Detection of Exosomal CEMIP as a Prognostic Biomarker of Brain Metastasis

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<th>Background &amp; Unmet Need</th>
<th>Technology Overview</th>
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<td>• Brain metastasis most commonly arises from lung and breast cancers, and it has a 10-fold higher incidence than that of all primary brain tumors combined</td>
<td>• <strong>The Technology:</strong> A method to predict likelihood of brain metastasis based on the expression of cell migration-inducing and hyaluronan-binding protein (CEMIP) on tumor exosomes</td>
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<td>• Despite its high lethality, brain metastasis is poorly prognosed and lacks effective therapies</td>
<td>• <strong>The Discovery:</strong> CEMIP is enriched in brain metastatic breast and lung tumor-derived exosomes</td>
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<td>• Current protocols for prognosis rely on brain scans of patients who already have symptoms, and it is difficult to predict who will develop brain metastasis</td>
<td>• CEMIP promotes brain metastasis by altering the brain niche to be more favorable to brain metastasis</td>
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<td>• Predicting brain metastases could be useful to put at-risk patients under closer surveillance and intervene before metastasis has occurred</td>
<td>• <strong>PoC Data:</strong> CEMIP was found to be enriched in the exosomes from brain metastatic cells</td>
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<td>• Tumor-secreted factors, including exosomes, can reshape distant microenvironments, such as pre-metastatic niches, in order to drive organ-specific metastasis</td>
<td>• Loss of CEMIP in brain-tropic breast cancer cells reduced the number of brain metastatic foci by 70%</td>
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<td>• <strong>Unmet Need:</strong> Methods for prognosis of brain metastasis to guide early intervention</td>
<td>• Patients with brain metastasis had significantly higher CEMIP expression, and metastases of the brain had higher CEMIP expression than other sites</td>
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<td>• Patients with high levels of CEMIP expression had a shorter latency period for metastasis and significantly poorer prognoses</td>
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Inventors: David Lyden Goncalo Rodrigues

Patents: US Application Filed


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Technology Applications

- Prognostic biomarker for risk of metastasis to the brain
- Method to non-invasively screen patients for primary and recurrent brain metastasis
- A biomarker for treatment selection for CEMIP-targeted therapies to prevent metastasis to the brain

Technology Advantages

- CEMIP can detect likelihood of metastasis at an early stage before metastasis has occurred, facilitating use of preventative treatments
- CEMIP can be detected from patient plasma, allowing for non-invasive testing for this biomarker

Supporting Data / Figures

Figure 1: CEMIP is enriched in exosomes from brain-trophic breast cancer cells compared to other organ-specific metastatic cells, including lung-trophic (LuT1), bone-trophic (BoT1), and parental cells (Par). ACTB is a loading control. CD81 is an exosomal marker.

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**Supporting Data / Figures**

**Figure 2:** Left: CEMIP expression is higher in brain metastasis in both primary and metastatic tumors Right: Patients with high CEMIP expression had decreased progression-free survival for brain metastasis.

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