BACKGROUND

• More than 2.8 million family members provide unpaid care for cancer patients in the U.S. (1).
• Caregiving burden is perceived as stressful and may cause physiological changes in the caregivers ultimately affecting their health (2).
• Biomarkers that reflect underlying physiological processes may provide us with a greater understanding of mechanisms through which stress may influence health among caregivers (3).
• Biomarkers are defined as "biological molecules found in blood, other body fluids, or tissues that is a sign of a normal or abnormal process or a condition or disease" (4).
• Biomarkers can serve several 3 unique purposes (5,6):
  1) Prognostic biomarker: confirmation of diagnoses
  2) Predictors to an outcome
  3) Monitoring biomarker: monitoring treatment effect
• The scientific search for the biomarkers of health outcomes in caregivers is in its early stages (3).

OBJECTIVE

The purpose of this review was to:

1) provide a comprehensive summary of the research examining biomarkers as surrogate endpoints for clinical outcomes in family caregivers of patients with cancer;
2) to identify existing gaps; and
3) to make recommendations for future research.

METHODS

• Scoping review
  - Data source (Search engine)
    o PubMed, EBASE, CINAHL Plus, PsycINFO, and Scopus
  - Search strategy
    o Keywords: "caregivers/caregiving" AND "neoplasm/cancer" AND "biomarkers" OR "blood" OR "saliva" OR "urine" OR "physiological OR "endocrine system" OR "immune system" OR "cardiovascular system" OR "cognitive dysfunction" OR "inflammation" OR "cortisol" OR "cytokine"
  - Inclusion criteria
    ✓ Informal caregivers of patients diagnosed with cancer
    ✓ Full-text, peer-reviewed, English-language studies
  - Exclusion criteria
    • Not caregivers of patients diagnosed with cancer
    • Biomarkers not measured
    • Not original research
  - Study selection
    o The initial search yielded 830 articles.
    o A total of 18 studies were identified.
      ✓ Prognostic (n=0), Predictive (n=13), Monitoring (n=6)
      ✓ Design: Cross-sectional (n=7), Longitudinal (n=11)
    o Nationality: U.S. (n=13), Canada (n=3), Others (n=3)
• Categorization of biomarkers

<table>
<thead>
<tr>
<th>Physiological categories</th>
<th>Biomarkers</th>
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<tbody>
<tr>
<td>Neuroendocrine function</td>
<td>CAT (EPI, NE)</td>
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<td>Cortisol, DHEA-S, Endorphin, Oxytocin</td>
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<td>Immune function</td>
<td>NK cell</td>
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RESULTS

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DISCUSSION

• Biomarkers are most commonly incorporated into caregiver studies to predict group membership and psychological health.
• Neuroendocrine and immune biomarkers, especially cortisol and cytokines, are most frequently assessed.
• Recommendations for the future research:
  o Appropriate and accurate biomarker collection
  o Biomarkers of other physiologic function (e.g., cardiovascular function, cognitive dysfunction, cell aging)
  o Biomarkers with multisystem indicators (e.g., allostatic load)
  o Biomarkers to monitor the efficacy of caregiving interventions
  o Expanding the scientific search for biomarkers will contribute to our understanding of the mechanisms through which stress may influence caregiver health.
• Future direction:
  o Biomarkers of cardio-metabolic risk in cancer caregivers: Lipoprotein particle profile by nuclear magnetic resonance (NMR) spectroscopy

Reference