Leptomeningeal Metastases

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson’s specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient’s care. This algorithm should not be used to treat pregnant women.

Note: Consider Clinical Trials as treatment options for eligible patients.

**EVALUATION**

- Physical exam with comprehensive neurologic evaluation
- MRI brain and MRI cervical/thoracic/lumbar spine with and without contrast
- Cerebrospinal fluid (CSF) exam for the following:
  - Cell count with differential, with pathologist review as applicable
  - Glucose
  - Protein
  - Cytopathology (10-12 mL)
  - Flow cytometry for lymphoma or hematologic malignancies
- If indicated, consider:
  - Gram stain and culture
  - Cryptococcal antigen
  - Calcofluor white smear
  - Viral PCR (HSV, CMV, EBV)
  - Fungal and viral cultures
  - Lifestyle risk assessment

**DIAGNOSIS**

- CSF positive for tumor cells
- Positive radiologic findings with supportive neurologic findings
- Suggestive CSF findings with supportive neurologic findings in a patient with a known malignancy

**RISK STATUS**

- Poor Risk:
  - Low Karnofsky performance status (KPS)
  - Multiple, serious, major neurologic deficits
  - Extensive systemic disease with few treatment options
  - Encephalopathy

- Good Risk:
  - High Karnofsky performance status (KPS)
  - No major neurologic deficits
  - Minimal systemic disease
  - Reasonable treatment options available for systemic disease (if applicable)

**TREATMENT**

- Consider fractionated external beam radiation therapy to symptomatic sites and/or best supportive care
- Consider placing intraventricular catheter (Ommaya Reservoir) and/or ventriculoperitoneal shunt with adjustable valve (including on/off or programmable) for intrathecal chemotherapy if symptoms and/or radiological findings suggestive of hydrocephalus
- Perform Nuclear Medicine CSF Shunt Evaluation, see Page 2

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1 Mental status, cranial nerves, motor, sensory and cerebellar exam
2 Use caution for lumbar punctures in patients who are anticoagulated, thrombocytopenic, or who have a bulky intracranial mass
3 See Physical Activity, Nutrition, and Tobacco Cessation algorithms; ongoing reassessment of lifestyle risks should be a part of routine clinical practice
4 CSF suggestive of leptomeningeal metastasis in the absence of positive cytology includes high WBC and/or low glucose and/or high protein. If CSF is not positive for tumor cells, up to 3 lumbar punctures may be of clinical value.
5 Poor risk patients with exceptionally chemosensitive tumors (e.g., small cell lung cancer, lymphoma) may be treated
6 Refer Karnofsky Performance Status Scale (Appendix A) – Score ≤ 50 is considered a poor risk factor
7 Refer Karnofsky Performance Status Scale (Appendix A) – Score ≥ 60 is considered a good risk factor
8 Usually whole brain radiation therapy (WBRT) and/or partial spine field recommended

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Approved by the Executive Committee of the Medical Staff on 06/25/2019
Reassess CSF from site where positive CSF cytology was originally obtained; if CSF cytology was originally negative, reassess by obtaining CSF from a different site.

### PRIMARY TREATMENT

- **Induction intra-CSF chemotherapy** for 4-8 weeks, if systemic disease stable or
  - Consider high-dose methotrexate (if breast or lymphoma) or
  - Consider radiation (if breast or lymphoma)

Reassess CSF from site where positive CSF cytology was originally obtained; if CSF cytology was originally negative, reassess by obtaining CSF from a different site.

- **Flow abnormalities**

- **Normal flow**

### POST-INDUCTION THERAPY

- Consider increasing the interval of treatments between intra-CSF chemotherapy

  - **Cytology continues to be positive and/or evidence of clinical or radiologic progression of leptomeningeal metastases**
    - Consider switching intra-CSF medications and treat for 4 weeks before re-testing CSF or
    - **Consider radiation therapy to previously un-irradiated symptomatic sites**: o Fractionated external beam radiation or o Stereotactic radiosurgery and/or
    - Best supportive care

  - **Negative cytology**
    - Repeat CSF cytology

  - **Repeat Nuclear Medicine CSF Shunt Evaluation**
    - **Normal flow**
    - Consider switching intra-CSF medication
    - **Radiation to symptomatic sites or**
      - Systemic chemotherapy and/or
      - Best supportive care

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1 Induction intra-CSF chemotherapy can start after radiation
2 Depending upon the extent of the disease, consider appropriate radiation therapy
3 Usually WBRT and/or partial spine field recommended
4 Consider switching intra-CSF medications and treat for 4 weeks before re-testing CSF

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## APPENDIX A: Karnofsky Performance Status Scale Definitions

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>100</td>
<td>Normal; no complaints; no evidence of disease</td>
</tr>
<tr>
<td>90</td>
<td>Able to carry on normal activity; minor signs or symptoms of disease</td>
</tr>
<tr>
<td>80</td>
<td>Normal activity with effort; some signs of disease</td>
</tr>
<tr>
<td>70</td>
<td>Cares for self; unable to carry on normal activity or to do active work</td>
</tr>
<tr>
<td>60</td>
<td>Requires occasional assistance, but is able to care for most of his personal needs</td>
</tr>
<tr>
<td>50</td>
<td>Requires considerable assistance and frequent medical care</td>
</tr>
<tr>
<td>40</td>
<td>Disabled; requires special care and assistance</td>
</tr>
<tr>
<td>30</td>
<td>Severely disabled; hospital admission is indicated although death not imminent</td>
</tr>
<tr>
<td>20</td>
<td>Very sick; hospital admission necessary; active supportive treatment necessary</td>
</tr>
<tr>
<td>10</td>
<td>Moribund; fatal processes progressing rapidly</td>
</tr>
<tr>
<td>0</td>
<td>Dead</td>
</tr>
</tbody>
</table>
SUGGESTED READINGS


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DEVELOPMENT CREDITS

This practice algorithm is based on majority expert opinion of the Leptomeningeal Metastases workgroup at the University of Texas MD Anderson Cancer Center. It was developed using a multidisciplinary approach that included input from the following:

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