Table S1. Research Investigated the Interaction Between Serum Lipids and Magnesium.

No. Crt.	Study	Type	Population	Conclusion
163	El-Haggar Sahar, M.; Mostafa Tarek, M. Role of Magnesium Supplement on Hyperlipidemia and L-CAT Level in Patient on Atorvastatin Therapy. British Journal of Pharmaceutical Research. 2014 June; 4(12): 15211534.	prospective cohort study	40	Mg++ supplement to atorvastatin improve all lipid profile and provide better control on dyslipidemia than atorvastatin alone
168	Jiao, Y.; Li, W.; Wang, L.; Jiang, H.; Wang, S.; Jia, X.; Wang, Z.; Wang, H.; Zhang, B.; Ding, G. Relationship between Dietary Magnesium Intake and Metabolic Syndrome. Nutrients. **2022** May 11;14(10):2013. doi: 10.3390/nu14102013.	longitudinal follow-up study initiated in 1989 that had completed 11 waves of followup	6104 subjects adults aged 18 years and above who participated in at least two follow-up surveys in 2009, 2015 and 2018	overall and non-linear associations between dietary magnesium and MetS and its components were statistically significant, the risk of them decreased significantly when magnesium intake was lower than 280 mg/day, and then the curve leveled off or slightly increased.
169	Jin, S.; Liu, J; Jia, Y.; Han, T.; Zhao, X.; Sun, C.; Na, L. The association of dietary flavonoids, magnesium and their interactions with the metabolic syndrome in Chinese adults: a prospective cohort study. Br J Nutr. **2021** Sep 28;126(6):892902. doi: 10.1017/S0007114520004754.	prospective cohort study	6417 participants aged 20 to 74 years from the Harbin Cohort Study on Diet, Nutrition and Chronic Noncommunicable Diseases	higher intake of flavonoids was associated with a decreased risk of the MetS, which was more significant in the presence of higher Mg intake. In addition, higher intake of flavonoids was also associated with a decreased risk of central obesity.
170	Yang, N.; He, L.; Li, Y.; Xu, L.; Ping, F.; Li, W.; Zhang, H. Reduced Insulin Resistance Partly Mediated the Association of High Dietary Magnesium Intake with Less Metabolic Syndrome in a Large Chinese Population. Diabetes Metab. Syndr. Obes. **2020**; 13:2541–2550. doi: 10.2147/DMSO.S257884.	cross-sectional study	8120 participants	Significant and independent negative relationship among weight-adjusted dietary magnesium intake, HOMA-IR, and MetS in a large Chinese population. IR partly mediated the relationship between dietary magnesium intake and MetS.
13	Castellanos-Gutiérrez, A.; Sánchez-Pimienta, T.G.; Carriquiry, A.; da Costa, T.; Ariza ,A.C. Higher dietary magnesium intake is associated with lower body mass index, waist circumference and serum glucose in Mexican adults. Nutr. J. **2018**; 17:114. doi: 10.1186/s12937-0180422-2. [	a population-based multistage study	1739 participants	The results of this study suggest that increased dietary magnesium intake is associated with lower BMI and WC. In women without impaired glucose metabolism, it is also associated with lower serum glucose concentrations. These results highlight the importance of an adequate dietary magnesium intake

171	Jin, H.; Nicodemus-Johnson, J. Gender and Age Stratified Analyses of Nutrient and Dietary Pattern Associations with Circulating Lipid Levels Identify Novel Gender and Age-Specific Correlations. Nutrients. **2018** Nov 14;10(11):1760. doi: 10.3390/nu10111760.	Retrospective National Health and Nutrition Examination Study (NHANES) 2001–2013	Adult individuals n-12,284	Dietary Mg was positively correlated with HDL concentration but negatively with the TC/HDL-C ratio in females
172	Bain, L.K.; Myint, P.K.; Jennings, A.; Lentjes, M.A.; Luben, R.N.; Khaw, K.T.; Wareham, N.J.; Welch, A.A. The relationship between dietary magnesium intake, stroke and its major risk factors, blood pressure and cholesterol, in the EPIC-Norfolk cohort. Int J Cardiol. **2015** Oct 1; 196:108-14. doi: 10.1016/j.ijcard.2015.05.166.	cross-sectional study (European Prospective Investigation into Cancer (EPIC)-Norfolk)	Adult individuals (40–75 years) n-4443	Inverse relationship between high dietary Mg intake (mean 456 mg/d) and serum TC (p-trend = 0.02 men and 0.04 women)
173	Yamori, Y.; Sagara, M.; Mizushima, S. et al. An inverse association between magnesium in 24-h urine and cardiovascular risk factors in middle-aged subjects in 50 CARDIAC Study populations. Hypertension Research: Official Journal of the Japanese Society of Hypertension. **2015** Mar;38(3):219-225. DOI: 10.1038/hr.2014.158.	Cross-sectional analysis (World Health Organizationcoordinated Cardiovascular Diseases and Alimentary Comparison (CARDIAC) Study (1985–1994)	Adult participants (48–56 years) n-4211	Mg/creatinine (Cre) ratio was inversely associated with BMI, SBP, DBP, and TC (p for linear trend < 0.001 for each)
139	Rotter, I.; Kosik-Bogacka, D.; Dołęgowska, B.; Safranow, K.; Karakiewicz, B.; Laszczyńska, M. Relationship between Serum Magnesium Concentration and Metabolic and Hormonal Disorders in Middle-Aged and Older Men. Magnes. Res. **2015**; 28:99–107. doi: 10.1684/mrh.2015.0391.	prospective cohort study	313 men aged 5075 years	(+) correlations: Mg-TC (r = 0.25, p < 0.0001), Mg-LDL-C (r = 0.26, p < 0.0001)
174	Yuan, Z.; Liu, C.; Tian, Y.; Zhang, X.; Ye, H.; Jin, L.; Ruan, L.; Sun, Z..; Zhu, Y. Higher Levels of Magnesium and Lower Levels of Calcium in Whole Blood Are Positively Correlated with the Metabolic Syndrome in a Chinese Population: A Case-Control Study. Ann. Nutr. Metab. **2016**; 69:125–134.	Case-control study	408 patients	(+) correlations: Mg-BMI (r = 0.128, p < 0.05), Mg-TC (r = 0.254, p < 0.05), Mg-LDL-C (r = 0.280, p < 0.05)

175	Dibaba, D.T.; Chen, C.; Lu, L.; Bidulescu, A.; Fly, A.D.; Xun, P.; Judd, S.E.; Cushman, M.; Kahe, K. Magnesium intake is inversely associated with the risk of metabolic syndrome in the Reasons for geographic and racial differences in stroke (REGARDS) cohort study. Clin Nutr. **2021** Apr;40(4):2337-2342. doi: 10.1016/j.clnu.2020.10.024.	Population-based cohort study	n=30,239 aged ≥45 years at baseline, and self-identified as black or white	A total of 1,470 participants developed MetS during an average follow-up of 10 years. Comparing the highest quintile of total Mg intake (>437.9 mg/day) to the lowest group (<223.5 mg/day), total Mg intake had a significant inverse association with the risk of MetS [relative risk (RR) = 0.79 (0.63, 0.98), P trend = 0.043]. Dietary Mg intake was inversely associated with MetS [RR = 0.72 (0.56, 0.91), P trend = 0.006]. Adjusting for baseline components of MetS attenuated the associations, but the linear trends remained.
176	Dominguez, L.J.; Gea, A.; RuizEstigarribia, L.; Sayón-Orea, C.; Fresán, U.; Barbagallo, M.,;RuizCanela, M.; Martínez-González, M.A. Low Dietary Magnesium and Overweight/Obesity in a Mediterranean Population: A Detrimental Synergy for the Development of Hypertension. The SUN Project. Nutrients. **2020** Dec 31;13(1):125. doi: 10.3390/nu13010125.	Prospective cohort study	14,057 participants of the SUN (Seguimiento Universidad de Navarra)	Dietary magnesium intake < 200 mg/d was independently associated with a higher risk of developing hypertension in a Mediterranean cohort, stronger for overweight/obese participants.
177	Toprak, O.; Sarı, Y.; Koç, A.; Sarı, E.; Kırık, A. The Impact of Hypomagnesemia on Erectile Dysfunction in Elderly, Non-Diabetic, Stage 3 and 4 Chronic Kidney Disease Patients: A Prospective Cross-Sectional Study. Clin. Interv. Aging. **2017**;12:437–444.	Prospective Cross-Sectional Study.	372 patients	hypoMg: ↑ obesity (p = 0.003), ↑ MetS (p = 0.026), ↓ HDL-C (p = 0.009)
178	Dey, R.; Rajappa, M.; Parameswaran, S.; Revathy, G. Hypomagnesemia and Atherogenic Dyslipidemia in Chronic Kidney Disease: Surrogate Markers for Increased Cardiovascular Risk. Clin. Exp. Nephrol**. 2015**; 19:1054–1061. doi:	Prospective cohort study	180 patients	↓ serum and urinary Mg ↑ TC, LDL-C, non-HDL-C (p < 0.001 for all) (+) correlation of serum Mg and HDL-C (r = 0.326, p = 0.002) (−) correlations of serum Mg and TC (r = −0.247, p = 0.019), LDL-C (r = −0.303, p = 0.004), non-HDL-C (r = −0.289, p = 0.006), Framingham risk score (r = −0.939, p < 0.001), the presence of MetS (r = −0.830, p <

	10.1007/s10157-015-1097-z.			0.001), CKD severity (r = −0.245, p = 0.02)
179	Cambray, S.; Ibarz, M.; Bermudez-Lopez, M.; Marti-Antonio, M.; Bozic, M.; Fernandez, E.; Valdivielso, J.M. Magnesium Levels Modify the Effect of Lipid Parameters on Carotid Intima Media Thickness. Nutrients. **2020**; 12:2631. doi: 10.3390/nu12092631.	Prospective cohort study	1754 patients	↑ CKD severity = ↑ Mg and ↑ TG (p < 0.001 for trend) ↑ CKD severity = ↓ TC, LDL-C, HDL-C (p < 0.001 for) associations of Mg with T2DM (r = −0.070, p = 0.003), HTN (r = 0.053, p = 0.028), BMI (r = −0.053, p = 0.027) association of CIMT and Mg-TC (β = 0.008, SE = 0.003, p = 0.011), Mg-HDL-C (β = −0.007, SE = 0.003, p = 0.016), Mg-LDL-C (β =
				−0.007, SE = 0.003, p = 0.03), Mg-TG (β = −0.0014, SE = 0.0005, p = 0.01) interactions
123	Hamedifard, Z.; Farrokhian, A.; Reiner, Ž.; Bahmani, F.; Asemi, Z.; Ghotbi, M.; Taghizadeh, M. The Effects of Combined Magnesium and Zinc Supplementation on Metabolic Status in Patients with Type 2 Diabetes Mellitus and Coronary Heart Disease. Lipids Health Dis. **2020**; 19:112. doi: 10.1186/s12944-020-01298-4.	randomized, double-blind, placebo-controlled trial	60 patients	HDL-C: ↑ TC, TC/HDL-C, LDL-C, VLDL, TG: no effect

143	Rashvand, S.; Mobasseri, M.; Tarighat-Esfanjani, A. Effects of Choline and Magnesium Concurrent Supplementation on Coagulation and Lipid Profile in Patients with Type 2 Diabetes Mellitus: A Pilot Clinical Trial. Biol. Trace Elem. Res. **2020**; 194:328–335. doi: 10.1007/s12011019-01802-7.	randomized, double-blind, placebo-controlled trial	96 patients	Compared with baseline values, there were significant differences in serum magnesium, HDL, and triglycerides (TG) following cholinemagnesium co-supplementation ($p < 0.05$); however, there were no significant differences in serum magnesium, HDL, and TG among the groups ($p > 0.05$). Overall, concurrent supplementation of magnesium and choline is more effective than either magnesium or choline alone to improve coagulation in subjects with T2DM.

Abbreviation: Mg, magnesium. MetS, metabolic syndrome. T2DM, type 2 diabetes mellitus. HTN, hypertension. hypoMg, hypomagnesemia. OR, odds ratio. CI, confidence interval. ↑, increased. ↓, decreased. (+), positive. (−), negative. HDL-C, high-density lipoprotein cholesterol. LDL-C, low-density lipoprotein cholesterol. TC, total cholesterol. TG, triglycerides. VLDL, very low-density lipoprotein cholesterol. apoA1, apolipoprotein A1. RTC, randomized controlled trials.