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Ketogenic diet and cancer patients: can it evolve into a synergistic adjuvant avenue in the therapeutic algorithm?

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1. Background-Aim

Ketogenic Metabolic Therapy (KMT): Ketogenic Diet (KD) and other low-glycemic diets

- potential **anti-tumor effects**
- positive impacts on quality of life **(QoL)** and **survival**

KMT in combination with radiotherapy

- emerging field of investigation
- **potential complementary therapy** for various types of cancer

Aim: *a review of recent evidence about* ***the role of KMT as an adjuvant to radiotherapy*** *for cancer patients*

2. Materials & Methods

A review was conducted using the **PubMed platform**, with an advanced search employing the terms:

“ketogenic diet” AND

“radiotherapy” AND

“cancer” OR **“oncological patient”**

3. Results

✓ **Increasing number of pre-clinical and clinical studies**

(mostly case reports /pilot studies, small number of RCTs) exploring the role of Ketogenic Metabolic Therapy(KMT) as an adjuvant in traditional therapies of certain cancer types *(brain, breast, lung, head and neck, pancreatic, colorectal)*

✓ **KMT: various regimes applied during chemotherapy and/or radiotherapy**

- ketogenic diet in different ratios
- caloric restricted diet
- low carbohydrate diet
- fasting protocols

3. Results

✓ **multiple mechanisms of KMT to anti-cancer effect**

- targeting glucose (Warburg effect) and amino acid metabolism of cancer cells
- interfering with ROS production in cancer cells
- special actions of ketone bodies (e.g. epigenetic alterations, molecular signaling, anti-inflammatory effects)

✓ **significant KD anti-tumor effects concerning**

tumor growth, survival rate, cancer initiation, cancer-induced cachexia,

enhancement of targeted therapy efficacy, sensitization of cancer cells to classic chemo or radiotherapy

✓ **different response to KD according to tumor special characteristics**

(e.g. genetic alterations, glucose uptake on PET scan)

4. Conclusions

- small number of RCTs
- heterogeneity in study design (different types of cancer, variety of chemotherapy and RT schedules, differences in diet composition, exogenous ketone esters, etc)
- questions about optimal KD ratio, time point, caloric restriction, fasting
- low compliance rate due to KD low palatability and tumor growth related complications

✓ **No robust evidence to form guidelines** for the use of KMT in cancer patients

✓ Need for RCTs with **protocol standardization**

✓ KMT improves **overall health, body composition and QoL** in certain cancer patients

✓ KMT is a **cost-effective adjuvant therapy to chemotherapy and RT with no serious adverse effects or toxicity**

✓ **KMT could be included in the therapeutic algorithm with careful implementation and monitoring by a multidisciplinary team of experts** to increase **radiotherapy efficiency** and preserve patient's **nutritional status**

5. References

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