarize the currently available literature reporting on common inflammatory blood biomarkers, excluding cytokines and chemokines, and their association with prognosis in cancer patients.

Methods

- A literature search was conducted on Medline and Embase utilizing keywords such as 'neoplasm,' 'inflammation,' 'biomarker,' 'allele,' and 'genomics.'
- Articles that reported on the levels of commonly implemented prognostic biomarkers (C-reactive protein (CRP), albumin, white blood cell and platelet counts) and their derivative scores or ratios relating to prognosis were selected for inclusion.
- Information regarding the patient population, cancer type, interventions received, type of biomarker, and the impact on prognosis was extracted

Results

- Using our search strategy, a total of 3,287 original articles were identified using Medline, and 2,193 using Embase.
- After screening for inclusion and exclusion criteria, 23 studies were included (study sample sizes 62 to 1,825), spanning 11 distinct cancer types
- Prognosis was classified into five different types with overall survival (OS) being the most prevalent (n=18) (5, 8, 10–30). Other outcomes included cancer specific survival (CSS, n=6), disease free survival (DFS, n=6), progression free survival (PFS, n=1), and distant metastasis free survival (DMFS, n=1)
- Prognostic inflammatory blood biomarkers were classified as protein-based (n=21), cell-based (n=13), or both (n=1)

Studies that assessed CRP or albumin inflammatory blood biomarkers

- **Albumin** associated with poor OS (n=6), DFS (n=1), or PFS (n=1) from 6 studies
- **CRP** were associated with poor OS (n=8), CSS (n=3), DFS (n=3), PFS (n=1), or DMFS (n=1) from 11 studies
- **High GPS score** (high CRP, low albumin) associated with poor outcome from 7 studies
- **High modified GPS score** associated with poor outcome from 10 studies
- **High CRP/albumin ratio** associated with poor outcome from 2 studies

Studies that assessed counts and ratios of platelets and leukocytes with outcome in cancer

- **Absolute neutrophil count (ANC):** High cell count associated with poor outcome in 3 studies
- **Absolute monocyte count (AMC):** High cell count associated with poor outcome in 1 study
- **White blood cell count (WBC):** High cell count generally associated with poor outcome in 2 studies
- **Neutrophil-Lymphocyte ratio (NLR):** High ratio (high neutrophils, low lymphocytes) associated with poor outcome in 12 studies
- **Platelet-Lymphocyte ratio (PLR):** high ratio (high platelets, low lymphocytes) generally associated with poor outcome in 4 studies
- **Lymphocyte-Monocyte ratio (LMR):** Low ratio (high lymphocytes, low monocytes) generally associated with poor outcome in 2 studies

Discussion

- ❖ The abundance of literature that found significant associations between inflammatory blood biomarkers and prognosis in cancer patients supported the role of inflammation as an important factor in cancer outcomes.
- ❖ Of the leukocyte and platelet measures, the NLR ratio was the most often used prognostic tool and was found to be associated with outcome of at least six cancer types.
- ❖ Measurements of just two blood proteins, CRP and Albumin, could be used to assess prognosis in at least eight cancer types using four different methods of evaluation: protein concentrations taken at face value, and three versions of GPS scoring (GPS, mGPS, new-mGPS).

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Conclusion

- ❖ These prognostic blood biomarkers are not only simple and economical to test for, but also provide prognostic information on duration of expected survival.
- ❖ This information is invaluable for patients, family members, and healthcare practitioners in order to help them prepare and plan for the future, such as switching from treatment to supportive or palliative care.