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An investigation was conducted using a double-blind, randomized clinical trial to evaluate the effects of L-arginine supplementation on body composition and performance in athletes

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ABSTRACT

The main aim of this study was to examine the effect of L-arginine supplements on individuals' athletic abilities and physical condition. The study involved 18 male track and field athletes between the ages of 15 and 37 years who were affiliated with sports clubs in FC Sherwana, Kurdistan-Iraq. Participants were randomly divided into two groups: one received L-arginine supplements and the other received placebos. Over 30 days, the athletes were given either a daily dose of 4 g of L-arginine or an equivalent amount of placebo. Pre- and post-intervention assessments were conducted to evaluate exercise performance, body mass index (BMI), body fat mass (BFM), and lean body mass (LBM). The mean age of the participants was 23.14 ± 2.75 years. The group that received L-arginine supplementation showed a significant improvement in exercise performance (4.15 ± 0.35) compared to the placebo group (2.89 ± 0.76) (P = 0.04) . This increase in performance remained significant throughout the study even after accounting for baseline values, physical activity, and usual dietary intake. Furthermore, L-arginine supplementation had a significant impact on weight, BMI, BFM and LBM with values of (68.31 ± 10.11), (22.30 ± 1.12), (14.07 ± 6, 99) or (54.67 ± 4.75). The p values for these effects were (0.09), (0.02), (0.05), and (0.02), respectively. Overall, the results suggest that a daily intake of 4 g of L-arginine may increase the athletic performance of male track and field athletes and also impact various anthropometric measurements such as BMI, BFM and LBM.

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INTRODUCTION

L-arginine, a semi-essential amino acid used by most cells, typically accounts for 5-7% of the total amino acid content in the human diet (Wu G, Morris SM Jr. 1998). The absorption rate of L-arginine from food sources is estimated to be around 60% (Reyes AA, Karl IE, Klahr S 1994). Studies suggest that L-arginine supplementation may improve endothelial function and insulin secretion, reduce oxidative stress, and lead to improvements in conditions such as diabetes mellitus (DM) and cardiovascular disease (CVD) (Lucotti P et al. 2009, Martina V et al 2008). According to Gahche J et al. (2011), there was an increase in the consumption of dietary supplements in the previous year. Most of these supplements are commonly used to improve strength retention during short, high-intensity workouts. In recent studies, researchers have examined the possible effects of certain supplements, including creatine monohydrate and hydroxyl methyl butyrate (HMB), on high-intensity exercise (Nissen SL, Sharp RL 2003). Another type of supplement that has gained attention is amino acids, which have been shown to have a positive effect on muscle protein metabolism (Antonio J et al. 2000). Clinical studies have shown conflicting results in this regard, with limited evidence available from Western countries. For example, a study conducted by (Santos et al. 2002), found that taking 3 g of L-arginine supplement daily for 15 days resulted in a reduction in muscle fatigue and an improvement in athletic performance. However, a similar study by (Liu TH et al in 2009) reported no significant effect on an athlete's performance when adding 6g of L-arginine daily for 3 days. Additionally, combining 2g of L-arginine per day with ornithine over a period of five weeks was found to increase both muscle strength and lean body mass (LBM), as reported in a study by (Elam RP, Hardin DH, Sutton) was observed RA and Hagen L in 1989). The study did not consider the impact of L-arginine supplementation on athletic performance. There is currently no research examining the effects of adding 4g of L-arginine per day on athletic performance. (Elam RP, Hardin DH, Sutton RA, Hagen L 1989) discovered that increasing the duration of L-arginine supplementation may be more beneficial than increasing the L-arginine dosage. The aim of this clinical study was to evaluate the effects of a 4-week regimen on athletic performance and body composition compared to various dosages used in previous studies.

METHODS

The research was conducted on FC. Sherwan athletes aged 15 to 37 in Kalar, Kurdistan Iraq. Each athlete completed a participant information sheet and a medical questionnaire, which also included questions about

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acute or chronic illnesses such as mental disorders, untreated hypothyroidism, heart and kidney disease, hepatitis, and infectious and inflammatory diseases. A total of 18 athletes were selected from the circuit, all of whom participated in the training program for 30 days. Participants were randomly divided into two groups: the L-arginine supplementation group (n = 9) and the placebo group (n = 9), after stratification based on pre-intervention body mass index (kg/m2).

MEASUREMENTS

Comprehensive data on age, anthropometry, medical background, and use of medications and nutritional supplements were collected. The anthropometric measurements, including body weight, height, BMI, lean body mass (LBM), and body fat mass (BFM), were assessed for both the initial and final participants. The material had a minimum weight of 0.5 kg without shoes. Height was measured using an unstretched measuring tape (without shoes) with a normal shoulder position. BMI, LBM and BFM were assessed using the Body Composition Analysis model (GS 6.5). Before body composition assessment, all participants abstained from food. Currently, all athletes train at least 5 days per week, with each session lasting 90 minutes. This regular physical activity program was maintained throughout the duration of the study. Participants were instructed not to change their physical activity level during the study period, and any differences in physical activity between the two groups were taken into account in the final analysis.

INTERVENTION

After randomly assigning participants to either the L-arginine or placebo groups, those in the L-arginine group were administered tablets containing 4 grams of L-arginine daily. These tablets were purchased from Bazhdar protein shop in Kalar. Conversely, participants in the placebo group received an equivalent amount of placebo tablets every day for 30 days. Except for exercise time, participants were instructed to take these tablets either in the evening or in the afternoon. The placebo tablets were designed to closely resemble the L-arginine tablets in color, shape, size and packaging. Throughout the study, all subjects were discouraged from changing their overall dietary intake and were instructed not to consume any additional nutritional supplements such as vitamins, minerals, proteins, or carbohydrates, except for those prescribed. From the beginning to the end of the study, the remaining tablets were taken from the subjects to assess their compliance. This was determined using the following formula: number of tablets used divided by the total number of tablets administered, multiplied by 100. In addition, subjects were required to keep a food log for

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three days and accurately document all food and drink consumed throughout the day, inclusive all supplements, meals and late evening snacks. Means obtained from these recordings were used to determine subjects' normal dietary intake during the intervention.

STATISTICAL ANALYSIS

I conducted a thorough examination of the data using SPSS software version 25 (SPSS, Inc., Chicago, IL, USA). Paired-sample t-tests were used to evaluate the influence of L-arginine and placebo supplements on exercise performance and anthropometric measurements. The homogeneity of anthropometric measurements, dietary intake and general characteristics in two groups was assessed using an independent samples t-test. To evaluate the influence of L-arginine and placebo supplements on anthropometric measurements and exercise performance, we used a paired samples t-test and independent samples t-test to compare the differences in changes between groups. Using analysis of covariance (ANCOVA), we adjusted for baseline values, physical activity, and usual dietary intake to determine whether the magnitude of change depended on these factors. The result was an independent effect of L-arginine supplementation on body composition and athletic performance. The significance level was defined as a P value < 0.05.

RESULT

Of the 20 male athletes involved in this athletics research, 18 individuals were selected based on specific inclusion and exclusion criteria. Of the first 18 subjects, one participant from the L-arginine group was excluded due to stomach problems, while another participant from the placebo group was excluded due to an injury. Consequently, the study was completed by a total of 18 subjects, 9 in the L-arginine group and 9 in the placebo group (Figure 1). The basic data are presented in Table 1. Notably, significant statistical differences were observed in weight, BMI, BFM and LBM between the two groups. In addition, the level of physical activity remained constant throughout the study.

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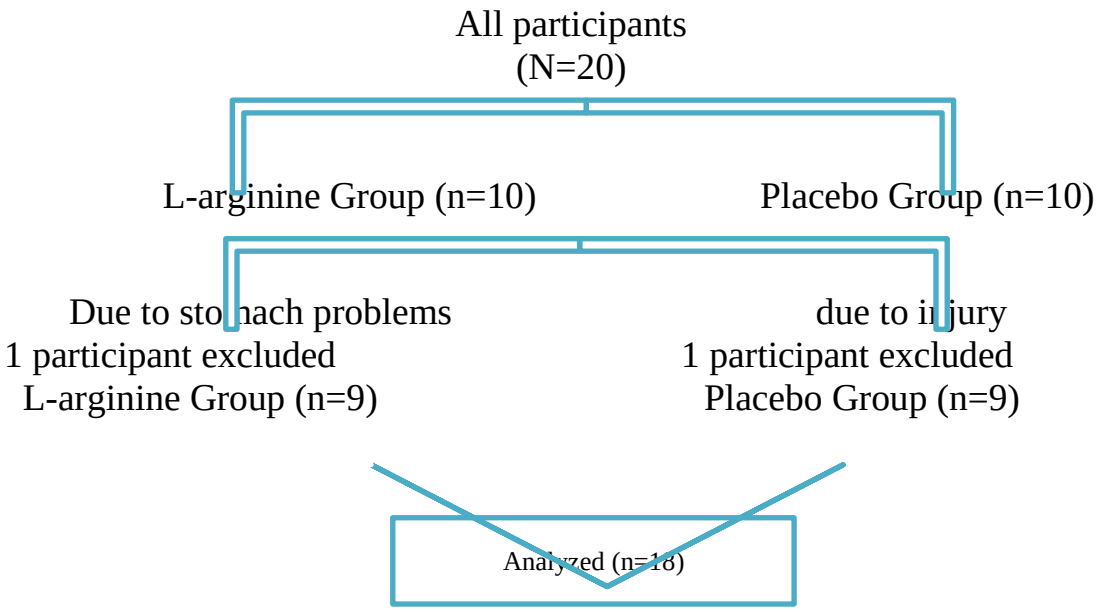

Figure 1 Summary of athletes participated.

Table 1: presents the general baseline characteristics of athletes administered either L-arginine or placebo.

Variables	L-arginineGroup (n=9)	Placebo Group (n=9)	P-value
Age (years)	23.09 ± 3.39	23.18 ± 2.11	0.04
Weight(kg)	68.45 ± 10.22	69.03 ± 13.76	0.11
Height (cm)	175 ± 4.53	173 ± 2.25	0.36
BMI (kg/m^2)	22.36 ± 1.25	23.08 ± 0.86	0.02
BFM (kg)	14.20 ± 7.69	15.87 ± 7.69	0.05
LBM(kg)	54.25 ± 4.6	53.16 ± 1.2	0.07
Physical activity	2841.23 ± 721.40	2741.44 ± 908.56	0.12
Abbreviations: BMI= body mass index. BFM= body fat mass. LBM= lean body mass. Received 2000 mg L-arginine and placebo per day during study.			

DISCUSSION

This research is among the limited number of studies that have examined the impact of L-arginine supplementation on athletic performance and anthropometric measurements of FC Sherwan athletes. Previous studies have analyzed the effects of different L-arginine dosages on exercise performance over a 35-day period. It appears that prolonged consumption of L-arginine is more beneficial than increasing the dosage in sports facilities (Santos R, et al. 2002), (Elam RP, Hardin DH, Sutton RA, Hagen L. 1989). By taking 4g of L-arginine per day for 30 days, we were able to increase our athletic performance. This improvement remained statistically significant even after taking into account participants' baseline

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values, physical activity levels, and normal dietary intake throughout the study period. These results are consistent with previous research in this area. In a comprehensive resistance training program in which participants were administered either a combination of L-arginine or a placebo, those who received L-arginine supplementation were observed to experience increases in muscle strength, lean body mass (LBM), and overall recorded athletic performance after a period of 5 weeks (Elam RP, Hardin DH, Sutton RA, Hagen L. 1989). In addition, another study found that administration of a combination of L-arginine and glycine during exercise resulted in an improvement in skeletal muscle function, while the glycine-L-arginine mixture reduced muscle fatigue during physical activity (Stevens BR, Godfrey MD, Kaminski TW, Braith RW 2000). However, in contrast to our results, a separate research study examining the effects of three days of supplementation with 6 g of L-arginine per day on exercise performance failed to demonstrate a significant improvement in exercise performance (Liu TH, et al. 2009). These inconsistent results may be attributed to differences in the duration of the study and the standards of the athletes involved. Furthermore, it was observed that supplementation of L-arginine aspartate 14 days before a marathon had no discernible effect on the performance of trained athletes (Colombani PC et al.1999). It is worth noting that the composition of the body plays a crucial role in the success of sports performance. When people lose weight, they often experience fatigue and constant fatigue. A recent study found that the effects of L-arginine supplementation were observed in terms of weight, BMI, BFM and LBM. This result is consistent with previous research results. For example, Piatti et al. (2001) conducted a study in diabetics and found that a diet supplemented with L-arginine (9 g per day) had no effect on weight over a 4-week period. Similarly, (Lucotti et al. 2009) conducted a study on patients undergoing coronary artery bypass graft surgery and found that taking L-arginine (6.4 g per day) had no effect on weight or had fat mass. However, it is important to note that some studies have shown a significant effect of L-arginine supplementation on body composition, which contradicts our results. For example, (Lucotti et al.) conducted a study in which obese patients with type 2 diabetes were given 8.3 g of L-arginine per day as a dietary supplement for three weeks. The results showed a significant reduction in waist circumference and fat weight, although there was no significant effect on overall weight. These conflicting results may be attributed to differences in study design, dosage of L-arginine supplements, and duration of the study.

Therapeutic exercises and dietary supplements are two complementary components in rehabilitation and physical therapy programs. Regular exercise helps improve physiological functions and

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strengthen affected muscles, while supplements aid in accelerating recovery and compensating for nutritional deficiencies caused by physical exertion or medical conditions. The coordination between both elements enhances treatment outcomes and speeds up the return to optimal health. (Abdullah, 2025) (Ahmed, Hayder. 2020)

Rehabilitation plays a fundamental role in modifying body composition, as it helps reduce fat mass and increase lean muscle mass through targeted exercise programs. The effectiveness of these programs depends on the type and intensity of the exercises, as well as accompanying nutrition. Combining cardiovascular training with resistance exercises improves the balance between muscle mass and fat, positively impacting overall physical performance and functional health in athletes. (Al-Rubaie.2024) (Abd, 2024)

Dietary supplements play a supportive role in enhancing the effectiveness of exercise, especially when used properly and in conjunction with structured training programs. They contribute to faster muscle recovery, improved physical performance, and increased endurance, allowing athletes to maximize the benefits of their training efforts—particularly during periods of high intensity or training volume. (Ahmed, Hayder, 202)

Table 2: shows the usual dietary intake of the subjects who were administered either L-arginine or placebo throughout the research period.

Variables	L-arginine group (n = 9)	Placebo group (n = 9)	P-value
Energy Intake (Kcal)	2189.65 ± 226.09	2101.43 ± 217.02	0.41
Protein Intake (g per day)	78.09 ± 8.11	79.23 ± 5.76	0.45
Carbohydrate (g per day)	311.15 ± 50.58	320.74 ± 35.38	0.29
Fat (g per day)	60.92 ± 11.25	61.01 ± 10.67	0.04
L-arginine (mg per day)	390.37 ± 250.23	425.69 ± 358.90	0.11
Iron (mg per day)	15.25 ± 1.73	33.12 ± 54.12	0.31
Zinc (mg per day)	10.15 ± 2.63	10.21 ± 3.41	0.23
Vitamin C (mg per day)	99.78 ± 54.11	97.61 ± 56.04	0.38
Vitamin E (mg per day)	20.09 ± 16.99	20.17 ± 3.56	0.09
Received 2000 mg L-arginine and placebo per day during study			

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Table 3: presents athletic performance and measurements before and after 30 days of intervention for athletes administered either L-arginine or placebo.

L-arginine group (n = 9)					Placebo group (n = 9)				
Variables	Before	After	Change	P value	Before	After	Change	P value	P value
Weight (Kg)	68.45 ± 10.22	68.31 ± 10.11	− 0.14 ± 0.11	0.01	69.03 ± 13.76	68.91 ± 12.56	− 0.12 ± 1.20	0.26	0.09
BMI (kg/m2)	22.36 ± 1.25	22.30 ± 1.12	− 0.06 ± 0.13	0.02	23.08 ± 0.86	23.01 ± 0.81	− .07 ± 0.05	0.02	0.02
BFM (Kg)	14.20 ± 7.69	14.07 ± 6.99	− 0.13 ± 0.70	0.04	15.87 ± 7.69	15.80 ± 7.36	− 0.07 ± 0.33	0.05	0.05
LBM (kg)	54.25 ± 4.6	54.67 ± 4.75	0.42 ± 0.15	0.01	53.16 ± 1.2	53.30 ± 1.3	0.14 ± 0.1	0.04	0.02
Sport performance	3.99 ± 0.14	4.15 ± 0.35	0.16 ± 0.21	0.05	2.76 ± 0.45	2.89 ± 0.76	013 ± 0.31	0.03	0.04
Abbreviations: BMI= body mass index. BFM= body fat mass. LBM= lean body mass. Received 2000 mg L-arginine and placebo per day during study.									

Table 4: 30-day results of athletes receiving either L-arginine or placebo.

Variables	*L-arginine group* (n = *9)*	*Placebo group* (n = *9)*	P *value*
Weight (Kg)	68.31 ± 10.11	68.91 ± 12.56	0.09
BMI (kg/m^2)	22.30 ± 1.12	23.01 ± 0.81	0.02
BFM (Kg)	14.07 ± 6.99	15.80 ± 7.36	0.05
LBM (kg)	54.67 ± 4.75	53.30 ± 1.3	0.02
Sport performance	4.15 ± 0.35	2.89 ± 0.76	0.04
Abbreviations: BMI= body mass index. BFM= body fat mass. LBM= lean body mass. Received 2000 mg L-arginine and placebo per day during study.			

L-arginine has been shown to enhance athletic performance by increasing protein synthesis and promoting tissue regeneration (White MF, 1985). It serves as a precursor of nitric oxide, which is known to increase muscle strength (Alvares TS, Meirelles CM, Bhambhani YN, Paschoalin VM, Gomes PS, 2011; Mendes-Ribeiro AC et al., 2009). This can be particularly beneficial for people who do resistance exercises. Additionally,

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increasing blood L-arginine levels can potentially improve athletic performance by facilitating the delivery of nutrients to muscles and aiding in the removal of waste products (Little JP, Forbes SC, Candow DG, Cornish SM, Chilibeck PD, 2008). In our study, we did not observe any significant side effects associated with L-arginine supplementation, with the exception of cases of dietary dermatitis. To address this issue, we reduced the dosage of supplementation for affected subjects and excluded them from further analysis. It is important to acknowledge certain limitations of our study. First, the sample size was relatively small and the study was conducted exclusively on FC Sherwana club members. Therefore, future studies with a larger sample are needed to validate the effect of L-arginine supplementation. Furthermore, we were unable to determine the optimal dosage of L-arginine in this study. Consequently, this limitation should be taken into account in future studies.

CONCLUSION

Consuming a daily dose of 4 grams of L-arginine for 30 days has been shown to increase athletic performance. In addition, this dosage of L-arginine has been found to affect anthropometric measurements such as BMI, BFM and LBM. To provide further clarity on these results, further research focusing on determining the optimal L-arginine dose and using a larger sample is needed.

REFERENCES

- Abd, M. T. (2024). Effect of Rehabilitation Exercises Using Mini Swiss Balls on the Rehabilitation of Patients with Partial Tears of Some Shoulder Muscles. *JOURNAL OF SPORT SCIENCES*, *16*(60).
- Abdullah Ahmed Mohammed. (2025). The Effect of a Proposed Approach Using Therapeutic Exercises in the Rehabilitation of Wrist Joint Muscle Injuries among Players of the First Division Clubs of Kurdistan, Iraq in Volleyball. *Journal of Sport Science*, *17*(63), 112-124. https://doi.org/10.26400/63/10
- Ahmed, B. A., & Hayder, A. K. (2020). The Effect of Rehabilitative Exercises in The Case of Anterior Dislocation of The Uncomplicated Shoulder Joint for Men Aged 40-50 Years. *European Journal of Molecular & Clinical Medicine*, *7*(6), 337-344.
- Ahmed, B. A., & Hayder, A. K. (2020). The Effect Of Using Rehabilitative Exercises In A Preventive Manner To Reduce Shoulder Rotation For People With Special Needs (Wheelchairs). *European Journal of Molecular & Clinical Medicine*, *7*(06).
- Al-Rubaie, H. J. R. (2024). The impact of a rehabilitation program on raising serotonin levels among residents of the shelter for homeless women in Baghdad Governorate. *JOURNAL OF SPORT SCIENCES*, *16*(60).
- Alvares TS, Meirelles CM, Bhambhani YN, Paschoalin VM, Gomes PS. L-Arginine as a potential ergogenic aid in healthy subjects. *Sports Med* 2011; 41: 233–248.

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ISSN: 2074 - 6032 ISSN-e: 2710 - 5016
https://pessj.uodiyala.edu.iq :الصفحة الرسمية

- Antonio J *et al.* Effects of exercise training and amino-acid supplementation on body composition and physical performance in untrained women. *Nutrition* 2000; 16: 1043–1046.
- Colombani PC *et al.* Chronic arginine aspartate supplementation in runners reduces total plasma amino acid level at rest and during a marathon run. *Eur J Nutr* 1999; 38: 263–270.
- Elam RP, Hardin DH, Sutton RA, Hagen L. Effects of arginine and ornithine on strength, lean body mass and urinary hydroxyproline in adult males. *J Sports Med Phys Fitness* 1989; 29: 52–56.
- Gahche J *et al.* Dietary supplement use among U.S. adults has increased since NHANES III (1988-1994). *NCHS Data Brief* 2011; 61: 1–8.
- Little JP, Forbes SC, Candow DG, Cornish SM, Chilibeck PD. Creatine, arginine alpha-ketoglutarate, amino acids, and medium-chain triglycerides and endurance and performance. *Int J Sport Nutr Exerc Metab* 2008; 18: 493–508.
- Liu TH *et al*. No effect of short-term arginine supplementation on nitric oxide production, metabolism and perfor- mance in intermittent exercise in athletes. *J Nutr Biochem* 2009; 20: 462–468.
- Lucotti P *et al.* Beneficial effects of a long-term oral L-arginine treatment added to a hypocaloric diet and exercise training program in obese, insulin-resistant type 2 diabetic patients. *Am J Physiol Endocrinol Metab* 2006; 291: 906–912.
- Lucotti P *et al.* Oral L-arginine supplementation improves endothelial function and ameliorates insulin sensitivity and inflammation in cardiopathic nondiabetic patients after an aortocoronary bypass. *Metabolism* 2009; 58: 1270–1276.
- Martina V *et al.* Long-term N-acetylcysteine and L-arginine administration reduces endothelial activation and systolic blood pressure in hypertensive patients with type 2 diabetes. *Diabetes care* 2008; 31: 940–944.
- Mendes-Ribeiro AC at al. The role of exercise on L-arginine nitric oxide pathway in chronic heart failure. *Open Biochem J* 2009; 3: 55–65.
- Nissen SL, Sharp RL. Effect of dietary supplements on lean mass and strength gains with resistance exercise: a meta-analysis. *J Appl Physiol* 2003; 94: 651–659.
- Piatti PM *et al.* Long-term oral L-arginine administration improves peripheral and hepatic insulin sensitivity in type 2 diabetic patients. *Diabetes Care* 2001; 24: 875–880.
- Reyes AA, Karl IE, Klahr S. Role of arginine in health and in renal disease. *Am J Physiol* 1994; 267: 331–346.
- Santos R *et al*. Study of the effect of oral administration of L-arginine on muscular performance in healthy volunteers: an isokinetic study. *Isokinet Exerc Sci* 2002; 10: 153–158.
- Stevens BR, Godfrey MD, Kaminski TW, Braith RW. High-intensity dynamic human muscle performance enhanced by a metabolic intervention. *Med Sci Sports Exerc* 2000; 32: 2102–2108.
- White MF. The transport of cationic amino acids across the plasma membrane of mammalian cells. *Biochim Biophys Acta* 1985; 822: 355–374.
- Wu G, Morris SM Jr. Arginine metabolism: nitric oxide and beyond. *Biochem J* 1998; 336: 1–17.