Application of INAA to assess blood mineral in female athletes by exercise type

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The maintenance of nutritive mineral levels in blood is important for health. Most hard exercise can change the mineral level in female by sweating and other reasons. Also exercise itself can change the distribution of minerals among tissues. Macro-minerals such as Na, K, Cl can be lost through sweat and the level of antioxidant minerals like Fe, Se, Zn can be changed through seat, increased energy metabolism, and distribution between tissues during exercise. The macro-minerals are important for maintain body homeostasis and muscle contraction. The antioxidant minerals can protect human body against the production of free radicals and reactive oxygen spieces. In this study we measured using INAA-method serum mineral contents of collegiate female athletes such as judo, aerobics, and basketball, and of general sedentary female collegiate. Serum mineral level were different in females according to exercise type. Se level was the highest in aerobic players and lowest in judo athletes, while Zn level of serum was the highest in basketball player and the lowest in judo athletes. Na and Cl contents of serum were the highest in aerobic athletes and lowest in sedentary female. This study showed that the INAA is useful for measuring the tiny difference of diverse nutrient mineral levels by exercise type.

I. Introduction

Most athletic collegiate regularly conduct hard training to enhance the exercise performance. Most hard exercise can trigger the change of mineral level in female by sweating and other reasons. Also exercise itself can change the distribution of minerals among tissues. Macro-minerals such as Na, K, Cl can be lost through sweating. Also the level of antioxidant minerals like Fe, Se, Zn can be changed through sweating, increased energy metabolism and distribution between tissues during exercise. The macro-minerals are important in order to maintain body homeostasis during exercise. The antioxidant minerals can protect human body against the production of free radicals and reactive oxygen spieces. Little reports are known on the change of mineral of female athletes by exercise. The INAA is suitable to measure the multi-elements with precision. This work was conducted to determine the nutrient mineral levels of blood in female collegiate by exercise using INAA, because the female athletes seem to be more vulnerable to mineral deficiency compared to male counterpart.

II. Experimentals

The sedentary and athletic collegiate females of aerobics, basketball and judo were recruited for this study at a university. Blood was drawn from study participants after fasting of 12-14 hour and serum was separated. Serum mineral levels of participants were measured by INAA using HANARO reactor in Korea Atomic Energy Research Institute(KAERI). For the detection of nuclide, 60mg of each freeze-dried serum sample was irradiated by thermal neutrons. In addition, certified reference material of NISTs were used and the relative errors of mineral were below 10%.

III. Results

The range of mineral contents in serum of subjects were 129.0~380 mg/dl for Na, 188.8~556.0 mg/dl for Cl, 8.3~33.0 mg/dl for K, meanwhile those of antioxidant minerals were 38.5~378.9 ug/dl for Fe, 70.0~150.5 ug/dl for Zn , 8.4~17.1 ug/dl for Se. The serum mineral level of female showed difference by exercise type. Serum Se level was the highest in aerobic players and lowest in judo athletes, while Zn level of serum was the highest in basketball player and the lowest in judo athletes. Na and Cl contents of serum were the highest in aerobic athletes and lowest in sedentary female. Serum K content were higher in all athletes compared to sedentary female.

IV.Conclusion

Serum macro- and antioxidant mineral showed difference in female athletes by exercise type. This study showed that the INAA was suitable method to assess the tiny differences of macro- and micro-mineral contents in serum of collegiate female by sport type.

Fig.1. This is the APSORC 17 logo (this is for example only; do not reproduce this logo).

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II. CONCLUSIONS

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