

# Low-dose Carbon Monoxide Treatment for Metastatic Cancers

## Lead Inventors:

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## Background & Unmet Need

- Cancer metastasis is responsible for 90% of cancer-related deaths
- Patients with localized cancer often have undetectable tumor cells in distant sites, which could later form metastatic tumors
- Therapies to prevent or treat metastatic tumors are limited, and conventional anti-proliferative chemotherapies often do not decrease metastasis
- **Unmet Need:** Methods to treat, prevent, alleviate cancer metastasis

## Technology Overview

- **The Technology:** A method to treat or prevent metastatic cancer via administration of low-dose carbon monoxide separately or in combination with additional therapeutic agents
- By perturbing cancer cell metabolism, low-dose carbon monoxide (CO) treatment decreases metastatic potential in multiple cancer types including breast, colon, and prostate
- CO decreases cancer cell migration *in vitro* without affecting activity of non-malignant cells
- CO can be administered by gas inhalation, nanoparticle delivery, or other carbon-monoxide releasing molecules (CORMs)
- **PoC Data:** Pre-clinical testing via inhalation of low-dose CO reduced metastatic tumor burden completely in pancreatic ductal adenocarcinoma (PDAC) 8988T-bearing mice ( $p < 0.05$ ) and by 50% in triple-negative breast cancer (TNBC) MBA-MB-231-bearing mice ( $p < 0.0001$ )

### Inventors:

Nancy Du  
Augustine Choi

### Patents:

US Application Filed

### Publications:

Casanova et al. *Scientific Reports*. 2019.

Zhang et al. *Cancer Lett.* 2022.

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### Cornell Reference:

D-9146



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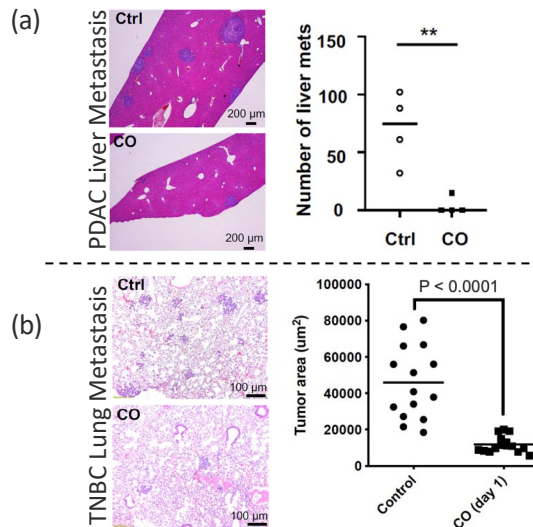
## Technology Applications

- Neoadjuvant prophylactic treatment to prevent metastasis following a primary cancer diagnosis
- Adjuvant treatment to prevent metastasis or treat metastatic lesions
- Combination adjuvant treatment with additional therapeutic agents
- Treatment of idiopathic lung fibrosis

## Technology Advantages

- Treatment is not cytotoxic and does not reduce activity of non-cancerous cells *in vitro*
- CO can be co-administered with current standard of care for a given cancer
- Effective against multiple cancers in reducing metastasis, metastatic burden, and tumor growth

## Supporting Data / Figures



**Figure 1:** CO treatment in animal models reduces liver metastasis (a) and lung metastatic outgrowth (b) in PDAC (8988T) and TNBC (MDA-MB-231) *in vivo*

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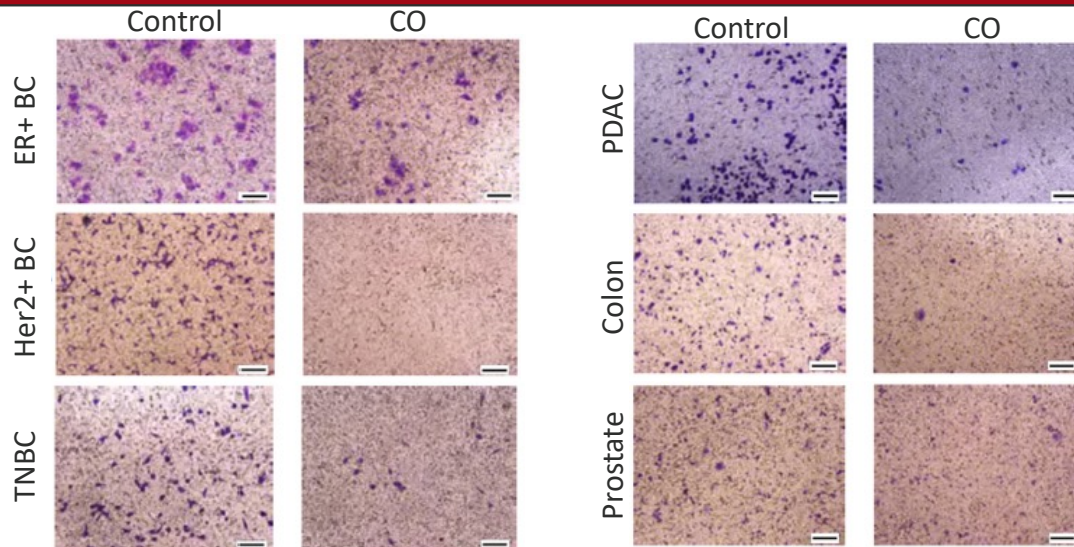
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## Supporting Data / Figures



**Figure 2:** Low-dose CO reduces transwell migration of ER+, HER2+, and triple negative breast cancer (BC) as well as pancreatic (PDAC), colon and prostate cancer *in vitro*

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