

# **AMINO ACID SUPPLEMENTATION IN AN ATHLETE WITH A RARE CARCINOMA OF THYROGLOSSAL DUCT CYST: A CASE REPORT**

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## **Table of Contents**

- 1) Introduction
- 2) Case Presentation
- 3) Discussion
- 4) Conclusion
- 5) Relevance To Practice
- 6) Footnotes
- 7) Acknowledgments
- 8) References

Note: This is an exploratory case study that was undertaken to determine if there was sufficient justification to undertake a larger-scale investigation. Where considerable uncertainty exists about research goals, and results, exploratory case studies help identify questions, select measurement constructs, and develop measures; they also serve to safeguard investment in next stage larger studies. The authors full recognize that the greatest pitfalls in an exploratory study involve premature conclusions and inadequate representation of diversity.

## **1) INTRODUCTION**

This is a case report of a young athlete in whom plasma amino acid profiling was undertaken, and amino acid supplementation administered to correct observed deficiencies. This athlete was originally diagnosed with papillary thyroid carcinoma arising in a thyroglossal duct cyst which was treated adequately without any need for specific thyroid surgery or replacement therapy. On resumption of athletic activity following surgery, and with the gradual restoration of the plasma amino acid levels to optimal values, the individual's athletic performance and quality of life was found to improve.

## **2) CASE PRESENTATION**

A 21-year-old female Olympic-level athlete reported to this "Center" (ISM-Immune System Management Lab and Clinic – an orthomolecular health clinic) with the history of surgery for a histologically diagnosed papillary carcinoma arising in a thyroglossal duct cyst. She gave the history of a painless midline neck swelling, about 4 centimeters in diameter, for about 2 months prior to a fine needle aspiration biopsy. There was no associated pain or difficulty in swallowing, hoarseness of voice or local nodal enlargements. Histopathology of the biopsy specimen as well as of the lesion removed later surgically confirmed the diagnosis. The thyroid was not involved and therefore not handled during surgery. The individual also did not require any thyroid replacement therapy, radio-therapy or chemotherapy.

She returned to athletic training about 2 months after her surgery. About 7 months after that the individual reported to this Center with the complaints of easy fatigability and muscle “tiredness”, especially during athletic training. She also complained of depression, bouts of irritability, poor memory and concentration, joint stiffness and soreness and bouts of sore throat with productive cough. She had no obvious abnormal physical findings except for the evidence of recent neck surgery.

Blood plasma concentrations of 28 amino acids were profiled. Individual profiles were referenced to standard amino acid norms (19). Initial plasma amino acid profile analysis revealed abnormal levels of the branched chain amino acids (BCAA) isoleucine, leucine, valine, as well as the amino acids methionine, taurine, arginine, tyrosine, aspartate, ornithine and asparagine. She was subsequently given a customized oral amino acid supplementation for correction of the deficiencies. Plasma amino acid profiling and administration of the customized supplementation was repeated at intervals of 2 months for a total period of about 7 months.

At the end of that period all the deficient amino acids were found to have returned to reasonably optimal levels. The individual also subjectively reported a substantial improvement in her athletic performance.

Quality of life assessment was carried out in accordance with the RAND-36 Short Form Health Survey Instrument. This questionnaire encompasses such areas as physical functioning, energy, emotional well-being, role limitations resulting from physical or emotional problems, pain and general health.

On first reporting, the individual scored well below the norm in every scoring parameter. When reviewed again with the questionnaire, about 11 months later, she scored much higher in each when compared to the first, but was still substantially below the norm in every parameter, except “physical functioning”. The only area where she scored below the first review was “general health” (see Table.1).

Table 1

RAND SF-36 parameters	INITIAL SCORE	POST-TREATMENT SCORE	NORMS
Physical functioning	80	85	<b>84.2</b>
Role limitation due to physical health	0	25	<b>81.0</b>
Role limitation due to emotional stress	0	66.6	<b>81.3</b>
Energy/Fatigue	15	25	<b>60.9</b>
Emotional well-being	40	56	<b>74.7</b>
Social functioning	25	37.5	<b>83.3</b>
Pain levels	45	57.5	<b>75.2</b>
General health	50	40	<b>72.0</b>

### 3) DISCUSSION

*Amino Acids and Muscle/ Athletic Performance:* It is reported that exercise results in a significant increase in the rate of amino acid catabolism, and that there is a depletion of the plasma amino acid pool with prolonged exercise (1). Branch chain amino acids (BCAA) make up about one-third of the muscle proteins (2), and prolonged heavy exercise results in increased protein catabolism and alterations in the plasma amino acid concentrations (3). Several amino acids are known to play crucial roles as carbon sources for maintaining blood glucose homeostasis during

exercise as well as glycogen restitution during recovery (4). It is, in fact, reported that intake of BCAA during exercise is accompanied by improved mental and physical performance (5) and that it also helps reduce muscle damage associated with endurance exercise (6, 7). It has recently been reported that maintaining the blood BCAA level throughout a period of long distance run reduces LDH release and reduces the degree of muscle damage (8). It has also been suggested that BCAA supplementation helps to reduce the immuno-suppression associated with intense long-duration exercise (9).

*The Clinical and Surgical Event Status:* Thyroglossal duct cysts are the most common congenital cervical abnormality in childhood (10 – 13). Malignant transformation is rare, and occurs in only about 1% of cases (10, 12, 14, 15). Less than 150 such cases have been reported in the literature (13 – 17). Papillary carcinoma is the most frequent, and has variously been reported to be anywhere between 82% - 92% (14 – 16, 18). It has also been reported that the frequency of regional lymph node metastasis is less in papillary thyroid carcinoma arising in thyroglossal duct cysts than those arising in the thyroid gland proper (15). Since most of these tumors originate from ectopic thyroid tissue within the thyroglossal cyst, most authors consider a Sistrunk operation to be adequate in the presence of a clinically normal thyroid, a palpably normal thyroid gland at surgery and a negative thyroid scan (13, 16, 18). Results of adequate excision using the Sistrunk operation are excellent (18). The prognosis and long term survival of patients with papillary carcinoma is good whether it occurs in the thyroglossal duct cyst or in the thyroid gland proper (11, 13, 15).

In the case being reported, the papillary carcinoma of the thyroglossal duct cyst was treated adequately. There was also no detectable abnormality of the thyroid, and the individual had not required any thyroid replacement therapy for the condition.

Therefore, it was assumed that the symptoms that the individual presented with were likely unrelated directly to her recent clinical and surgical event. It was postulated that the symptoms could be attributed to a depletion of muscle protein through intense athletic training, and the concomitant absence of adequate amounts of BCAA required for replenishment. There was an observed depletion of her plasma amino acid pool that follows any prolonged intense exercise, as evidenced in her amino acid profile. This depletion had also resulted in a state of immune-suppression in the individual that likely had led to the episodes of respiratory infections.

Customized amino acid supplementation to correct the deficiencies resulted in an improvement in the individual's physical performance and emotional status as evidenced in the quality of life assessment and subjective comment from the individual. The individual's RAND-36 scores will be followed in 12-month intervals in anticipation of continued improvement.

#### **4) CONCLUSION**

From this one Case Report we might surmise that athletic activities and sports lead to depletion of specific amino acid stores that can adequately be corrected with customized amino acid supplementation. Not only may this orthomolecular treatment prevent a decline in performance and in fact, improve performance levels, it may also lead to an overall improvement in the quality of life which can also directly impact on an athlete's peak performance.

#### **5) RELEVANCE TO PRACTICE**

Extrapolation of this Case Report may indicate that similar measures could be undertaken for all individuals involved in sports and athletics.

## **6) FOOTNOTES**

Conflict of interest: Chowdhury Zaman is the Medical Director and Dr. Ken Lin is the Lab Director for Immune System Management Inc., the corporate entity that has sponsored this research.

## **7) ACKNOWLEDGMENTS**

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