METABOLIC TERRAIN
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Is It Time to Consider Metabolic Oncology in Cancer Treatment today?

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Introduction

Since 1914, the Somatic Mutation Theory has been followed in the treatment of cancer and remains the dominant theory in oncology care today. Though many important discoveries have come from this theory, we still fall short of changing cancer outcomes.

Accumulating evidence indicates that the dysregulated metabolism in cancer cells is more than a hallmark of cancer but may be the underlying cause of the tumor. Most of the well-characterized oncogenes or tumor suppressor genes function to sustain the altered metabolic state in cancer. Unlike genetic alterations that do not occur in all cancer types, metabolic alterations are more common among cancer subtypes and across cancers.

As tumors grow, they can rewire their metabolic pathways to meet the energetic demands of continuous cell growth. Increased consumption of fuel sources such as glucose and glutamine, begs the questions:

- why do cancer cells shift their metabolism in certain ways?
- are these changes a consequence of the changes in proliferation or a driver of cancer progression?
- can targeting these metabolic pathways change patient outcomes?

Recognizing cancer as a metabolic disorder could unravel key diagnostic and treatments markers that can impact approaches used in cancer management.

The WHO expects the worldwide doubling of cancer rates by 2030, it is time to consider the Metabolic Theory, in addition to Somatic Mutation Theory, as having a role in and target for, cancer treatment and prevention.

Case examples are presented where a metabolic approach, alongside standard of care (SOC) was incorporated as part of the patient's treatment plan to the benefit of each patient.

Case presentations

A case of Glioblastoma (GBM)

A 38-year-old man presented with chronic headache, nausea, and vomiting accompanied by left partial motor seizures and upper left limb weakness in February 2016. The enhanced MRI revealed a solid cystic lesion in the right partial space suggesting GBM. Prior to tumor resection and SOC, the patient fasted for 3 days and then initiated a 21-day vitamin/mineral-supplemented Ketogenic Metabolic Therapy (KMT). Treatment included radiotherapy, temozolomide, and KMT. The patient received supportive medications and dietary supplements and hyperbaric oxygen therapy (HBOT) (60 min/session, 5 sessions/week at 2.5 ATA). No steroid medication was given at any time. After 9 months of treatment with the modified SOC and complementary KMT, seizures and left limb weakness resolved.

This is the first report of a confirmed GBM where KMT was the initial treatment followed by a modified SOC together with KMT and HBOT, and other targeted metabolic therapies. As rapid regression of GBM is rare following resection and SOC alone, it is possible that the response observed in this case resulted in part from the modified SOC and other novel treatments.

Case Presentations (cont'd)

A case of Triple Negative Breast Cancer

An overweight 29-year-old woman with stage IV (T4N3M1) triple-negative invasive ductal carcinoma of the breast. The patient presented with an observable mass in her left breast in December 2015. In August 2016, MRI revealed a BI-RADS 5 tumor and multiple lymphadenomegaly in the left axilla, and a Tru-Cut biopsy led to the diagnosis of triple-negative nuclear grade 2 invasive ductal carcinoma (TNBC). The patient was admitted to ChemoThermia Oncology Center, Istanbul, Turkey in October 2016. A PET Scan confirmed the primary tumor in left breast, lymph node involvement and with metastases to liver and abdomen.

The patient received a treatment protocol consisting of metabolically supported chemo-therapy (MSCT), KMT. Hyperthemia (HT) and HBOT. She received MSCT on the first and eighth day of a 21-day cycle and following each MSCT session she received local 60 minutes sessions of HT and HBOT together. She was also encouraged to consume a ketogenic diet. After 12 sessions of MSCT, HT and HBOT a repeat PET scan, in February 2017, was performed which revealed a complete therapeutic response. The patient continued to receive 6 additional sessions and in April 2017 underwent a mastectomy.

Pathology confirmed a complete response consistent with the response indicated by her PET-CT imaging. This case study presents evidence of a complete clinical, radiological, and pathological response following a six-month treatment period using a combination of MSCT and a novel metabolic therapy in a patient with stage IV TNBC.

Case Presentations (cont'd)

A case of Stage IV Breast Cancer

A 47-year-old woman with stage IV (T4N3M1) grade 3, ER +, PR +, and HER2- breast cancer which had metastasized to the brain, lungs, mediastinum, liver, abdomen, and bones. It was determined that she was ineligible for standard conventional treatment due to advanced disease, poor performance status, and life expectancy of less than one month.

She was admitted to the ChemoThermia Oncology Center, Istanbul, Turkey, in November of 2018 where she received 17 rounds of MSCT along with local HT and HBOT) on the same day as and the day following MSCT. KMT along with supportive medications and dietary supplements were used during the entire treatment period and following her return home. The treatment resulted in a complete and enduring response spanning two years at present (2021).

Summary

These cases highlight the benefits of integrating a combination of modalities targeting multiple vulnerabilities of tumor cells with standard chemotherapeutic drugs administered using an MSCT protocol along with other metabolic therapies. With disease regression as the goal, patients can achieve a complete and durable response to the administered treatment, extend their lives and experience an enhanced quality of life.