Appendix 1. Search terms

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1950 to Present>

Search Strategy:

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1 exp Dietary Proteins/ (71799)

2 Proteins/me [Metabolism] (61274)

3 Nitrogen/me [Metabolism] (19039)

4 amino acids/ or exp amino acids, essential/ (266907)

5 exp Diet, Protein-Restricted/ or exp Diet, Vegetarian/ (3849)

6 exp Fish Proteins/ (7102)

7 exp Plant Proteins/ (112865)

8 ((egg* or yolk* or milk or animal* or diet*) adj3 protein*).tw. (30205)

9 (amino adj2 acid* adj4 (essential* or nonessential* or non essential* or dispensable* or nondispensable* or non dispensable*)).tw. (6328)

10 (diet* adj3 (low protein* or protein restricted or protein free or high protein)).tw. (5813)

11 ((Soy or soy bean* or soybean* or plant or vegetable* or fish) adj3 protein*).tw. (10738)

12 ((vegan* or vegetarian*) and protein*).tw. (444)

13 ((diet* or balance*) adj3 nitrogen*).tw. (4906)

14 or/1-13 (528777)

15 (intake* or timing* or frequen* or requirement* or utilization*).tw. (1384587)

16 nutritional requirements/ (15722)

17 15 or 16 (1392935)

18 14 and 17 (48263)

19 exp Lipids/bl [Blood] (164517)

20 exp Lipoproteins/ (107523)

21 exp Hyperlipidemias/ (50696)

22 cholesterol, hdl/ or cholesterol, ldl/ (27190)

23 exp Triglycerides/ (55871)

24 ((serum or blood) adj2 lipid*).tw. (21078)

25 lipoprotein*.tw. (95533)

26 hyperlipidemia*.tw. (12571)

27 (cholesterol adj2 (hdl or ldl)).tw. (35090)

28 triglyceride*.tw. (63777)

29 or/19-27 (281777)

30 exp Glucose/ (215099)

31 exp Hyperglycemia/ (20648)

32 (glucose or dextrose).tw. (280143)

33 (d glucose or l glucose).tw. (16987)

34 (fasting adj3 glucose).tw. (18392)

35 (hyperglycemia or hyperglucemia or hyperglycemic or (hyper adj glycemi*)).tw. (25219)

36 (blood adj2 (sugar or glucose)).tw. (43161)

37 (glucose adj2 intoleranc*).tw. (5750)

38 or/30-37 (370848)

39 Insulin/ (142600)

40 exp Insulin Resistance/ (38231)

41 exp Hyperinsulinism/ (43180)

42 (humulin or iletin or insulin or novolin or velosulin).tw. (226819)

43 (hyperinsulin* or insulinem*).tw. (18338)

44 (insulin adj2 (sensitiv* or resistanc* or hypersensitiv*)).tw. (46353)

45 or/39-44 (270838)

46 exp Blood Pressure/ (226330)

47 exp hypertension/ (188397)

48 exp hypotension/ (21099)

49 ((blood or diastolic* or pulse or systolic*) adj2 pressur*).tw. (211754)

50 (hypertension* or hypotension*).tw. (263275)

51 or/46-49 (453970)

52 exp Body Composition/ (28527)

53 exp body mass index/ (56123)

54 exp Abdominal Fat/ (2418)

55 Waist-hip ratio/ (2052)

56 exp Adipose Tissue/ (59986)

57 (body adj2 composition*).tw. (16839)

58 (body adj2 fat* adj3 (distribution* or pattern*)).tw. (2312)

59 (body adj2 mass adj3 index).tw. (68249)

60 bmi.tw. (46648)

61 ((fat free or lean) adj3 body mass).tw. (5098)

62 (waist adj2 hip).tw. (6197)

63 adiposity.tw. (9077)

64 ((visceral or abdominal or body or pad) adj2 fat*).tw. (28631)

65 or/52-64 (192342)

66 exp "Bone and Bones"/ (429468)

67 Bone Density/ (33081)

68 exp Fractures, Bone/ (124402)

69 exp Osteoporosis/ (38044)

70 (bone or bones).tw. (430056)

71 (osteoporos* or bone loss*).tw. (47186)

72 or/66-71 (802479)

73 exp Pregnancy Outcome/ (32312)

74 exp Parturition/ (5980)

75 Abortion, Spontaneous/ (12901)

76 exp Infant, Newborn/ (447494)

77 "growth and development"/ or exp aging/ or exp growth/ (673749)

78 exp Muscular Atrophy/ (7784)

79 (birth* or childbirth* or stillbirth* or (pregnancy adj2 outcome*)).tw. (212641)

80 parturition*.tw. (10663)

81 (abortion* or miscarriage*).tw. (47509)

82 ((Infant* adj2 newborn) or neonate*).tw. (74510)

83 (Body adj2 (size or height* or weight*)).tw. (142288)

84 (cell* adj2 (growth or enlargement* or proliferation*)).tw. (182400)

85 (organ adj2 (size* or weight* or volume*)).tw. (4629)

86 (development* adj2 (human* or child* or infant* or adolescent*)).tw. (26608)

87 (aging or ageing or longevity).tw. (117701)

88 ((muscular adj2 atrop*) or sarcopenia).tw. (5675)

89 or/73-88 (1537884)

90 exp Body Weight/ (291817)

91 ((birth or body or fetal or gain or los* or reduc* or decreas* or chang*) adj2 weight*).tw. (232690)

92 (obesit* or obese or leanness or thinness or underweight or under weight or overweight or over weight).tw. (134236)

93 (emaciation* or cachexia).tw. (5111)

94 or/90-93 (473911)

95 Cardiovascular Diseases/ (77121)

96 exp heart diseases/ (772950)

97 exp vascular diseases/ (1159229)

98 (cardio* or cardia* or heart* or vascular* or ischem* or ischeam* or coronary* or myocardial* or angina* or cvd or chd or arrythmi* or atrial* or endocardi* or fibrillate*).tw. (1595528)

99 (vascular* or thromboembolism* or thrombosis*).tw. (451761)

100 or/95-99 (2391038)

101 exp neoplasms/ (2199022)

102 (cancer* or tumor* or carcinoma* or neoplasm*).tw. (1573780)

103 or/101-102 (2505578)

104 exp Diabetes Mellitus, Type 2/ (63869)

105 exp Insulin Resistance/ (38231)

106 ((typ* 2 or typ* ii) adj diabet*).tw. (51164)

107 impaired glucose toleranc*.tw. (6845)

108 glucose intoleranc*.tw. (5714)

109 insulin resistanc*.tw. (36244)

110 (MODY or NIDDM or T2DM or DM 2).tw. (10504)

111 ((non insulin* or noninsulin*) adj2 depend*).tw. (11937)

112 (non insulin?depend* or noninsulin?depend*).tw. (18)

113 ((keto restist* or non keto* or nonketo*) adj2 diabet*).tw. (346)

114 ((adult* or matur* or late or slow or stabl*) adj2 diabet*).tw. (5486)

115 (insulin defic* adj2 relativ*).tw. (126)

116 plur?metabolic* syndrome*.tw. (32)

117 or/104-115 (128394)

118 exp diabetes insipidus/ (6512)

119 diabet* insipidus.tw. (6199)

120 or/118-119 (8185)

121 117 not 120 (128330)

122 Interleukin-6/ (35767)

123 exp receptors, interleukin-6/ (2773)

124 c-reactive protein/ (22323)

125 tumor necrosis factor-alpha/ (79154)

126 Cytokines/ (79501)

127 exp lymphocytes/ (390817)

128 (interleukin 6 or IL 6 or IL6).tw. (58213)

129 (interleukin* adj2 (b or hp1)).tw. (227)

130 ((plasmacytoma or hybridoma) adj2 growth factor*).tw. (97)

131 (b cell adj2 (differentiat* or stimulat*)).tw. (4462)

132 (hepatocyte adj2 stimulat*).tw. (485)

133 ((beta2 or beta 2) adj2 interferon*).tw. (133)

134 (hepatocyte adj2 stimulat*).tw. (485)

135 (b adj lymphocyte*).tw. (25416)

136 (BSF?2 or IFN?beta?2 or MGI?2).tw. (56)

137 (BSF 2 or IFN beta 2 or MGI 2).tw. (242)

138 (myeloid adj3 protein).tw. (449)

139 ((26k or 26 k) adj2 protein*).tw. (36)

140 ((((il6 or il 6) adj soluble*) or (sil6r or sil 6 r or il6r or il 6 r or interleukin 6 receptor)) adj4 protein*).tw. (56)

141 (hsCRP or CRP).tw. (20078)

142 cd126.tw. (51)

143 (high sensitiv* adj3 c reactive protein*).tw. (3292)

144 cachectin*.tw. (447)

145 (Tnfalpha or tnf alpha*).tw. (70756)

146 tumor necrosis*.tw. (69922)

147 Tnf superfamily*.tw. (493)

148 (lymphocyte* or ((lymphoid* or killer) adj2 cell*)).tw. (282046)

149 or/122-148 (675867)

150 exp Kidney Diseases/ (358584)

151 exp Renal Circulation/ (11422)

152 (((kidney* or renal*) adj2 (calculi or calculus or stone*)) or nephrolithiasis).tw. (9918)

153 ((kidney* or renal*) adj2 (disease* or function*)).tw. (114942)

154 (renal adj3 (flow* or circulat*)).tw. (13708)

155 or/150-154 (418863)

156 exp Muscle Strength/ (10755)

157 Muscle Fatigue/ (4587)

158 exp Physical Endurance/ (19718)

159 exp Exercise/ (54191)

160 Physical fitness/ (18227)

161 exp Motor Activity/ (93817)

162 ((muscle or muscular) adj2 (strength* or fatigue* or weak*)).tw. (22245)

163 (physical* adj2 (fitness or exercise* or active or activity or endur*)).tw. (50835)

164 ((train* or exercise*) adj2 endur*).tw. (6383)

165 or/156-164 (218608)

166 Mortality/ (30837)

167 mortal*.tw. (358222)

168 ((fatalit* or death*) adj2 rate*).tw. (21676)

169 (excess adj2 mortalit*).tw. (3980)

170 or/166-169 (382939)

171 exp Lactation/ (29877)

172 Milk, human/ (13700)

173 breast feeding/ (22118)

174 lactation*.tw. (23492)

175 (milk adj2 (human* or breast*)).tw. (13617)

176 (breast feed* or breastfeed*).tw. (19668)

177 or/171-176 (74168)

178 18 and 29 (2069)

179 18 and 38 (4390)

180 18 and 45 (2751)

181 18 and 51 (1153)

182 18 and 65 (3577)

183 18 and 72 (1449)

184 18 and 89 (12410)

185 18 and 94 (9635)

186 18 and 100 (3007)

187 18 and 103 (3541)

188 18 and 121 (863)

189 18 and 149 (2860)

190 18 and 155 (2096)

191 18 and 165 (1243)

192 18 and 170 (901)

193 18 and 177 (2680)

194 or/178-193 (26444)

195 limit 194 to (humans and yr="2000 -Current") (6022)

196 limit 195 to English language (5632)

197 limit 196 to "reviews (sensitivity)" (3153)

Appendix 2. Excluded full text papers

Article	Reason for exclusion
(2000) "Position of the American Dietetic Association, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and athletic performance." Journal of the American Dietetic Association 100(12):1543	Position paper
(2002). "Protein and amino acid requirements in human nutrition." World Health Organization Technical Report Series(935): 1-265.	Report
Afolabi, P. R., et al. (2004). "Response of hepatic proteins to the lowering of habitual dietary protein to the recommended safe level of intake." American Journal of Physiology - Endocrinology and Metabolism 287(2): E327-E330.	Not included endpoints
Agus, M. S., et al. (2000). "Dietary composition and physiologic adaptations to energy restriction." American Journal of Clinical Nutrition 71(4): 901-907.	Short term. Energy restriction
Aldrich, N. D., M. M. Reicks*, et al.* (2011). "Varying protein source and quantity do not significantly improve weight loss, fat loss, or satiety in reduced energy diets among midlife adults." Nutrition Research 31(2): 104-112	Diet during weight loss in overweight/obese
Alemany, J. A., et al. (2008). "Effects of dietary protein content on IGF-I, testosterone, and body composition during 8 days of severe energy deficit and arduous physical activity." Journal of Applied Physiology 105(1): 58-64.	Short-term. 8 days with energy deficit. Military
Alfenas, R. C., et al. (2010). "Effects of protein quality on appetite and energy metabolism in normal weight subjects." Arquivos Brasileiros de Endocrinologia e Metabologia 54(1): 45-51.	Short duration. Each intervention was 7 days.
Allen, J. K., et al. (2007). "Effect of soy protein-containing isoflavones on lipoproteins in postmenopausal women." Menopause 14(1): 106-114.	Included in the meta-analysis by Harland & Haffner, 2008
Allen, N. E., et al. (2008). "Animal foods, protein, calcium and prostate cancer risk: the European Prospective Investigation into Cancer and Nutrition." British Journal of Cancer 98(9): 1574-1581.	Foods (dairy protein)
American Dietetic, A., et al. (2003). "Position of the American Dietetic Association and Dietitians of Canada: vegetarian diets." Canadian Journal of Dietetic Practice and Research 64(2): 62-81.	Review

Amsellem-Ouazana, D., et al. (2004). "Diet and prostate cancer: from prevention to treatment." Progres en Urologie 14(4): 573-576.	Review
Anderson, G. H., et al. (2004). "Dietary proteins in the regulation of food intake and body weight in humans." Journal of Nutrition 134(4): 974S-979S.	Review
Anderson, G. H., et al. (2004). "Protein source, quantity, and time of consumption determine the effect of proteins on short-term food intake in young men." Journal of Nutrition 134(11): 3011-3015.	Short term
Anderson, R. A. (2002). "A complementary approach to urolithiasis prevention." World Journal of Urology 20(5): 294-301.	Review
Aparicio, M. (2009). "Protein intake and chronic kidney disease: literature review, 2003 to 2008." Journal of Renal Nutrition 19(5:Suppl): Suppl-8.	Review
Appel, L. J. (2003). "The effects of protein intake on blood pressure and cardiovascular disease." Current Opinion in Lipidology 14(1): 55-59.	Review
Appel, L. J., et al. (2009). "ASH Position Paper: Dietary approaches to lower blood pressure." Journal of Clinical Hypertension 11(7): 358-368.	Review
Appleby, P., et al. (2007). "Comparative fracture risk in vegetarians and nonvegetarians in EPIC-Oxford." European Journal of Clinical Nutrition 61(12): 1400-1406.	Not protein. Vegetarians vs non-vegetarians. Ca2+ intake
Arnal, M. A., et al. (2000). "Protein feeding pattern does not affect protein retention in young women." Journal of Nutrition 130(7): 1700-1704.	Short term
Arnal, M. A., et al. (2000). "Protein turnover modifications induced by the protein feeding pattern still persist after the end of the diets." American Journal of Physiology - Endocrinology and Metabolism 278(5): E902-E909.	Short term
Ashton, E., et al. (2000). "Effects of soy as tofu vs meat on lipoprotein concentrations." European Journal of Clinical Nutrition 54(1): 14-19.	Meat vs. tofu. Not protein
Aubertin-Leheudre, M., et al. (2009). "Relationship between animal protein intake and muscle mass index in healthy women." British Journal of Nutrition 102(12): 1803-1810.	Cross-sectional

Baer, D. J., K. S. Stote*, et al.* (2011). "Whey protein but not soy protein supplementation alters body weight and composition in free-living overweight and obese adults." Journal of Nutrition 141(8): 1489-1494	Overweight/obese subjects
Ball, R. O., et al. (2006). "The in vivo sparing of methionine by cysteine in sulfur amino acid requirements in animal models and adult humans." Journal of Nutrition 136(6:Suppl): Suppl-1693S.	Review
Ballard, T.L., et al. (2005) "Effect of protein supplementation during a 6-mo strength and conditioning program on insulin-like growth factor I and markers of bone turnover in young adults." American Journal of Clinical Nutrition 81(6):1442-8.	Supplement containing various components.
Ballard, T.L., et al. (2006) "Effect of protein supplementation during a 6-month strength and conditioning program on areal and volumetric bone parameters." Bone 38(6):898-904.	Supplement containing various components
Basu, A., et al. (2006). "Dietary factors that promote or retard inflammation." Arteriosclerosis, Thrombosis and Vascular Biology 26(5): 995-1001.	Review
Beasley, J. M., A. K. Aragaki*, et al.* (2011). "Higher biomarker-calibrated protein intake is not associated with impaired renal function in postmenopausal women." Journal of Nutrition 141(8): 1502-1507	Cross-sectional
Beasley, J. M., et al. (2009). "Associations between macronutrient intake and self-reported appetite and fasting levels of appetite hormones: results from the Optimal Macronutrient Intake Trial to Prevent Heart Disease." American Journal of Epidemiology 169(7): 893-900.	OMNI-Heart. Prehypertension or stage 1 hypertension and only 40 % Caucasians. No subgroup analyses
Beelen, M., L. M. Burke*, et al.* (2010). "Nutritional strategies to promote postexercise recovery. [Review]." International Journal of Sport Nutrition & Exercise Metabolism 20(6): 515-532	Review
Benito-Garcia, E., et al. (2007). "Protein, iron, and meat consumption and risk for rheumatoid arthritis: a prospective cohort study." Arthritis Research and Therapy 9(1): R16.	Rheumatoid arthritis not included as an endpoint
Bernstein, A. M., et al. (2010). "Major dietary protein sources and risk of coronary heart disease in women." Circulation 122(9): 876-883.	Food based, not protein

Betts, J. A. and C. Williams (2010). "Short-term recovery from prolonged exercise: exploring the potential for protein ingestion to accentuate the benefits of carbohydrate supplements. [Review]." Sports Medicine 40(11): 941-959	Review
Bilsborough, S., et al. (2006). "A review of issues of dietary protein intake in humans." International Journal of Sport Nutrition and Exercise Metabolism 16(2): 129-152.	Review
Bingham, S. A. (2000). "Diet and colorectal cancer prevention." Biochemical Society Transactions 28(2): 12-16.	Review
Blatt, A. D., L. S. Roe, *et al.* (2011). "Increasing the protein content of meals and its effect on daily energy intake." Journal of the American Dietetic Association 111(2): 290-294	Short term
Blazejewski, S., et al. (2009). "The chronic oral administration of arginine aspartate decreases secretion of IGF-1 and IGFBP-3 in healthy volunteers." Fundamental and Clinical Pharmacology 23(3): 339-344.	Arginine aspartate, not protein
Blom, W. A., et al. (2006). "Effect of a high-protein breakfast on the postprandial ghrelin response." American Journal of Clinical Nutrition 83(2): 211-220.	Acute study
Bloomer, R. J., et al. (2010). "Effect of a 21 day Daniel Fast on metabolic and cardiovascular disease risk factors in men and women." Lipids in Health and Disease 9: 94.	Vegetarian diet. Only 21 days. No control group. Heterogenic subject group
Bode-Boger, S. M., et al. (2007). "The L-arginine paradox: Importance of the L-arginine/asymmetrical dimethylarginine ratio." Pharmacology and Therapeutics 114(3): 295-306.	Review
Boelsma, E., et al. (2009). "Lactotripeptides and antihypertensive effects: a critical review." British Journal of Nutrition 101(6): 776-786.	Review
Bohe, J., et al. (2001). "Latency and duration of stimulation of human muscle protein synthesis during continuous infusion of amino acids." Journal of Physiology 532(Pt:2): 2-9.	Acute study

Bolster, D.R., et al. (2005) “Dietary protein intake impacts human skeletal muscle protein fractional synthetic rates after endurance exercise.” American Journal of Physiology - Endocrinology and Metabolism 289(4):E678-83.	Athletes.
Bonjour, J. P. (2005). "Dietary protein: an essential nutrient for bone health." Journal of the American College of Nutrition 24(6:Suppl): Suppl-36S.	Review
Bonjour, J. P., et al. (2001). "Protein intake and bone growth." Canadian Journal of Applied Physiology 26: 153-166.	Review
Bortolotti, M., et al. (2009). "High protein intake reduces intrahepatocellular lipid deposition in humans." American Journal of Clinical Nutrition 90(4): 1002-1010.	Short term
Borzoei, S., et al. (2006). "A comparison of effects of fish and beef protein on satiety in normal weight men." European Journal of Clinical Nutrition 60(7): 897-902.	Acute study
Bos, C., et al. (2002). "Isotopic studies of protein and amino acid requirements." Current Opinion in Clinical Nutrition and Metabolic Care 5(1): 55-61.	Review
Bourre, J. M. (2004). "The role of nutritional factors on the structure and function of the brain: an update on dietary requirements." Revue Neurologique 160(8-9): 767-792.	Review
Bourre, J. M. (2006). "Effects of nutrients (in food) on the structure and function of the nervous system: update on dietary requirements for brain. Part 2 : macronutrients." Journal of Nutrition, Health and Aging 10(5): 386-399.	Review
Bowen, J., et al. (2006). "Appetite regulatory hormone responses to various dietary proteins differ by body mass index status despite similar reductions in ad libitum energy intake." Journal of Clinical Endocrinology and Metabolism 91(8): 2913-2919.	Acute study
Bowtell, J. L., et al. (2000). "Effect of oral glucose on leucine turnover in human subjects at rest and during exercise at two levels of dietary protein." Journal of Physiology 525: t-81.	Short term

Bray, G. A., S. R. Smith, *et al.* (2012). "Effect of dietary protein content on weight gain, energy expenditure, and body composition during overeating: a randomized controlled trial." JAMA 307(1): 47-55	Only 28% Caucasians
Bronte, V., et al. (2005). "Regulation of immune responses by L-arginine metabolism." Nature Reviews 5(8): 641-654.	Review
Burd, N.A., et al. (2009) "Exercise training and protein metabolism: influences of contraction, protein intake, and sex-based differences." Journal of Applied Physiology 106(5):1692-701.	Review
Burk, A., et al. (2009) "Time-divided ingestion pattern of casein-based protein supplement stimulates an increase in fat-free body mass during resistance training in young untrained men." Nutrition Research 29(6):405-13.	Supplement containing various components
Burke, V., et al. (2001). "Dietary protein and soluble fiber reduce ambulatory blood pressure in treated hypertensives." Hypertension 38(4): 821-826.	Hypertensives
Calbet, J. A., et al. (2002). "Plasma glucagon and insulin responses depend on the rate of appearance of amino acids after ingestion of different protein solutions in humans." Journal of Nutrition 132(8): 2174-2182.	Short term
Campbell, W. W. and M. Tang (2010). "Protein intake, weight loss, and bone mineral density in postmenopausal women." Journals of Gerontology Series A Biological Sciences & Medical Sciences 65(10): 1115-1122	During weight loss
Campbell, W. W., et al. (2004). "Short-term low-protein intake does not increase serum parathyroid hormone concentration in humans." Journal of Nutrition 134(8): 1900-1904.	Short term and PTH
Campbell, W. W., et al. (2010). "Protein intake, weight loss, and bone mineral density in postmenopausal women." Journals of Gerontology Series A-Biological Sciences and Medical Sciences 65(10): 1115-1122.	Weight loss in overweight
Cao, J. J. and F. H. Nielsen (2010). "Acid diet (high-meat protein) effects on calcium metabolism and bone health. [Review]." Current Opinion in Clinical Nutrition & Metabolic Care 13(6): 698-702	Review

Carey, V. J., et al. (2005). "Rationale and design of the Optimal Macro-Nutrient Intake Heart Trial to Prevent Heart Disease (OMNI-Heart)." Clinical Trials 2(6): 529-537.	Description of OMNI-Heart design
Carruba, G., et al. (2006). "A traditional Mediterranean diet decreases endogenous estrogens in healthy postmenopausal women." Nutrition and Cancer 56(2): 253-259.	Dietary pattern (Mediterranean diet), not protein
Caudarella, R., et al. (2004). "Osteoporosis and urolithiasis." Urologia Internationalis 72: 17-19.	Review
Chang, E. T., et al. (2008). "Dietary patterns and risk of ovarian cancer in the California Teachers Study cohort." Nutrition and Cancer 60(3): 285-291.	Dietary patterns
Choi, H. K., et al. (2004). "Purine-rich foods, dairy and protein intake, and the risk of gout in men." New England Journal of Medicine 350(11): 1093-1103.	Gout not included as an outcome
Clifton, P. M., et al. (2007). "Metabolic effects of high-protein diets." Current Atherosclerosis Reports 9(6): 472-478.	Review
Cloutier, G. R., et al. (2003). "Protein and bone health: literature review and counselling implications." Canadian Journal of Dietetic Practice and Research 64(1): 5-11.	Review
Coelho, J. S., et al. (2006). "Selective carbohydrate or protein restriction: effects on subsequent food intake and cravings." Appetite 47(3): 352-360.	Short term. 3 days followed by acute study
Conigrave, A. D., et al. (2008). "Dietary protein and bone health: roles of amino acid-sensing receptors in the control of calcium metabolism and bone homeostasis." Annual Review of Nutrition 28: 131-155.	Review
Craig, W. J., et al. (2009). "Position of the American Dietetic Association: vegetarian diets." Journal of the American Dietetic Association 109(7): 1266-1282.	Review
Dawson-Hughes, B. (2003). "Calcium and protein in bone health." Proceedings of the Nutrition Society 62(2): 505-509.	Review
Dawson-Hughes, B. (2003). "Interaction of dietary calcium and protein in bone health in humans." Journal of Nutrition 133(3): 852S-854S.	Review

Dawson-Hughes, B., et al. (2007). "Comparative effects of oral aromatic and branched-chain amino acids on urine calcium excretion in humans." Osteoporosis International 18(7): 955-961.	Short term
Deglaire, A., et al. (2009). "Hydrolyzed dietary casein as compared with the intact protein reduces postprandial peripheral, but not whole-body, uptake of nitrogen in humans." American Journal of Clinical Nutrition 90(4): 1011-1022.	Short term
Dent, S. B., et al. (2001). "Soy protein intake by perimenopausal women does not affect circulating lipids and lipoproteins or coagulation and fibrinolytic factors." Journal of Nutrition 131(9): 2280-2287.	Intervention with isoflavones in protein isolate
Ding, E. L., et al. (2006). "Optimal dietary habits for the prevention of stroke." Semin Neurol 26(1): 11-23.	Review
Dioguardi, F. S. (2004). "Wasting and the substrate-to-energy controlled pathway: a role for insulin resistance and amino acids." American Journal of Cardiology 93(8A): 6A-12A.	Review
Duranti, M. (2006). "Grain legume proteins and nutraceutical properties." Fitoterapia 77(2): 67-82.	Review
Dye, L., et al. (2000). "Macronutrients and mental performance." Nutrition 16(10): 1021-1034.	Review
Elango, R., et al. (2008). "Indicator amino acid oxidation: concept and application." Journal of Nutrition 138(2): 243-246.	review
Elliott, P. (2003). "Protein intake and blood pressure in cardiovascular disease." Proceedings of the Nutrition Society 62(2): 495-504.	Review
Elliott, P., et al. (2006). "Association between protein intake and blood pressure: the INTERMAP Study." Archives of Internal Medicine 166(1): 79-87.	Cross-sectional
Erdmann, J., et al. (2003). "Differential effect of protein and fat on plasma ghrelin levels in man." Regulatory Peptides 116(1-3): 101-107.	Acute studies
Esfahani, A., et al. (2010). "Session 4: CVD, diabetes and cancer: A dietary portfolio for management and prevention of heart disease." Proceedings of the Nutrition Society 69(1): 39-44.	Symposium

Evans, W.J. (2001) "Protein nutrition and resistance exercise." Canadian Journal of Applied Physiology 26:Suppl-52.	Review
Feigelson, H. S., et al. (2003). "Alcohol, folate, methionine, and risk of incident breast cancer in the American Cancer Society Cancer Prevention Study II Nutrition Cohort." Cancer Epidemiology, Biomarkers and Prevention 12(2): 161-164.	Not protein
Fernstrom, J. D. (2000). "Can nutrient supplements modify brain function?" American Journal of Clinical Nutrition 71(6:Suppl): 1669S-1675S.	Review
Fielding, R.A., and Parkington, J. (2002) "What are the dietary protein requirements of physically active individuals? New evidence on the effects of exercise on protein utilization during post-exercise recovery." Nutrition in Clinical Care 5(4):191-6.	Review
Fleming, R. M. (2000). "The effect of high-protein diets on coronary blood flow." Angiology 51(10): 817-826.	CAD patients
Flood, A., et al. (2002). "Folate, methionine, alcohol, and colorectal cancer in a prospective study of women in the United States." Cancer Causes and Control 13(6): 551-561.	Not protein
Fontana, L., et al. (2006). "Long-term low-protein, low-calorie diet and endurance exercise modulate metabolic factors associated with cancer risk." American Journal of Clinical Nutrition 84(6): 1456-1462.	Raw food, vegan diet
Fontana, L., et al. (2008). "Long-term effects of calorie or protein restriction on serum IGF-1 and IGFBP-3 concentration in humans." Aging Cell 7(5): 681-687.	Calorie restriction combined with reduced protein, and endpoint IGF-1
Fouillet, H., et al. (2008). "Urea-nitrogen production and salvage are modulated by protein intake in fed humans: results of an oral stable-isotope-tracer protocol and compartmental modeling." American Journal of Clinical Nutrition 87(6): 1702-1714.	Acute study
Friedman, A. N. (2004). "High-protein diets: potential effects on the kidney in renal health and disease." American Journal of Kidney Diseases 44(6): 950-962.	Review
Friedman, M. (2010). "Origin, microbiology, nutrition, and pharmacology of D-amino acids." Chemistry and Biodiversity 7(6): 1491-1530.	Review

Friedman, M., et al. (2001). "Nutritional and health benefits of soy proteins." Journal of Agricultural and Food Chemistry 49(3): 1069-1086.	Review
Fuchs, C. S., et al. (2002). "The influence of folate and multivitamin use on the familial risk of colon cancer in women." Cancer Epidemiology, Biomarkers and Prevention 11(3): 227-234.	Not protein
Fukagawa, N. K. (2006). "Sparing of methionine requirements: evaluation of human data takes sulfur amino acids beyond protein." Journal of Nutrition 136(6:Suppl): Suppl-1681S.	Review
Furtado, J. D., et al. (2008). "Effect of protein, unsaturated fat, and carbohydrate intakes on plasma apolipoprotein B and VLDL and LDL containing apolipoprotein C-III: results from the OmniHeart Trial." Am J Clin Nutr 87(6): 1623-1630.	OMNI-Heart. Prehypertension or stage 1 hypertension and only 40 % Caucasians. No subgroup analyses
Furtado, J. D., et al. (2010). "Dietary interventions that lower lipoproteins containing apolipoprotein C-III are more effective in whites than in blacks: results of the OmniHeart trial." American Journal of Clinical Nutrition 92(4): 714-722.	OMNI-Heart. Prehypertension or stage 1 hypertension No subgroup analysis among prehypertensives
Gaine, P.C., et al. (2006) "Level of dietary protein impacts whole body protein turnover in trained males at rest." Metabolism: Clinical and Experimental 55(4):501-7.	Athletes
Gann, P. H., et al. (2005). "Sequential, randomized trial of a low-fat, high-fiber diet and soy supplementation: effects on circulating IGF-I and its binding proteins in premenopausal women." International Journal of Cancer 116(2): 297-303.	IGF-1 Not included functional outcome
Garlick, P. J. (2006). "Toxicity of methionine in humans." Journal of Nutrition 136(6:Suppl): Suppl-1725S.	Review
Geleijnse, J. M., et al. (2010). "Lactopeptides and human blood pressure." Current Opinion in Lipidology 21(1): 58-63.	Review
Genton, L., et al. (2010) "Energy and macronutrient requirements for physical fitness in exercising subjects." Clinical Nutrition 29(4):413-23.	Review
Genton, L., K. Melzer, *et al.* (2010). "Energy and macronutrient requirements for physical fitness in exercising subjects. [Review]." Clinical Nutrition 29(4): 413-423	Review

Gibala, M.J. (2007) "Protein metabolism and endurance exercise." Sports Medicine 37(4-5):337-40.	Review
Gilbert, J. A., N. T. Bendsen, *et al.* (2011). "Effect of proteins from different sources on body composition. [Review]." Nutrition Metabolism & Cardiovascular Diseases 21	Review
Ginty, F. (2003). "Dietary protein and bone health." Proceedings of the Nutrition Society 62(4): 867-876.	Review
Gleeson, M. (2005) "Interrelationship between physical activity and branched-chain amino acids." Journal of Nutrition 135(6:Suppl):Suppl-5S.	Review
Gleeson, M., et al. (2004). "Exercise, nutrition and immune function." Journal of Sports Sciences 22(1): 115-125.	Review
Grases, F., et al. (2006). "Renal lithiasis and nutrition." Nutrition Journal 5: 23.	Review
Greany, K. A., et al. (2008). "Consumption of isoflavone-rich soy protein does not alter homocysteine or markers of inflammation in postmenopausal women." European Journal of Clinical Nutrition 62(12): 1419-1425.	Isoflavones from soy protein isolates
Guadagni, M., et al. (2009). "Effects of inflammation and/or inactivity on the need for dietary protein." Current Opinion in Clinical Nutrition and Metabolic Care 12(6): 617-622.	Review
Hackney, K.J., et al. (2010) "Timing protein intake increases energy expenditure 24 h after resistance training." Medicine and Science in Sports and Exercise 42(5):998-1003.	Short term
Hall, W. L., et al. (2003). "Casein and whey exert different effects on plasma amino acid profiles, gastrointestinal hormone secretion and appetite." British Journal of Nutrition 89(2): 239-248.	Acute study
Handa, K., et al. (2002). "Diet patterns and the risk of renal cell carcinoma." Public Health Nutr 5(6): 757-767.	Foods, not protein
Harnack, L., et al. (2002). "Relationship of folate, vitamin B-6, vitamin B-12, and methionine intake to incidence of colorectal cancers." Nutrition and Cancer 43(2): 152-158.	Not protein

Hayashi, Y. (2003). "Application of the concepts of risk assessment to the study of amino acid supplements." Journal of Nutrition 133(6:Suppl:1): Suppl-2024S.	Review
Heaney, R. P., et al. (2008). "Amount and type of protein influences bone health." American Journal of Clinical Nutrition 87(5): 1567S-1570S.	Review
Hecker, K. D. (2001). "Effects of dietary animal and soy protein on cardiovascular disease risk factors." Current Atherosclerosis Reports 3(6): 471-478.	Review
Heilberg, I. P., et al. (2006). "Renal stone disease: Causes, evaluation and medical treatment." Arquivos Brasileiros de Endocrinologia e Metabologia 50(4): 823-831.	Review
Hermansen, K., et al. (2005). "Effects of soy supplementation on blood lipids and arterial function in hypercholesterolaemic subjects." European Journal of Clinical Nutrition 59(7): 843-850.	Hypercholesterolemic subjects
Hermsdorff, H. H., et al. (2007). "Macronutrient profile affects diet-induced thermogenesis and energy intake." Archivos Latinoamericanos de Nutricion 57(1): 33-42.	Review
Hess, B. (2002). "Nutritional aspects of stone disease." Endocrinology and Metabolism Clinics of North America 31(4): 1017-1030.	Review
Hesselink, M. K., et al. (2006). "Eat the meat or feed the meat: protein turnover in remodeling muscle." Current Opinion in Clinical Nutrition and Metabolic Care 9(6): 672-676.	Review
Higashi, K., et al. (2001). "Effects of soy protein on levels of remnant-like particles cholesterol and vitamin E in healthy men." Journal of Nutritional Science and Vitaminology 47(4): 283-288.	Soy protein isolate
Hochstenbach-Waelen, A., et al. (2009). "Comparison of 2 diets with either 25% or 10% of energy as casein on energy expenditure, substrate balance, and appetite profile." American Journal of Clinical Nutrition 89(3): 831-838.	Acute study. 36-h stay in indirect calorimetry chamber
Hochstenbach-Waelen, A., et al. (2009). "Single-protein casein and gelatin diets affect energy expenditure similarly but substrate balance and appetite differently in adults." Journal of Nutrition 139(12): 2285-2292.	Acute study. 36-h stay in indirect calorimetry chamber

Hodgson, J. M., et al. (2006). "Partial substitution of carbohydrate intake with protein intake from lean red meat lowers blood pressure in hypertensive persons." American Journal of Clinical Nutrition 83(4): 780-787.	Hypertensive subjects
Hughes, R., et al. (2000). "Protein degradation in the large intestine: relevance to colorectal cancer." Current Issues in Intestinal Microbiology 1(2): 51-58.	Review
Hulmi, J.J., et al. (2009) "Acute and long-term effects of resistance exercise with or without protein ingestion on muscle hypertrophy and gene expression." Amino Acids 37(2):297-308.	Whey isolate supplement
Ince, B. A., et al. (2004). "Lowering dietary protein to U.S. Recommended dietary allowance levels reduces urinary calcium excretion and bone resorption in young women." Journal of Clinical Endocrinology and Metabolism 89(8): 3801-3807.	Short term
Ioannou, G. N., et al. (2009). "Association between dietary nutrient composition and the incidence of cirrhosis or liver cancer in the United States population." Hepatology 50(1): 175-184.	Cirrhosis not included as an endpoint, and only five with liver cancer
Isaia, G., et al. (2007). "Protein intake: the impact on calcium and bone homeostasis." Journal of Endocrinological Investigation 30(6:Suppl): 48-53.	Review
Jackson, A. A., et al. (2001). "Synthesis of hepatic secretory proteins in normal adults consuming a diet marginally adequate in protein." American Journal of Physiology - Gastrointestinal and Liver Physiology 281(5): G1179-G1187.	Hepatic secretory proteins not included as outcome
Jacobs, D. R., Jr., et al. (2009). "The effects of dietary patterns on urinary albumin excretion: results of the Dietary Approaches to Stop Hypertension (DASH) Trial." American Journal of Kidney Diseases 53(4): 638-646.	DASH study Dietary patterns
Jacobsen, R., et al. (2005). "Effect of short-term high dietary calcium intake on 24-h energy expenditure, fat oxidation, and fecal fat excretion." International Journal of Obesity 29(3): 292-301.	Short term
James, P. (2006). "Marabou 2005: nutrition and human development." Nutrition Reviews 64(5:Pt:2): t-11.	Review

Jenkins, D. J., et al. (2001). "High-protein diets in hyperlipidemia: effect of wheat gluten on serum lipids, uric acid, and renal function." American Journal of Clinical Nutrition 74(1): 57-63.	Hyperlipidemic subjects
Jenkins, D. J., et al. (2003). "Effect of high vegetable protein diets on urinary calcium loss in middle-aged men and women." European Journal of Clinical Nutrition 57(2): 376-382.	Hyperlipidemic subjects
Jenkins, D. J., et al. (2009). "The effect of a plant-based low-carbohydrate ("Eco-Atkins") diet on body weight and blood lipid concentrations in hyperlipidemic subjects." Archives of Internal Medicine 169(11): 1046-1054.	Hyperlipidemic subjects
Jenkins, D. J., et al. (2010). "Supplemental barley protein and casein similarly affect serum lipids in hypercholesterolemic women and men." Journal of Nutrition 140(9): 1633-1637.	Hypercholesterolemic subjects
Jesudason, D. and P. Clifton (2011). "The interaction between dietary protein and bone health. [Review]." Journal of Bone & Mineral Metabolism 29(1): 1-14	Review
Johnstone, A. M., et al. (2000). "Altering the temporal distribution of energy intake with isoenergetically dense foods given as snacks does not affect total daily energy intake in normal-weight men." British Journal of Nutrition 83(1): 7-14.	Short term
Kendler, B. S. (2006). "Supplemental conditionally essential nutrients in cardiovascular disease therapy." Journal of Cardiovascular Nursing 21(1): 9-16.	Review
Kerksick, C.M., et al. (2006) "The effects of protein and amino acid supplementation on performance and training adaptations during ten weeks of resistance training." Journal of Strength and Conditioning Research 20(3):643-53.	Supplementation: whey+casein vs. whey+BCAA+glutamine vs. CHO
Kerstetter, J. E., A. M. Kenny, *et al.* (2011). "Dietary protein and skeletal health: a review of recent human research. [Review]." Current Opinion in Lipidology 22(1): 16-20	Review
Kerstetter, J. E., et al. (2000). "A threshold for low-protein-diet-induced elevations in parathyroid hormone." American Journal of Clinical Nutrition 72(1): 168-173.	Short term

Kerstetter, J. E., et al. (2003). "Dietary protein, calcium metabolism, and skeletal homeostasis revisited." American Journal of Clinical Nutrition 78(3:Suppl): Suppl-592S.	Review
Kerstetter, J. E., et al. (2003). "Low protein intake: the impact on calcium and bone homeostasis in humans." Journal of Nutrition 133(3): 855S-861S.	Review
Kimball, S. R., et al. (2006). "Signaling pathways and molecular mechanisms through which branched-chain amino acids mediate translational control of protein synthesis." Journal of Nutrition 136(1:Suppl): Suppl-31S.	Review
Kitazato, H., et al. (2002). "Effects of chronic intake of vegetable protein added to animal or fish protein on renal hemodynamics." Nephron 90(1): 31-36.	Japanese
Knerr, I., et al. (2003). "Endocrine effects of food intake: insulin, ghrelin, and leptin responses to a single bolus of essential amino acids in humans." Annals of Nutrition and Metabolism 47(6): 312-318.	Acute study
Knight, J., et al. (2009). "Increased protein intake on controlled oxalate diets does not increase urinary oxalate excretion." Urological Research 37(2): 63-68.	Short term
Knowler, W. C. (2006). "Optimal diet for glycemia and lipids." Nestle Nutrition Workshop Series Clinical and Performance Program 11: 97-102.	Review
Koutros, S., et al. (2008). "Nutrients contributing to one-carbon metabolism and risk of non-Hodgkin lymphoma subtypes." Am J Epidemiol 167(3): 287-294.	Not protein
Krebs, M., et al. (2002). "Mechanism of amino acid-induced skeletal muscle insulin resistance in humans." Diabetes 51(3): 599-605.	Acute study
Kreider, R.B., and Campbell, B. (2009) "Protein for exercise and recovery." Physician and Sportsmedicine 37(2):13-21.	Review
Krieger, J. W., et al. (2006). "Effects of variation in protein and carbohydrate intake on body mass and composition during energy restriction: a meta-regression 1." American Journal of Clinical Nutrition 83(2): 260-274.	Energy restriction during weight loss

Krissansen, G. W. (2007). "Emerging health properties of whey proteins and their clinical implications." Journal of the American College of Nutrition 26(6): 713S-723S.	Review
Kune, G., et al. (2006). "Colorectal cancer protective effects and the dietary micronutrients folate, methionine, vitamins B6, B12, C, E, selenium, and lycopene." Nutr Cancer 56(1): 11-21.	Not protein
Larsson, S. C., et al. (2007). "Methionine and vitamin B6 intake and risk of pancreatic cancer: a prospective study of Swedish women and men." Gastroenterology 132(1): 113-118.	Not protein
Layman, D. K. (2003). "The role of leucine in weight loss diets and glucose homeostasis." Journal of Nutrition 133(1): 261S-267S.	Review
Layman, D. K. (2004). "Protein quantity and quality at levels above the RDA improves adult weight loss." Journal of the American College of Nutrition 23(6:Suppl): Suppl-636S.	Review
Layman, D. K., et al. (2003). "Increased dietary protein modifies glucose and insulin homeostasis in adult women during weight loss." Journal of Nutrition 133(2): 405-410.	Weight loss
Lee, S. A., et al. (2009). "Adolescent and adult soy food intake and breast cancer risk: results from the Shanghai Women's Health Study." American Journal of Clinical Nutrition 89(6): 1920-1926.	Chinese
Leidy, H. J., et al. (2009). "Increased dietary protein consumed at breakfast leads to an initial and sustained feeling of fullness during energy restriction compared to other meal times." British Journal of Nutrition 101(6): 798-803.	Short term
Lejeune, M. P., et al. (2006). "Ghrelin and glucagon-like peptide 1 concentrations, 24-h satiety, and energy and substrate metabolism during a high-protein diet and measured in a respiration chamber." American Journal of Clinical Nutrition 83(1): 89-94.	Short term
Lemon, P. W. (2000). "Beyond the zone: protein needs of active individuals." Journal of the American College of Nutrition 19(5:Suppl): Suppl-521S.	Review

Levi, F., et al. (2002). "Macronutrients and colorectal cancer: a Swiss case-control study." Annals of Oncology 13(3): 369-373.	included
Li, P., et al. (2007). "Amino acids and immune function." British Journal of Nutrition 98(2): 237-252.	Review
Lichtenstein, A. H., et al. (2002). "Lipoprotein response to diets high in soy or animal protein with and without isoflavones in moderately hypercholesterolemic subjects." Arteriosclerosis, Thrombosis and Vascular Biology 22(11): 1852-1858.	Hypercholesterolemic subjects
Lim, U., et al. (2005). "Dietary determinants of one-carbon metabolism and the risk of non-Hodgkin's lymphoma: NCI-SEER case-control study, 1998-2000." Am J Epidemiol 162(10): 953-964.	Not protein
Lin, Y., S. Bolca*, et al.* (2011). "Plant and animal protein intake and its association with overweight and obesity among the Belgian population." British Journal of Nutrition 105(7): 1106-1116	Cross-sectional
Linn, T., et al. (2000). "Effect of long-term dietary protein intake on glucose metabolism in humans." Diabetologia 43(10): 1257-1265.	Glucose metabolism
Loenneke, J. P., A. Balapur*, et al.* (2010). "Short report: Relationship between quality protein, lean mass and bone health." Annals of Nutrition & Metabolism 57(3-4): 219-220	Cross-sectional
Lu, L. J., et al. (2001). "Effects of an isoflavone-free soy diet on ovarian hormones in premenopausal women." Journal of Clinical Endocrinology and Metabolism 86(7): 3045-3052.	Not included endpoint (ovarian hormones)
Luhovyy, B. L., et al. (2007). "Whey proteins in the regulation of food intake and satiety." Journal of the American College of Nutrition 26(6): 704S-712S.	Review
Luiking, Y. C., et al. (2005). "Casein and soy protein meals differentially affect whole-body and splanchnic protein metabolism in healthy humans." Journal of Nutrition 135(5): 1080-1087.	Acute study
Luiking, Y. C., M. P. Engelen*, et al.* (2011). "Differential metabolic effects of casein and soy protein meals on skeletal muscle in healthy volunteers." Clinical Nutrition **30**(1): 65-72.	Not ordered, received by mistake from librarian

Lukaczer, D., et al. (2006). "Effect of a low glycemic index diet with soy protein and phytosterols on CVD risk factors in postmenopausal women." Nutrition 22(2): 104-113.	Overweight and obese. Dyslipidemi. Low glycemic diet w soy protein and phytosterols
Lundberg, J. O., M. Carlstrom, *et al.* (2011). "Roles of dietary inorganic nitrate in cardiovascular health and disease. [Review]." Cardiovascular Research **89**(3): 525-532	Not ordered, received by mistake from librarian
Mamo, J. C., et al. (2005). "A low-protein diet exacerbates postprandial chylomicron concentration in moderately dyslipidaemic subjects in comparison to a lean red meat protein-enriched diet." European Journal of Clinical Nutrition 59(10): 1142-1148.	Dyslipidemic subjects
Mangravite, L. M., S. Chiu, *et al.* (2011). "Changes in atherogenic dyslipidemia induced by carbohydrate restriction in men are dependent on dietary protein source." Journal of Nutrition 141(12): 2180-2185	Not the effect of protein
Manore, M.M. (2005) "Exercise and the Institute of Medicine recommendations for nutrition." Current Sports Medicine Reports 4(4):193-8.	Review
Mariotti, F., et al. (2000). "Postprandial modulation of dietary and whole-body nitrogen utilization by carbohydrates in humans." American Journal of Clinical Nutrition 72(4): 954-962.	Acute study
Marmonier, C., et al. (2002). "Snacks consumed in a nonhungry state have poor satiating efficiency: influence of snack composition on substrate utilization and hunger." American Journal of Clinical Nutrition 76(3): 518-528.	Acute study
Maskarinec, G., et al. (2005). "Insulin-like growth factor-1 and binding protein-3 in a 2-year soya intervention among premenopausal women." British Journal of Nutrition 94(3): 362-367.	Not included endpoint (IGF-1)
Massey, L. K. (2003). "Dietary animal and plant protein and human bone health: a whole foods approach." Journal of Nutrition 133(3): 862S-865S.	Review
McCarron, D. A., et al. (2001). "Reducing cardiovascular disease risk with diet." Obes Res 9 Suppl 4: 335S-340S.	Subjects w hypertension, hyperlipidemia, or type2 diabetes
McCarty, M. F. (2000). "The origins of western obesity: a role for animal protein?" Medical Hypotheses 54(3): 488-494.	Review

McCarty, M. F. (2001). "Mortality from Western cancers rose dramatically among African-Americans during the 20th century: are dietary animal products to blame?" Medical Hypotheses 57(2): 169-174.	Review
McKnight, J. R., et al. (2010). "Beneficial effects of L-arginine on reducing obesity: potential mechanisms and important implications for human health." Amino Acids 39(2): 349-357.	Review
McKnight, J. R., M. C. Satterfield*, et al.* (2010). "Beneficial effects of L-arginine on reducing obesity: potential mechanisms and important implications for human health. [Review] [74 refs]." Amino Acids 39(2): 349-357	Doublet from initial search
McLaughlin, J. M., S. Olivo-Marston*, et al.* (2011). "Effects of tomato- and soy-rich diets on the IGF-I hormonal network: a crossover study of postmenopausal women at high risk for breast cancer." Cancer Prevention Research 4(5): 702-710	High risk participants and not included outcome
Medina, M. A. (2001). "Glutamine and cancer." Journal of Nutrition 131(9:Suppl): Suppl-42S.	Review
Merz-Demlow, B. E., et al. (2000). "Soy isoflavones improve plasma lipids in normocholesterolemic, premenopausal women." American Journal of Clinical Nutrition 71(6): 1462-1469.	Soy isoflavones, not protein
Michaud, D. S., et al. (2005). "Dietary patterns and pancreatic cancer risk in men and women." Journal of the National Cancer Institute 97(7): 518-524.	Dietary patterns, not protein
Michelfelder, A. J. (2009). "Soy: a complete source of protein." American Family Physician 79(1): 43-47.	Review
Mikkelsen, P. B., et al. (2000). "Effect of fat-reduced diets on 24-h energy expenditure: comparisons between animal protein, vegetable protein, and carbohydrate." American Journal of Clinical Nutrition 72(5): 1135-1141.	Short term
Miles, M. P., C. M. Depner*, et al.* (2010). "Influence of macronutrient intake and anthropometric characteristics on plasma insulin after eccentric exercise." Metabolism: Clinical & Experimental 59(10): 1456-1464	Short term
Miller, E. R., III, et al. (2006). "The effects of macronutrients on blood pressure and lipids: an overview of the DASH and OmniHeart trials." Current Atherosclerosis Reports 8(6): 460-465.	Review

Millward, D. J. (2000). "Postprandial protein utilization: implications for clinical nutrition." Nestle Nutrition Workshop Series Clinical and Performance Program 3: 135-152.	Review
Millward, D. J. (2001). "Protein and amino acid requirements of adults: current controversies." Canadian Journal of Applied Physiology 26: 130-140.	Review
Millward, D. J. (2004). "Macronutrient intakes as determinants of dietary protein and amino acid adequacy." Journal of Nutrition 134(6:Suppl): Suppl-1596S.	Review
Millward, D. J., et al. (2002). "Efficiency of utilization of wheat and milk protein in healthy adults and apparent lysine requirements determined by a single-meal [1-13C]leucine balance protocol." American Journal of Clinical Nutrition 76(6): 1326-1334.	Short term
Millward, D. J., et al. (2004). "Protein/energy ratios of current diets in developed and developing countries compared with a safe protein/energy ratio: implications for recommended protein and amino acid intakes." Public Health Nutrition 7(3): 387-405.	Review
Millward, D. J., et al. (2008). "Protein quality assessment: impact of expanding understanding of protein and amino acid needs for optimal health." American Journal of Clinical Nutrition 87(5): 1576S-1581S.	Review
Millward, D. J., et al. (2010). "Plenary Lecture 3: Food and the planet: nutritional dilemmas of greenhouse gas emission reductions through reduced intakes of meat and dairy foods." The Proceedings of the Nutrition Society 69(1): 103-118.	Review
Misra, D., S. D. Berry, *et al.* (2011). "Does dietary protein reduce hip fracture risk in elders? The Framingham Osteoporosis Study." Osteoporosis International 22(1): 345-349	To the elderly group
Mittendorfer, B., et al. (2001). "Whole body and skeletal muscle glutamine metabolism in healthy subjects." American Journal of Physiology - Endocrinology and Metabolism 280(2): E323-E333.	Acute study
Moghaddam, E., et al. (2006). "The effects of fat and protein on glycemic responses in nondiabetic humans vary with waist circumference, fasting plasma insulin, and dietary fiber intake." Journal of Nutrition 136(10): 2506-2511.	Short term and after consuming glucose, not meals

Mohanty, P., et al. (2002). "Both lipid and protein intakes stimulate increased generation of reactive oxygen species by polymorphonuclear leukocytes and mononuclear cells." American Journal of Clinical Nutrition 75(4): 767-772.	Acute study
Mohr, S. B., et al. (2006). "Are low ultraviolet B and high animal protein intake associated with risk of renal cancer?" International Journal of Cancer 119(11): 2705-2709.	Cross-sectional
Mojtahedi, M., et al. (2002). "Nitrogen balance of healthy Dutch women before and during pregnancy." American Journal of Clinical Nutrition 75(6): 1078-1083.	Short term, small study
Morens, C., et al. (2003). "Increasing habitual protein intake accentuates differences in postprandial dietary nitrogen utilization between protein sources in humans." Journal of Nutrition 133(9): 2733-2740.	Short term
Mosoni, L., et al. (2003). "Type and timing of protein feeding to optimize anabolism." Current Opinion in Clinical Nutrition and Metabolic Care 6(3): 301-306.	Review
Myers, V. H., et al. (2007). "Nutritional effects on blood pressure." Current Opinion in Lipidology 18(1): 20-24.	Review
Nagata, C., et al. (2002). "A prospective cohort study of soy product intake and stomach cancer death." British Journal of Cancer 87(1): 31-36.	Japanese
Nakamura, T., et al. (2009). "Beneficial potential of casein hydrolysate containing Val-Pro-Pro and Ile-Pro-Pro on central blood pressure and hemodynamic index: a preliminary study." Journal of Medicinal Food 12(6): 1221-1226.	Hypertensive subjects
Newsholme, P. (2001). "Why is L-glutamine metabolism important to cells of the immune system in health, postinjury, surgery or infection?" Journal of Nutrition 131(9:Suppl): Suppl-22S.	Review
Nguyen, Q. V., et al. (2001). "Sensitivity to meat protein intake and hyperoxaluria in idiopathic calcium stone formers." Kidney International 59(6): 2273-2281.	Short term, stone formers

Nicolosi, R. J., et al. (2001). "Dietary effects on cardiovascular disease risk factors: beyond saturated fatty acids and cholesterol." Journal of the American College of Nutrition 20(5:Suppl): 421S-427S.	Review
Nussberger, J. (2007). "Blood pressure lowering tripeptides derived from milk protein." Therapeutische Umschau 64(3): 177-179.	Review
O'Keefe, J. H., et al. (2008). "Dietary strategies for improving post-prandial glucose, lipids, inflammation, and cardiovascular health." Journal of the American College of Cardiology 51(3): 249-255.	Review
Pal, S. & Ellis V (2010). "The acute effects of four protein meals on insulin, glucose, appetite and energy intake in lean men." British Journal of Nutrition 104(8): 1241-1248.	Acute study
Papapolychroniadis, C. (2004). "Environmental and other risk factors for colorectal carcinogenesis." Techniques in Coloproctology 8: 7-9.	Review
Paul, G.L. (2009) The rationale for consuming protein blends in sports nutrition. Journal of the American College of Nutrition 28:Suppl-472S.	Protein blends
Pencharz, P. B., et al. (2007). "Aromatic amino acid requirements in healthy human subjects." Journal of Nutrition 137(6:Suppl:1): 1576S-1578S.	Review
Phillips, G. C. (2007). "Glutamine: the nonessential amino acid for performance enhancement." Current Sports Medicine Reports 6(4): 265-268.	Review
Phillips, S. M., D. R. Moore, *et al.* (2007). "A critical examination of dietary protein requirements, benefits, and excesses in athletes. [Review]." International Journal of Sport Nutrition & Exercise Metabolism 17(76)	Review
Phillips, S.M. (2006) “Dietary protein for athletes: from requirements to metabolic advantage.” Applied Physiology, Nutrition, and Metabolism 31(6):647-54.	Review
Potier, M., et al. (2009). "A high-protein, moderate-energy, regular cheesy snack is energetically compensated in human subjects." British Journal of Nutrition 102(4): 625-631.	Acute study

Potier, M., et al. (2009). "Protein, amino acids and the control of food intake." Current Opinion in Clinical Nutrition and Metabolic Care 12(1): 54-58.	Review
Preis, S. R., M. J. Stampfer*, et al.* (2010). "Dietary protein and risk of ischemic heart disease in middle-aged men." American Journal of Clinical Nutrition 92(5): 1265-1272	Doublet from initial search
Prentice, A. (2004). "Diet, nutrition and the prevention of osteoporosis." Public Health Nutrition 7(1A): 227-243.	Review
Prentice, R. L., et al. (2009). "Biomarker-calibrated energy and protein consumption and increased cancer risk among postmenopausal women." American Journal of Epidemiology 169(8): 977-989.	Focus on new equations from a biomarker study within in the WHI
Promintzer, M., et al. (2006). "Effects of dietary protein on glucose homeostasis." Current Opinion in Clinical Nutrition and Metabolic Care 9(4): 463-468.	Review
Raben, A., et al. (2003). "Meals with similar energy densities but rich in protein, fat, carbohydrate, or alcohol have different effects on energy expenditure and substrate metabolism but not on appetite and energy intake." American Journal of Clinical Nutrition 77(1): 91-100.	Acute study
Ratamess, N.A., et al. (2007) "The combined effects of protein intake and resistance training on serum osteocalcin concentrations in strength and power athletes." Journal of Strength and Conditioning Research 21(4):1197-203.	Athletes
Ratliff, J., et al. (2010). "Consuming eggs for breakfast influences plasma glucose and ghrelin, while reducing energy intake during the next 24 hours in adult men." Nutrition Research 30(2): 96-103.	Acute study Eggs, not protein
Reitelseder, S., J. Agergaard*, et al.* (2011). "Whey and casein labeled with L-[1-13C]leucine and muscle protein synthesis: effect of resistance exercise and protein ingestion." American Journal of Physiology Endocrinology & Metabolism 300(1)	Acute study
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Rennie, M. J., et al. (2006). "Branched-chain amino acids as fuels and anabolic signals in human muscle." Journal of Nutrition 136(1:Suppl): Suppl-8S.	Review
Reynolds, K., et al. (2006). "A meta-analysis of the effect of soy protein supplementation on serum lipids." American Journal of Cardiology 98(5): 633-640.	Isolated soy protein supplementation
Riazi, R., et al. (2003). "The total branched-chain amino acid requirement in young healthy adult men determined by indicator amino acid oxidation by use of L-[1-13C]phenylalanine." Journal of Nutrition 133(5): 1383-1389.	Amino acid recommendation not included
Rizzoli, R. (2008). "Nutrition: its role in bone health." Best Practice and Research Clinical Endocrinology and Metabolism 22(5): 813-829.	Review
Robinson, F., et al. (2002). "Changing from a mixed to self-selected vegetarian diet--influence on blood lipids." Journal of Human Nutrition and Dietetics 15(5): 323-329.	Vegetarian diet. Not protein (Protein E% didn't change)
Rodriguez, N.R., et al. (2007) "Dietary protein, endurance exercise, and human skeletal-muscle protein turnover." Current Opinion in Clinical Nutrition and Metabolic Care 10(1):40-5.	Review
Roughead, Z. K., et al. (2003). "Controlled high meat diets do not affect calcium retention or indices of bone status in healthy postmenopausal women." Journal of Nutrition 133(4): 1020-1026.	High vs low meat intake, thus food based
Roughead, Z. K., et al. (2005). "Controlled substitution of soy protein for meat protein: effects on calcium retention, bone, and cardiovascular health indices in postmenopausal women." Journal of Clinical Endocrinology and Metabolism 90(1): 181-189.	Meat vs soy protein isolate and a small number of mildly hypercholesterolemic women
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Saito, T. (2008). "Antihypertensive peptides derived from bovine casein and whey proteins." Advances in Experimental Medicine and Biology 606: 295-317.	Review
Salazar-Martinez, E., et al. (2002). "Nutritional determinants of epithelial ovarian cancer risk: a case-control study in Mexico." Oncology 63(2): 151-157.	Mexican diet
Salazar-Martinez, E., et al. (2005). "Dietary factors and endometrial cancer risk. Results of a case-control study in Mexico." International Journal of Gynecological Cancer 15(5): 938-945.	Mexican diet
Sallinen, J., et al. (2004) "Relationship between diet and serum anabolic hormone responses to heavy-resistance exercise in men." International Journal of Sports Medicine 25:627-33.	Acute study
Sanders, T. A., et al. (2002). "Moderate intakes of intact soy protein rich in isoflavones compared with ethanol-extracted soy protein increase HDL but do not influence transforming growth factor beta(1) concentrations and hemostatic risk factors for coronary heart disease in healthy subjects." American Journal of Clinical Nutrition 76(2): 373-377.	High or low isoflavone diet, not protein study
Satia-Abouta, J., et al. (2003). "Associations of total energy and macronutrients with colon cancer risk in African Americans and Whites: results from the North Carolina colon cancer study." American Journal of Epidemiology 158(10): 951-962.	African Americans
Saunders, M. J. (2007). "Coingestion of carbohydrate-protein during endurance exercise: influence on performance and recovery. [Review]." International Journal of Sport Nutrition & Exercise Metabolism 17(103)	Review
Shaffer, E. A. (2006). "Gallstone disease: Epidemiology of gallbladder stone disease." Best Practice and Research in Clinical Gastroenterology 20(6): 981-996.	Review
Shoveller, A. K., et al. (2005). "Nutritional and functional importance of intestinal sulfur amino acid metabolism." Journal of Nutrition 135(7): 1609-1612.	Review
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Siener, R. (2006). "Impact of dietary habits on stone incidence." Urological Research 34(2): 131-133.	Review
Silventoinen, K., et al. (2009). "Modification effects of physical activity and protein intake on heritability of body size and composition." American Journal of Clinical Nutrition 90(4): 1096-1103.	Cross-sectional
Sirtori, C. R., et al. (2007). "Hypocholesterolaemic effects of soya proteins: results of recent studies are predictable from the anderson meta-analysis data." British Journal of Nutrition 97(5): 816-822.	Review
Smit, E., et al. (2007). "Protein and legume intake and prostate cancer mortality in Puerto Rican men." Nutrition and Cancer 58(2): 146-152.	Puerto Rico population
Soenen, S., et al. (2008). "Proteins and satiety: implications for weight management." Current Opinion in Clinical Nutrition and Metabolic Care 11(6): 747-751.	Review
Soenen, S., G. Plasqui, *et al.* (2010). "Protein intake induced an increase in exercise stimulated fat oxidation during stable body weight." Physiology & Behavior 101(5): 770-774	Fat oxidation
Soenen S, Westerterp-Plantenga MS. Changes in body fat percentage during body weight stable conditions of increased daily protein intake vs. control. Physiology & Behavior 2010; 101: 635-638.	Supplement with protein powder
Sonn, G. A., et al. (2005). "Impact of diet on prostate cancer: a review." Prostate Cancer and Prostatic Diseases 8(4): 304-310.	Review
Spaaij, C. J., et al. (2004). "New dietary reference intakes in the Netherlands for energy, proteins, fats and digestible carbohydrates." European Journal of Clinical Nutrition 58(1): 191-194.	About DRI Netherlands
Spector, D., et al. (2003). "Soy consumption and colorectal cancer." Nutrition and Cancer 47(1): 1-12.	Review
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Stein, T. P. and S. Blanc (2011). "Does protein supplementation prevent muscle disuse atrophy and loss of strength?. [Review]." Critical Reviews in Food Science & Nutrition 51(9): 828-834	Review
Straub, M., et al. (2005). "Developments in stone prevention." Current Opinion in Urology 15(2): 119-126.	Review
Sun, C. L., et al. (2002). "Dietary soy and increased risk of bladder cancer: the Singapore Chinese Health Study." Cancer Epidemiology, Biomarkers and Prevention 11(12): 1674-1677.	Chinese
Swain, J. H., et al. (2002). "Iron indexes and total antioxidant status in response to soy protein intake in perimenopausal women." American Journal of Clinical Nutrition 76(1): 165-171.	Soy protein isolate and iron status
Tapiero, H., et al. (2002). "II. Glutamine and glutamate." Biomedicine and Pharmacotherapy 56(9): 446-457.	Review
Tarnopolsky, M. A. (2000). "Gender differences in metabolism; nutrition and supplements." Journal of Science and Medicine in Sport 3(3): 287-298.	Review
Tarnopolsky, M.A. (2008) Nutritional consideration in the aging athlete. Clinical Journal of Sport Medicine 18(6):531-8.	Athletes
Tarnopolsky, M.A., et al. (2001) Creatine-dextrose and protein-dextrose induce similar strength gains during training. Medicine and Science in Sports and Exercise 33(12):2044-52.	Creatine-dextrose vs. protein-dextrose
Thalacker-Mercer, A. E., et al. (2007). "Nutrient ingestion, protein intake, and sex, but not age, affect the albumin synthesis rate in humans." Journal of Nutrition 137(7): 1734-1740.	Albumin synthesis rate
Thalacker-Mercer, A. E., J. C. Fleet*, et al.* (2010). "The skeletal muscle transcript profile reflects accommodative responses to inadequate protein intake in younger and older males." Journal of Nutritional Biochemistry 21(11): 1076-1082	Short term
Thorp, A. A., et al. (2008). "Soy food consumption does not lower LDL cholesterol in either equol or nonequol producers." American Journal of Clinical Nutrition 88(2): 298-304.	Hypercholesterolemic subjects

Thorpe, D. L., et al. (2008). "Effects of meat consumption and vegetarian diet on risk of wrist fracture over 25 years in a cohort of peri- and postmenopausal women." Public Health Nutrition 11(6): 564-572.	Foods, not protein
Thorpe, M. P. and E. M. Evans (2011). "Dietary protein and bone health: harmonizing conflicting theories. [Review]." Nutrition Reviews 69(4): 215-230	Review
Tipton, K. D. (2011). "Efficacy and consequences of very-high-protein diets for athletes and exercisers. [Review]." Proceedings of the Nutrition Society 70(2): 205-214	Review, symposia
Tipton, K.D., and Witard, O.C. (2007) "Protein requirements and recommendations for athletes: relevance of ivory tower arguments for practical recommendations." Clinics in Sports Medicine 26(1):17-36.	Review
Tipton, K.D., and Wolfe, R.R. (2001) "Exercise, protein metabolism, and muscle growth." International Journal of Sport Nutrition and Exercise Metabolism 11(1):109-32.	Review
Tome, D., et al. (2007). "Lysine requirement through the human life cycle." Journal of Nutrition 137(6:Suppl:2): Suppl-1645S.	Review
Tome, D., et al. (2009). "Protein, amino acids, vagus nerve signaling, and the brain." American Journal of Clinical Nutrition 90(3): 838S-843S.	Review
Torres, N., et al. (2006). "Regulation of lipid metabolism by soy protein and its implication in diseases mediated by lipid disorders." Journal of Nutritional Biochemistry 17(6): 365-373.	Review
Tovar, A. R., et al. (2010). "The role of dietary protein on lipotoxicity." Biochimica et Biophysica Acta 1801(3): 367-371.	Review
Travis, R. C., et al. (2008). "A prospective study of vegetarianism and isoflavone intake in relation to breast cancer risk in British women." International Journal of Cancer 122(3): 705-710.	Vegetarian vs non-veg. diets
Tremblay, F., et al. (2007). "Role of dietary proteins and amino acids in the pathogenesis of insulin resistance." Annual Review of Nutrition 27: 293-310.	Review

Trevisan, M. C., J. M. Souza*, et al.* (2010). "Influence of soy protein intake and weight training on the resting energy expenditure of postmenopausal women." Revista Da Associacao Medica Brasileira 56(5): 572-578	Brazil and overweight/obese women
Trock, B. J., et al. (2006). "Meta-analysis of soy intake and breast cancer risk." Journal of the National Cancer Institute 98(7): 459-471.	Asian and Western countries
Trumbo, P., et al. (2002). "Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein and amino acids." Journal of the American Dietetic Association 102(11): 1621-1630.	RDI overview
Turner-McGrievy, G. M., et al. (2008). "Changes in nutrient intake and dietary quality among participants with type 2 diabetes following a low-fat vegan diet or a conventional diabetes diet for 22 weeks." Journal of the American Dietetic Association 108(10): 1636-1645.	Diabetes patients
Um, S. H., et al. (2006). "Nutrient overload, insulin resistance, and ribosomal protein S6 kinase 1, S6K1." Cell Metabolism 3(6): 393-402.	Review
van Wijk, J. P., et al. (2001). "Effects of different nutrient intakes on daytime triacylglycerolemia in healthy, normolipemic, free-living men." American Journal of Clinical Nutrition 74(2): 171-178.	Short term.
Vatanparast, H., et al. (2007). "The effects of dietary protein on bone mineral mass in young adults may be modulated by adolescent calcium intake." Journal of Nutrition 137(12): 2674-2679.	Children 8-15 yr at study entry
Vega-Lopez, S., et al. (2005). "Dietary protein type and cardiovascular disease risk factors." Preventive Cardiology 8(1): 31-40.	Review
Vega-Lopez, S., et al. (2005). "Plasma antioxidant capacity in response to diets high in soy or animal protein with or without isoflavones." American Journal of Clinical Nutrition 81(1): 43-49.	Hypercholesterolemic subjects
Veldhorst, M. A., et al. (2009). "A breakfast with alpha-lactalbumin, gelatin, or gelatin + TRP lowers energy intake at lunch compared with a breakfast with casein, soy, whey, or whey-GMP." Clinical Nutrition 28(2): 147-155.	Acute study
Veldhorst, M. A., et al. (2009). "Comparison of the effects of a high- and normal-casein breakfast on satiety, 'satiety' hormones, plasma amino acids and subsequent energy intake." British Journal of Nutrition 101(2): 295-303.	Acute study

Veldhorst, M. A., et al. (2009). "Dose-dependent satiating effect of whey relative to casein or soy." Physiology and Behavior 96(4-5): 675-682.	Acute study
Veldhorst, M. A., et al. (2009). "Effects of high and normal soyprotein breakfasts on satiety and subsequent energy intake, including amino acid and 'satiety' hormone responses." European Journal of Nutrition 48(2): 92-100.	Acute study
Veldhorst, M., et al. (2008). "Protein-induced satiety: effects and mechanisms of different proteins." Physiology and Behavior 94(2): 300-307.	Review
Venho, B., et al. (2002). "Arginine intake, blood pressure, and the incidence of acute coronary events in men: the Kuopio Ischaemic Heart Disease Risk Factor Study." American Journal of Clinical Nutrition 76(2): 359-364.	Dietary sources of arginine
Verdijk, L.B., et al. (2009) ”Protein supplementation before and after exercise does not further augment skeletal muscle hypertrophy after resistance training in elderly men.” American Journal of Clinical Nutrition 89(2):608-16.	To the Elderly group
Verheus, M., et al. (2008). "Soy protein containing isoflavones and mammographic density in a randomized controlled trial in postmenopausal women." Cancer Epidemiology, Biomarkers and Prevention 17(10): 2632-2638.	Effect of isoflavones from soy vs milk protein
Verhoef, P., et al. (2005). "A high-protein diet increases postprandial but not fasting plasma total homocysteine concentrations: a dietary controlled, crossover trial in healthy volunteers." American Journal of Clinical Nutrition 82(3): 553-558.	Short term and homocysteine level
Vieillevoye, S., et al. (2010) “Effects of a combined essential amino acids/carbohydrate supplementation on muscle mass, architecture and maximal strength following heavy-load training.” European Journal of Applied Physiology 110:479–88.	Essential amino acid supplementation.
Vieillevoye, S., J. R. Poortmans*, et al.* (2010). "Effects of a combined essential amino acids/carbohydrate supplementation on muscle mass, architecture and maximal strength following heavy-load training." European Journal of Applied Physiology 110(3): 479-488	Amino acid intervention
Villegas, R., et al. (2008). "Legume and soy food intake and the incidence of type 2 diabetes in the Shanghai Women's Health Study." American Journal of Clinical Nutrition 87(1): 162-167.	Chinese

Virtanen, J. K., et al. (2006). "High dietary methionine intake increases the risk of acute coronary events in middle-aged men." Nutrition Metabolism and Cardiovascular Diseases 16(2): 113-120.	Methionine, not protein
von Post-Skagegard, M., et al. (2006). "Glucose and insulin responses in healthy women after intake of composite meals containing cod-, milk-, and soy protein." European Journal of Clinical Nutrition 60(8): 949-954.	Acute study
Vozzo, R., et al. (2003). "Similar effects of foods high in protein, carbohydrate and fat on subsequent spontaneous food intake in healthy individuals." Appetite 40(2): 101-107.	Acute study
Wang, Y. F., et al. (2008). "The relationship between dietary protein intake and blood pressure: results from the PREMIER study." Journal of Human Hypertension 22(11): 745-754.	Cross-sectional
Ward, M., et al. (2000). "Fluctuations in dietary methionine intake do not alter plasma homocysteine concentration in healthy men." Journal of Nutrition 130(11): 2653-2657.	Not protein
Weaver, C. M., et al. (2006). "Measuring calcium absorption and utilization in humans." Current Opinion in Clinical Nutrition and Metabolic Care 9(5): 568-574.	Review
Weinstein, S. J., et al. (2006). "Dietary factors of one-carbon metabolism and prostate cancer risk." Am J Clin Nutr 84(4): 929-935.	Not protein
West, S. G., et al. (2005). "Effects of including soy protein in a blood cholesterol-lowering diet on markers of cardiac risk in men and in postmenopausal women with and without hormone replacement therapy." Journal of Women's Health 14(3): 253-262.	Hypercholesterolemic subjects
Westerterp-Plantenga, M. S. (2003). "The significance of protein in food intake and body weight regulation." Current Opinion in Clinical Nutrition and Metabolic Care 6(6): 635-638.	Review
Westerterp-Plantenga, M. S. (2008). "Protein intake and energy balance." Regulatory Peptides 149(1-3): 67-69.	Review

Westerterp-Plantenga, M. S., et al. (2004). "High protein intake sustains weight maintenance after body weight loss in humans." International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity 28(1): 57-64.	Weight maintenance after weight loss and short term (3 months)
Westerterp-Plantenga, M. S., et al. (2005). "Protein intake and body-weight regulation." Appetite 45(2): 187-190.	Review
Westerterp-Plantenga, M. S., et al. (2009). "Dietary protein, weight loss, and weight maintenance." Annual Review of Nutrition 29: 21-41.	Review
Williams, A.G., et al. (2001) "Is glucose/amino acid supplementation after exercise an aid to strength training?" British Journal of Sports Medicine 35(2):109-13.	Amino acid supplementation
Williams, G., et al. (2006). "High protein high fibre snack bars reduce food intake and improve short term glucose and insulin profiles compared with high fat snack bars." Asia Pacific Journal of Clinical Nutrition 15(4): 443-450.	Acute study
Wolfe, A. R., C. Arroyo*, et al.* (2011). "Dietary protein and protein-rich food in relation to severely depressed mood: A 10 year follow-up of a national cohort." Progress in Neuro Psychopharmacology & Biological Psychiatry 35(1): 232-238	Depression
Wolfe, R. R. (2001). "Effects of amino acid intake on anabolic processes." Canadian Journal of Applied Physiology 26: 220-227.	Review
Wolfe, R. R. (2002). "Regulation of muscle protein by amino acids." Journal of Nutrition 132(10): 3219S-3224S.	Review
Wolfe, R. R. (2006). "The underappreciated role of muscle in health and disease." American Journal of Clinical Nutrition 84(3): 475-482.	Review
Wolfe, R.R. (2000) "Protein supplements and exercise." American Journal of Clinical Nutrition 72(2:Suppl):Suppl-7S.	Review
Wu, A. H., et al. (2000). "A meta-analysis of soyfoods and risk of stomach cancer: the problem of potential confounders." Cancer Epidemiology, Biomarkers and Prevention 9(10): 1051-1058.	Isoflavones, not protein

Wu, A. H., et al. (2005). "A controlled 2-mo dietary fat reduction and soy food supplementation study in postmenopausal women." American Journal of Clinical Nutrition 81(5): 1133-1141.	Soy food supplements. Effect of varying fat (and CHO), not protein (kept constant in all three diet)
Wu, G. (2009). "Amino acids: metabolism, functions, and nutrition." Amino Acids 37(1): 1-17.	Review
Wu, G., et al. (2009). "Arginine metabolism and nutrition in growth, health and disease." Amino Acids 37(1): 153-168.	Review
Xiao, C. W., et al. (2008). "Effect of soy proteins and isoflavones on lipid metabolism and involved gene expression." Frontiers in Bioscience 13: 2660-2673.	Review
Xu, J. Y., et al. (2008). "Effect of milk tripeptides on blood pressure: a meta-analysis of randomized controlled trials." Nutrition 24(10): 933-940.	Milk tripeptides
Yang, G., et al. (2009). "Prospective cohort study of soy food intake and colorectal cancer risk in women." American Journal of Clinical Nutrition 89(2): 577-583.	Chinese
Yates, A. A. (2006). "Dietary reference intakes: concepts and approaches underlying protein and energy requirements." Nestle Nutrition Workshop Series 58: 79-90.	Review about US DRI.
Zachwieja, J. J., et al. (2000). "Intravenous glutamine does not stimulate mixed muscle protein synthesis in healthy young men and women." Metabolism: Clinical and Experimental 49(12): 1555-1560.	Glutamine injection, not protein
Zello, G.A. (2006) "Dietary Reference Intakes for the macronutrients and energy: considerations for physical activity." Applied Physiology, Nutrition, and Metabolism 31(1):74-9.	Review
Zhan, S., et al. (2005). "Meta-analysis of the effects of soy protein containing isoflavones on the lipid profile." American Journal of Clinical Nutrition 81(2): 397-408.	Isoflavones, not protein
Zhang, L., et al. (2009). "Diet-dependent net acid load and risk of incident hypertension in United States women." Hypertension 54(4): 751-755.	Net-acid load as an independent risk factor, not protein

Zhong, Y., et al. (2009). "Association of total calcium and dietary protein intakes with fracture risk in postmenopausal women: the 1999-2002 National Health and Nutrition Examination Survey (NHANES)." Nutrition (Burbank, Los Angeles County, Calif.) 25(6): 647-654.	Cross-sectional
Zyriax, B. C., et al. (2005). "Nutrition is a powerful independent risk factor for coronary heart disease in women--The CORA study: a population-based case-control study." European Journal of Clinical Nutrition 59(10): 1201-1207.	Foods rather than protein.

Appendix 3. Evidence tables

Table 1. Evidence table, N-balance studies

Reference	Study design	Population	Outcome measures	Intervention/ exposure	Dietary assessment method	No of subjects analysed	Intervention	Results	Study quality and relevance, Comments A-C
Rand et al., 2003 (3)	Meta-analysis	19 balance studies of healthy persons	N-balance		Controlled nitrogen (protein) intake. Measured urine and faeces, correction for dermal and miscellaneous losses. At least 3 test protein intakes, given for 10-14 days, urinary and faecal excretion data for, the last 5 days, eucaloric diet studies and a adaption period ≈ 5 days	N=235		The median estimated protein requirement of good quality protein: 0.65 g/kg BW/d and the estimated RDA: 0.83 g/kg BW/d No differences for adult age groups, sex or protein source	**B** Not sufficient power to detect possible differences between e.g. sex and age groups. Only one study with elderly available in the analysis. Data suggest a possible age difference in nitrogen utilization that needs to be further explored
Campbell et al., 2008 (8) USA	Controlled metabolic study	Healthy volunteers, young (n=27) 29-30 ±7-8 y and old (n=21) 72-75 ±6-4 y, 93% white. Young vs. old and men vs. women	N-balance	Low protein diet:0.5g /kg Medium: 0.75 g/kg High: 1.0 g /kg BW. Animal based egg and dairy protein	Strict dietary control. Duplicate portions of all foods and beverages on days 7-10 of each trial. Stool collections on day 7-9 of each trial. 24-h urine collections on day 7-10 and 14-17 of each trial.	Young n=23 Old n=19	Three 18-d periods, minimum 1 week habitual diet between the periods. 3-d rotation of menus Eucaloric diet (estimated energy intake from estimated REE times PAL.	Body weight unchanged. N-balance not different between the four groups. Estimated requirement expressed pr. kg BW was not significantly different for the young vs. old or	**A** The estimated adequate protein allowance was 0.85 ±0.21 g/kg BW/d and not significantly different from Rand et al

					Miscellaneous losses assumed to be 5 mg nitrogen/kg BW/d		Morning meal consumed at dining facility, lunch, dinner and weekend meals were packaged and taken home	men vs. women. Mean protein requirement was lower for older women vs. older men, but expressed pr. kg FFM there was no significant difference. For all subjects combined the adequate protein allowance was estimated to be 0.85 ±0.21 g/kg BW/d	
Walrand et al., 2009 (9) USA	CT Single-blinded	10 healthy young (5 men) and 10 old (5 men) volunteers	N-balance, glomerular filtration rate (GFR), muscle protein synthesis	High protein (HP): 3.0 g/kg FFM (22-24 E%) and usual protein (UP): 1.5 g/kg FFM (11-12 E%)	All food was prepared at the metabolic ward 24-h urine collection at the end of each 10-d trial. No stool collections and no estimate for miscellaneous losses	10 young and 9 old	10 days of HP (Young: 2.08±0.07 g/kg BW and old: 1.79±0.1 g/kg BW) or UP (young: 1.04±0.03g/kg BW and old 0.89±0.05 g/kg BW) protein diets in a cross-over design, separated by 2-8 weeks	Unchanged BW. N-balance and muscle protein synthesis did not differ with age. GFR was lower in older participants and they had a lesser increase in GFR during the HP diet corresponding to 77% of younger people at the UP and 58% of younger people during HP	**B** Short term, but interesting because of the high protein intake. No age related difference in N-balance but concern about a HP diet corresponding to app. 24E% in the elderly because of potential adverse effect on the kidney function

Appendix 3. Evidence tables

Table 2. Evidence table, protein intake and mortality

Reference	Study design	Population,	Outcome measures	Intervention/ exposure	Dietary assessment method	No of subjects analysed	Intervention	Follow- up period, drop-out rate	Results	Confoun-ders adjusted for	Study quality and relevance, Comments A-C
Fung et al., 2010 (10) USA	Cohort	Nurses' Health Study (NHS) 34-59 y, n=? in 1980 used as baseline Health Professionals' Follow-up Study (HPFS) 51,529 males 40-75 y	All-cause mortality and mortality of CVD and cancers (lung, colorectal, breast and prostate) from death certificates or medical records	E% of fat, protein and carbohydrate in deciles to create a low carbohydrate score (LC) and also an animal LC score (animal fat and animal protein and a vegetable LC score (vegetable fat and vegetable protein)	Baseline in 1980 a 61-item FFQ (NHS) expanded to 116-item FFQ in 1984 and used in HPFS. But dietary information collected in 1986 used in the analyses. Implausible energy intakes (< 500 kcal and > 3500 kcal) excluded. No sufficient information about validation	NHS: n=85,168 and 12,555 deaths HPFS: n=44,548 and 8,678 deaths	Range in intake of total protein: 15-23 E%	26 y in NHS and 20 y in HPFS	In pooled analysis hazard ratio (HR) comparing lowest vs highest decile All-cause mortality: LC score HR 1.12 (95% CI 1.01-1.24) Animal-based HR 1.23 (1.11-1.37) and vegetable-based HR 0.80 (0.75-0.85). Cardiovascular mortality: Animal-based HR 1.14 (1.01-1.29) and vegetable-based HR	Age, physical activity, BMI, energy intake, alcohol, history of hypertension, smoking, multivitamin use, menopausal status and hormone use. For relevant outcomes also history and family history of the cancer and risk factors	**B** In the present LC scores animal- and plant-based food have differential effect on mortality The present LC scores not designed to mimic any particular versions of the low-carbohydrate diets in the popular literature

									0.77 (0.68-0.87). Cancer mortality: Animal-based HR 1.28 (1.02-1.60)		
Halbesma et al., 2009 (11) The Netherlands	cohorte	Prevention of Renal and Vascular ENd-stage Disease (PREVEND) study All inhabitants of a city in the Netherlands invited. 48% responded. From these a random sample of 7,768 with 24 h urinary albumin ≥10 mg/L (6,000 participated) and another sample of 3,394 with 24 h urinary albumin < 10 mg/L (2,592 participated). Total in the two samples: 8,592. Gender distribution not given. Avg. Base-line age: 49-50 yrs. Exclusion	Cardiovascular morbidity and mortality. Non-cardiovascular mortality. Renal outcome = slope of decline in estimated glomerular filtration rate eGFR (from gender, age, race and serum creatinine)	Continuous values and quintiles of estimated baseline protein intake in g per kg body "ideal" weight (BW) (after correcting the BMI to 22)	Protein intake estimated from two 24-h urinary N. No correction for possible loss of urine (PABA)	5,778 of 8,461 and 373 deaths	Mean protein intake = 1.20 g/kg BW/d, range in percentiles: 5^{th} : 0.8 95^{th} : 2.66	7.0 y and 7.2 y for different outcomes. Follow-up: 70% of survivors	Significant inverse trend for total (p<0.001) and non-cardiovascular mortality (p<0.001) (univariate analysis). Similar results in Cox regression analyses	Age, gender cardiovascualor risk factors incl. sodium intake	**C** The intake level of protein could not be assessed because the values per kg BW are corrected to "ideal "BW and thus, probably higher than actual intake

		criteria: Type 1 diabetes, pregnancy, known kidney disease.									
Kelemen et al., 2005 (12) USA	Cohort	Iowa Women's Health Study 41,836 (42% response rate), 55-69 y	Chronic disease, and mortality	Total, animal and vegetable protein E% in quintiles (Q) substituted isoenergetically for carbohydrate	At baseline FFQ during past year. Implausible energy intakes (< 600 kcal and > 5000 kcal) excluded. No sufficient information about validation	29,017 (70%) Death all causes n = 3,978, deaths CHD n = 739, deaths cancer n = 1,676, new cancers n= 4,843	Q1: 14 E% Q5: 22 E%	15 y	Highest vs. lowest quintile. All-cause mortality: Total, animal and vegetable protein were significantly inverse associated with all-cause mortality, but no significant associations in the multivariable models. Deaths CHD: no association to total protein, vegetable protein RR (95% CI) 0.70 (0.49-0.99) and p for trend = 0.02 Cancer and cancer deaths: both animal and	Age, total energy intake, intake of animal/vegetable protein, fats, fibre, cholesterol, methionine and alcohol, smoking, physical activity, BMI, education, history of hypertension, family history of cancer, use of hormones, multi vitamin and E vitamin	**C** Women only. No information about the total energy intake and limited information about the FFQ method and validation. Food based: Dietary proteins from animal and vegetable sources when substituted for carbohydrates are differently associated with mortality from CHD and all causes

									vegetable protein was significantly inversely associated with cancer and cancer deaths in the macronutrient adjusted models, but no associations in the multivariable models. Substituting vegetable protein for animal protein only the inverse association to CHD mortality remained significant in the multivariable model: 0.70 (0.51-0.98 and p for trend = 0.02		
Lagiou et al., 2007 (13) Sweden	Cohort	The Women's Lifestyle and Health cohort 49,261, 30-49 y	Mortality derived from Register of Total Populatio n and	A 1-10 score based on deciles of energy adjusted protein intake and another	80-item FFQ during 6 months prior to study entry. No sufficient information	42,237 (86%) and 592 deaths	Lowest decile : 10 E% Highest decile: 23 E%	12y	Increased protein intake was associated to CVD mortality: RR 1.10	Height, BMI, smoking, physical activity, education, energy	**C** Reported low energy intake (median 6.4 MJ). Results more

			from Swedish Cause of Death Register	based on deciles of carbohydrate (CH) intake and also a additive low CH-high protein score	about validation				(95% CI 1.01-1.20) . The low CH-high protein score was positively associated with all cause mortality: RR 1.04 (95% CI 1.00-1.08) and especially cardiovascular mortality: RR 1.15 (1.01-1.28) Relation to cancer deaths NS	intake, saturated fat, alcohol	pronounced for cardiovascular mortality among women +40 y at baseline
Preis et al., 2010 (14) USA	Cohort	Health Professionals Follow-Up Study 51,529 male professionals 40-75 y at baseline	Physician verified ischemic heart disease (IHD) or from medical records, fatal and nonfatal	Quintiles of E% protein (total, animal and vegetable), substitution of protein for an isocaloric amount of carbohydrate (CH)	131-item FFQ Internal evaluation: the Pearson correlation for protein was 0.44	43,960 IHD n= 2,959 (1804 nonfatal and 155 fatal cases)	Lowest quintile 14.6 E% and highest quintile 22.5 E% substituted for CH	18 y	Inverse association between vegetable protein and fatal IHD Top quintile vs. bottom quintile RR 0.66 and 95%CI 0.49-0.88 , p for trend =0.005 Excluding the men free of diabetes, hypertension and hypercholeste	Age, BMI, smoking, parental history of myocardium infarction before age 65, Energy intake, alcohol, multivitamin, physical activity, glycemic index, folate, fibre,	**B** Higher intake of total and animal protein E% were associated with increased risk of IHD among "healthy" men (without baseline hypertension, diabetes and hypercholesterolemia)

										rolemia at baseline a higher intake of total (RR 1.21 (1.01-1.44, p for trend 0.02), and animal protein (RR 1.25 (1.04-1.51, P for trend 0.02) was associated with increased risk of total IHD	vitamin C, folate, magnesiu m, n-3. Baseline hypertensi on, diabetes and hyperchol esterolemi a	
Prentice et al., 2011 (15) USA	Two cohort s	Two Women's Health Initiative (WHI) cohorts: Dietary Modification trial (DMT) n = 0 26,595 (91%) and WHI Observational Study (WHI-OS) n = 67,492 (88%) And 85 % white All postmenopausal and 50-79 y at baseline	Self-ported and physician adjucated myocardie infarction, CHD deaths and stroke	Biomarker "Calibrated" Protein intake in g per day and protein E%	122-item FFQ Subgroup n = 544 urinary biomarkers in order to calibrate. Calibration equations applied to data from DMT after one year follow up and in the WHI-OS after 3 y follow	DMT n = 59,157 (88%) and WHI-OS n = 59,157 (88%) Total = 80,370 W and 3,917 cardiovasc ular disease events				Data combined for the two cohorts. Calibrated protein in g per day: Coronary deaths NS Calibrated protein E% without BMI: fatal CHD: 0.74 (0.59-0.93)	Calibratio n included: energy intake, age, ethnicity, income, education, Confound ers: ethnicity, education, history of CVD, family history of premature CVD, smoking, hypertensi on, treated diabetes, medicatio	**B** Energy intake level only acceptable after calibration. Only recreational physical activity and measurement method not described. Protein E% inverse y related to coronary heart disease mortality, while the relation to protein in g per day is NS

										n(statin aspirin prior hormone) recreation al physical activity and with/witho ut BMI in the model	
Trichopou lou et al., 2007 (16) Greece	Cohort	The Greek cohort of EPIC 28,572 volunteers, 20-86 y	Mortality from death certificate s	A low carbohydrate –high protein score (LC/HP) using deciles of energy adjusted intake	150-item FFQ during one year before study entry. Validation during pilot phase, but no further information Correlation of protein to LC/HP was low: absolute values R-Spearman 0.32 and energy-adjusted R-Spearman 0.28	22,944 (80%) , 59% female and 455 deaths	Range in intake of total protein: app. 10-20 E%	5 y (range 1-125 months)	The LC/HP score was positively related to all-cause mortality: RR 1.08 (95% CI: 1.03-1.13). A 2-unit increase in the LC/HP score was positively related to cardiovascula r deaths: RR 1.09 (1.01-1.23)	Gender, age, y of schooling, smoking, BMI, physical activity, alcohol, energy intake, saturated and unsaturate d lipids	**B** Many low-energy reporters among the women.

Appendix 3. Evidence tables

Table 3. Evidence table, protein intake and breast cancer

Reference	Study design	Population	Outcome measures	Intervention/ exposure	Dietary assessment method	No of subjects analysed	Follow- up period, drop-out rate	Results	Confoun-ders adjusted for	Study quality and relevance, Comments A-C
Holmes et al., 2003 (17) USA	Cohort	Nurses' Health Study In 1976: 121,700 women 30-55 y Baseline data from 1980 n = 88,647	Breast cancer verified by medical records	Quartiles of energy percentage (E%) of total, animal and vegetable protein and energy adjusted animal food sources as well	The 1980 edition of a 61-item FFQ over the past year Implausible energy intakes excluded (< 500 kcal or > 3500 kcal per day)	88,647 and 4,107 cases	18 y	No statistically significant associations to cancer of total, animal or vegetable protein	Age, history of benign breast disease, menopausal status, hormone use, parity, weight change from age 18, BMI, energy intake , alcohol	**C** Heredity not mentioned as a confounder. No information about the energy intake and the validity of the protein intake assessment
Sala et al., 2000 (18) UK	Nested case-control	EPIC-Norfolk and the National Health Service Regional Breast Screening Programme for Norwich N = 9,484	Mammographic parenchymal pattern	Protein in g per day in tertiles	7-d food diaries. No information about validation	Cases n = 203 Controls n = 203		Highest versus lowest adjusted tertiles: OR 2.00 (95 % CI: 1.06-3.77), trend test p = 0.004 and when adjusting for energy intake OR 2.30	Menopausal status, parity, Hormone use, BMI and energy intake	**B** Heredity not mentioned as a confounder

								(1.03-5.16), trend test p = 0.06		
Sieri et al., 2002 (19) Italy	Nested case-control	Italy, part of the ORDET prospective study. Healthy postmenopausal women 41-70 y, baseline data from 1987-1992. 83% of the cohort completed a FFQ n= 3367 After an average of 5.5 y follow up 56 cases with invasive breast cancer was found and matched with 214 controls	Histologically confirmed breast cancer cases	Energy adjusted intake in tertiles of total, animal and vegetable protein	107-item FFQ over the previous year Reproducibility after 1 y was 0.69 for protein	cases n=56 and controls n=214		No significant relations. Highest vs lowest tertile: Total protein: OR 1.44 (95% CI 0.70-2.97) Animal protein: OR 3.78 (0.95-15.0) Vegetable protein: OR 0.97 (0.31-3.01)	Place of birth, parity, education (BMI, WHR eliminated again)	**C** Small study and short follow-up. No information about the energy intake. Heredity not mentioned as a confounder

Appendix 3. Evidence tables

Table 4. Evidence table, protein intake and colorectal cancer

Reference	Study design	Population	Outcome measures	Intervention/ exposure	Dietary assessment method	No of subjects analysed	Results	Confoun-ders adjusted for	Study quality and relevance, Comments A-C
Alexander et al., 2009 (20)	Meta-analysis	3 cohort studies and 3 case-control studies included, just one study (cohort) included women	Colorectal cancer	Animal and meat protein in g per day			For animal protein no significant relation: summary relative risk estimate, SRRE 1.05 and 95% CI: 0.89-1.22		**C** The main focus was on fat in relation to cancer, and not protein. The included studies regarding protein were not described thoroughly and some of them not relevant in a nordic seeting. Only few included women. Few studies with animal protein, most studies included foods (meat)
Almendingen et al., 2001 (21)	Case-control	Baseline data from a Norwegian RCT	histologically confirmed	Total and animal protein in g	Weighed 5-day dietary record. No	Cases n=87 Hospital	Intake divided in 3 groups: Low,	BMI, family history,	**B** Focus on two different control

Norway		study, including 116 polyp patients 50-76 y of which 87 patient with histologically confirmed adenomas were included. Two control groups: “Hospital” controls with polyp-free status n=35 and healthy controls n=35	adenomas	per day	information about validation	controls n=35 Healthy controls n=35	medium and high (tertiles?) NS relations between cases and the two control groups for total and animal protein	smoking and intake of energy, fat, fibre	groups. The NS differences were most marked when healthy controls were used as the comparison group Small study. No information about protein E% or g protein per kg BW
Breuer-Katschinski et al., 2001 (22) Germany	Case-control	German study with cases who had identified and removed at least one colorectal adenomatous polyp verified histologically Two control groups: I: Hospital control:Patients without polyps after colonscopy II: Population controls from the general population	histologically confirmed adenomas	Quintiles of total protein and meat intake in g per day	Dietary history during the past year. The dietary history only evaluated against a similar method	Cases n= 182 (Response rate 69%) Hospital controls n=178 (response rate 66%) Population controls n= 182 (response rate 50%)	No significant association between protein intake and colorectal adenoma risk for both control groups	Energy intake, social class, BMI	**C** Disagreement between numbers of participants in the text compared to the tables. Self-reported height and weight
Levi et al., 2002 (23) Switzerland	Case-control	Swiss study, cases with histologically confirmed colon cancer, age 26-74 y. Hospital controls		Energy adjusted total protein intake in tertiles	79-item FFQ 2 years prior to diagnosis. No information about validation	Cases n= 286 (rate 84%) Controls n=550 (rate 85%)	No significant relation to protein, lowest vs highest tertile	Age, sex, education, physical activity, energy intake (BMI,	**C** No information about energy intake level

		age 27-74 y			(just as references)			family history, parity, age of first birth)	

Appendix 3. Evidence tables

Table 5. Evidence table, protein intake and various cancers

Reference	**Study design**	**Population,**	**Outcome measures**	**Intervention/ exposure**	**Dietary assessment method**	**No of subjects analysed**	**Follow- up period, drop-out rate**	**Results**	**Confoun-ders adjusted for**	**Study quality and relevance, Comments** A-C
Bosetti et al., 2003 (24) Italy	Case-control	Italy and Switzerland 1992-2000 Cases 30-79 Y Diagnosis no longer than 1 y before interview and diagnosis histologically confirmed Hospital controls 31-79 y non-neoplastic. a control-to-case ration of about five was chosen for women, as opposed for two males to compensate for the rarity of laryngeal cancer in women	Laryngeal cancer	Energy adjusted g per day of total, animal and vegetable protein in quintiles	78-item FFQ, diet 2 years before diagnosis	cases n=527 (91% male) and controls n=1297 (81% males)		Highest vs lowest quintile: OR and 95% CI Total protein: OR 1.62 (1.8-2.43) Animal protein: OR 1.71 (1.16-2.52) Vegetable protein: OR 0.51 (0.33-0.77)	Age, sex, centre, education, BMI, smoking, alcohol, energy intake	**C** Hospital controls, response rate just mentioned in the discussion. Self-reported anthropometry Cases had higher tobacco and alcohol consumption
Zheng et al., 2004 (25) USA	Case-control	21-84 y women identified through Connecticut Tumor Registry and histologically	Histologically confirmed non-Hodgkin's	Energy adjusted intake in quartiles of total, animal	120-item FFQ prior year before interview Designed to	601 cases 717 controls		Highest vs lowest quartile of animal protein: OR	Age, BMI, family history, (race, education,	**C** Women only. Insufficient information about validation

		confirmed in 1996-2000 Cases n=601 (response rate 72%). Population-based controls n=717 Response rate: random digit dialing: 69% (< 65 y) and Health care administration files: 47% (>65y)	lymphona	and vegetable protein in g per day	optimize estimation of fat intake			1.7 95 CI: 1.2-2.4). No association for total and vegetable protein	smoking, alcohol)	of the FFQ. No information about total energy intake No information about anthropometry
Mayne et al., 2001 (26) USA	Case-control	USA, multi centre English speaking 30-79 y cases, diagnosed 1993-1995. Population-based tumor registries and diagnoses histologically confirmed. Population-based controls	Histologically confirmed diagnoses. Target cases: I:Adenocarcinomas of the esophagus and II:gastric cardia (response rate 80.6%). Comparison case groups: esophageI II:al squamous cell carcinoma, IV: noncardia	Energy adjusted intake in quartiles of total, animal and vegetable protein	104-item FFQ, 3-5 y before diagnosis or interview. Insufficient information about validation of the FFQ.	Target cases n = 537 Comparison case groups n= 558 and controls n= 687 After exclusion of implausible energy intake estimates (< 600 kcal/day, n=20 or > 5000 kcal/day, n=3)		75th vs 25th percentile of intake: OR and 95% CI Total protein: I: 1.49 (1.02-2.18) II: 1.64 (1.11-2.42) III: 1.75 (1.07-2.88) IV: 1.52 (1.08-2.15) Animal protein: I: 1.79 (1.33-2.41) II: 1.60 (1.19-2.15) III: 2.14 (1.47-3.12) IV: 1.58 (1.22-2.06) Vegetable protein: I: 0.39 (0.27-	Location, age, sex, race, proxy status, BMI, income, education, smoking, alcohol, energy intake	**B** No information about anthropometry (“usual adult body mass index”). Vegetable protein inversely associated with risk (not significant for II)

			gastric cancer (response rate 74.16%). Controls (response rate 70.2%)					0.58) II: 0.75 (0.53-1.07) III: 0.34 (0.21-0.56) IV: 0.63 (0.45-0.87)		
Pan et al., 2004 (27) Canada	Case-control	Canadian National Enhanced Cancer Surveillance System (NECSS) 20-76 y participants. Data collection 1994-1997 in 8-10 Canadian provinces Population-based controls	Ovarian cancer registries identified cases defined by ICDO-2, code C56 and histologically confirmed	Energy adjusted intake in quartiles of total protein in g per week	69-item FFQ: usual diet 2 y before data collection. Weekly intake. Validation not sufficiently reported and taken into account	Cases: 442 (response rate 56.5% of ascertained cases) Controls: 2135(response rate 65.4 % of ascertained cases) but afterwards 204 excluded		No relation to protein intake (quartiles of intake)	Age, location, education, income, marital status, ethnic group, alcohol, BMI, energy intake, smoking, physical activity, years of menstruation, menopausal status In Ontario also: family history, oral contraceptive uses, hormone replacement therapy	**B** Low response rate. Only 69-item FFQ

Lucenforte et al., 2010 (28) Italy	Case-control	Italian, hospital based. Cases diagnosed no longer than 1 year before interview (83% diagnosed 3 months before)	Cancer of pancreas excl. neuroendocrine tumours)		78-itemFFQ Diet during 2 years before diagnosis. No information about validation and total energy intake.	326 cases and 652 controls (34-80 y and 53% men)		No association with total and vegetable protein, but a significant positive association with animal protein for the highest vs. Lowest quintile of intake (OR = 1.85, 95% CI: 1.15-2.96)	Age, sex, location, education, smoking, diabetes, energy intake. Apparently not alcohol	C Hospital based. Association found for animal protein
Hu et al., 2010 (29) Canada	Case-control	Canadian National Enhanced Cancer Surveillance System (NECSS) 20-76 y participants. Data collection 1994-1997 in 8 Canadian provinces	Prostate cancer registries identified cases defined by ICDO-2	Total protein g/week and in quartiles	69-item FFQ: usual diet 2 y before data collection. Weekly intake. Validation not sufficiently reported and taken into account	Cases: 1,797 (response rate 75.3%) Controls: 2,547 (response rate 64.5 %)		No relation for total proteins: 503.5 ±277.3 vs. 500.3 ±231.6 g/week And quartiles P for trend 0.15	Age, location, education, income, alcohol, energy intake, smoking BMI,	**B** Only 69-item FFQ
Lee et al., 2008 (30)	Pooled analysis	13 prospective cohort studies	Renal cell cancer	Intake of total, animal and plant protein (E%) in quintiles	FFQ or dietary history	530,469 W 244,483 M	7-20 y	NS associations (p for trend) for total, animal and vegetable protein in the multivariate analysis	Age, hypertension, BMI, smoking, parity and intake of energy, fruit-vegetables and alcohol	**B** Not a SLR but a pooled analysis. No information about the intake level in the quintiles used in the analysis

Appendix 3. Evidence tables

Table 6. Evidence table, protein intake and coronary heart disease

Reference	Study design	Population	Outcome measures	Intervention/ exposure	Dietary assessment method	No of subjects analysed	Intervention	Follow- up period, drop-out rate	Results	Confoun-ders adjusted for	Study quality and relevance, Comments A-C
Halbesma et al., 2009 (11) Netherlands	cohorte	Prevention of Renal and Vascular ENd-stage Disease (PREVEND) study All inhabitants of a city in the Netherlands invited. 48% responded. From these a random sample of 7,768 with 24 h urinary albumin ≥10 mg/L (6,000 participated) and another sample of 3,394 with 24 h urinary albumin < 10 mg/L (2,592 participated). Total in the two samples: 8,592. Gender distribution not given. Avg. Base-line age: 49-50 y	Cardiovascular morbidity and mortality. Non-cardiovascular mortality. Renal outcome = slope of decline in estimated glomerular filtration rate eGFR (from gender, age, race and serum creatinine)	Continuous values and quintiles of estimated baseline protein intake in g per kg body "ideal" weight (BW) (after correcting the BMI to 22)	Protein intake estimated from 24 urinary N. No correction for possible loss of urine (PABA).	5,778 of 8461 and 373 deaths	Mean protein intake = 1.20 g/kg BW/d, range in percentiles: 5th : 0.8 95th : 2.66	7.0 y and 7.2 y for different outcomes. Follow-up: 70% of survivors	No association with eGFR. Event rates: significant trend for high cardiovascular and non-cardiovascular mortality with low intake (univariate analysis). Apparently a U shaped association. Similar results in Cox regression analyses adjusted for age, gender and cardiovascular risk factors. No association between protein intake	Age, gender cardiovascualor risk factors incl. sodium intake	**C** The intake level of protein could not be assessed because the values per kg BW are corrected to "ideal "BW and thus, probably higher than actual intake

		Exclusion criteria: Type 1 diabetes, pregnancy, known kidney disease								and rate of decline in eGFR		
Halton et al., 2002 (31) USA	Cohort	Nurses' Health Study, 98,462 female nurses 34-59 y in 1980 with dietary data	Incident coronary heart disease (CHD), including nonfatal AMI or fatal events. Confirmed by medical records. Se-lipids from blood samples in a subgroup in 1990	Low-carbohydrate (CH) score (low CH and high fat and high protein diet) based on energy percentages (E%) and also based on animal or vegetable sources of fat and protein Also protein (total, animal and vegetable) in a separate analyses	61-item FFQ during previous year. From 1984 app. 120-items. Implausible energy intakes (< 500 kcal and > 3500 kcal) excluded Evaluation : correlation 0.56 for protein vs. six 1-week food records in 1980 and 1986	82,802 (84%) CHD n= 1994 Subgroup (n= 466)		20 y	Comparing the highest and lowest deciles of the score on the basis of E% from CH, vegetable protein and vegetable fat the RR (95%CI) was 0.70 (0.56-0.88) and p for trend 0.002 The score was inversely associated with s-triglycerid , p for trend = 0.05. When examining the association for each macronutrient separately	Age, BMI, smoking, physical activity, postmenopausal hormone use, alcohol, aspirin, supplements (multivitamin and E-vitamin), history of hypertension, hypercholesterolemia, parental MI	**B** No association with risk of CHD with a low CH and high fat-protein diet, and no association for protein separately. When vegetable sources of protein and fat were chosen in the score there was a 30% reduced risk of CHD. Thus difficult to separate the effect from protein *per se*.

									there was no significantly association between total, animal and vegetable protein and the risk of CHD		
Preis et al., 2010 (14) USA	Cohort	Health Professionals Follow-Up Study 51,529 male professionals 40-75 y at baseline	Physician verified ischemic heart disease (IHD) or from medical records, fatal and nonfatal	Quintiles of energy percentage (E%) protein (total, animal and vegetable), substituted for an isocaloric amount of carbohydrate (CH)	131-item FFQ Internal evaluation: the Pearson correlation for protein was 0.44	43,960 IHD n= 2,959 (1804 nonfatal and 155 fatal cases)	Lowest quintile 14.6 E% and highest quintile 22.5 E% substituted for CH	18 y	Inverse association between vegetable protein and fatal IHD Top quintile vs. bottom quintile RR 0.66 and 95%CI 0.49-0.88 , p for trend =0.005 Excluding the men free of diabetes, hypertension and hypercholesterolemia at baseline a higher intake of total (RR 1.21 (1.01-1.44, p for trend 0.02), and animal protein (RR 1.25 (1.04-1.51, P for trend 0.02)	Age, BMI, smoking, parental history of myocardium infarction before age 65, Energy intake, alcohol, multivitamin, physical activity, glycemic index, folate, fibre, vitamin C, folate, magnesium, n-3. Baseline hypertension, diabetes and hypercholesterolemi	**B** Higher intake of total and animal protein E% were associated with increased risk of IHD among “healthy” men (without baseline hypertension, diabetes and hypercholesterolemia)

									was associated with increased risk of total IHD	a	
Prentice et al., 2011 (15) USA	Two cohorts	Two Women's Health Initiative (WHI) cohorts: Dietary Modification trial (DMT) n = 0 26,595 (91%) and WHI Observational Study (WHI-OS) n = 67,492 (88%) And 85 % white All postmenopausal and 50-79 y at baseline	Self-ported and physician adjucated myocardie infarction, CHD deaths and stroke	Biomarker "Calibrated" Protein intake in g per day and protein E%	122-item FFQ Subgroup n = 544 urinary biomarkers in order to calibrate. Calibration equations applied to data from DMT after one year follow up and in the WHI-OS after 3 years follow	DMT n = 59,157 (88%) and WHI-OS n = 59,157 (88%) Total = 80,370 W and 3,917 cardiovascular disease events			Data combined for the two cohorts Calibrated protein intake without BMI: Stroke: 0.89 (0.82 – 0.98), NS for CHD Calibrated protein E% without BMI: CHD 0.85 (0.75-0.97) and fatal CHD: 0.74 (0.59-0.93) Total CVD (CHD and stroke): 0.89 (0.81-0.98)	Calibration included: energy intake, age, ethnicity, income, education, Confounders: ethnicity, education, history of CVD, family history of premature CVD, smoking, hypertension, treated diabetes, medication(statin aspirin prior hormone) recreational physical activity and BM	**B** Energy intake level only acceptable after calibration. Only recreational physical activity and measurement method not described

Appendix 3. Evidence tables

Table 7. Evidence table, protein intake and stroke

Reference	Study design	Population	Outcome measures	Intervention/ exposure	Dietary assessment method	No of subjects analysed	Intervention	Follow- up period, drop-out rate	Results	Confoun-ders adjusted for	Study quality and relevance, Comments A-C
Iso et al., 2001 (32) USA	Cohort	Nurses' Health Study 98,462 female nurses 34-59 y	Fatal and non-fatal stroke. Self-reported strokes were confirmed by medical records. Subclassified in: intraparenchymal hemorrhages, subarachnoidal hemorrhages, ischemic strokes and unclassified strokes	Baseline (1980) dietary intake data Quintiles of energy adjusted total, animal and vegetable protein in g per day	61-item FFQ Evaluation showed correlation 0.47 for protein	85,764 (87%)		14 y	No relation between total, animal or vegetable protein and strokes. Intraparenchymal hemorrhage (n=21). After adjustment for fat and vegetable protein , RR for animal protein was 0.32 (0.10-1.00), P for trend 0.04	Age, smoking, BMI, alcohol, menopause status, postmenopausal hormone use, physical activity, aspirin, multivitamin, Evitamin use, intake of energy, n-3, calcium, history of hypertension, diabetes and hypercholesterolemia	**C** No information about total energy intake Animal protein inversely associated with risk of intraparenchymal hemorrhage

Preis et al., 2010 (33) USA	Cohort	Health Professionals Follow-Up Study 51,529 male health professionals 40-75 y	Physician verified non-fatal strokes and fatal strokes confirmed by medical records	Quintiles of E% protein (total, animal and vegetable), substituted for an isocaloric amount of carbohydrate (CH)	131-item FFQ Internal evaluation, the Pearson correlation for protein was 0.44 Implausible energy intakes (< 800 kcal and > 4200 kcal) excluded	43,960	Q1: 14.2 E% Q5: 23.2 E%	18 months	For total stroke the relative risk for the top quintile vs bottom of energy percentage protein was 1.14 (0.90; 1.43) for total, 1.11 (0.87;1.41) for animal and 0.82(0.60; 1.12) for vegetable protein	Age, BMI, smoking, parental history of myocardium infarction before age 65, Energy intake, alcohol, multivitamin, physical activity, glycemic index, folate, fibre, vitamin B6, B12 and C, potassium, magnesium, n-3. Baseline hypertension, diabetes and hypercholesterolemia	**B** No association after adjustment for confounders between protein and risk of any kind of stroke. In contrast to Japanese studies

Appendix 3. Evidence tables

Table 8. Evidence table, protein intake and blood pressure

Reference	**Study design**	**Population**	**Outcome measures**	**Time between baseline exposure and outcome assessment**	**Dietary assessment method**	**No of subjects analysed**	**Intervention**	**Follow- up period, drop-out rate**	**Results**	**Confoun-ders adjusted for**	**Study quality and relevance, Comments** A-C
Appel et al., 2005 (34) USA	Randomized cross-over study	The Omniheart Study. 164 adults with prehypertension or stage 1 hypertension, 40 % Caucasians Subgroup analyses for race or BP	Systolic blood pressure and LDL-cholesterol. Secondary outcomes: diastolic blood pressure, HDL cholesterol and triglycerides			164 16% drop outs	A diet with 15 E% protein vs 25 E% protein, and the 10 E% protein replaced with carbohydrate. About half protein from plant sources Each feeding period lasted 6 weeks. All foods were provided and prepared in a research kitchen. Main meal was eaten on-site, other meals were consumed off-site.		Protein diet vs carbohydrate. Among prehypertensives: Systolic BP: -0.9 mm Hg (p = 0.047) Diastolic BP: -0.9 (p = 0.01) LDL: -2.1 mg/dL (p = 0.14). The same trend but NS in Caucasians		**B** Good quality study, but B because of the population. Both prehypertension and hypertension stage 1, only 40 % Caucasians. Only 21% normal weight, but body weight was kept constant. Subgroup analyses for race or BP, but not combined. Primary interest in carbohydrate vs protein and

											carbohydrate vs fat, protein vs fat was of secondary interest.
Alonso et al., 2006 (35) Spain	Cohort	SUN cohort, university graduates, n= 6,686 (39% men), at baseline	Self-reported BP and information about hypertension (HT)		36-item FFQ, intake during previous year. No information about the referred validation study	5,880 (88%)	E% of total, animal and vegetable protein in quintiles	12 % loss to 2 y follow up (median 28 months)	Highest vs. Lowest quintile of vegetable protein and risk of HT, hazard ration, and 95% CI: 0.5 (0.2-1.0) and p for trend = 0.06	Age, sex, BMI, physical activity, smoking, alcohol, sodium intake, personal history of hypercholesterolamia, intake of fruit, vegetables, fiber, caffeine, magnesium, potassium, low-fat dairy, MUFA and SFA	**B** No information about the intake level of protein E%
Dong et al., 2011 (38)	Mete-analysis	25 studies with 27 RCT , 9 in USA, 8 in Europe and 10 in other countries, n= 1608, both normo-and hyperternsive subjects, incl. 11 trials with only normotensives	Systolic blodpressure (SBP) and diastolic blodpressure (DBP)	Duration of intervention lasted 4- 52 weeks, median 8 weeks Parallel (n=14) and cross-over design (n=13). Most control		N = 1,608	Soya protein ranged 18-66 g/day with median 30 g/day		Weighed mean difference (WMD) and (95%CI) Overall SBP: -2.21 (-4.10 to -0.33) DBP: -1.44 (-2.56 to -0.31) Hypertensives: SBP -8.58 (-		**B** Differences more pronounced in hypertensive groups, in trials using carbohydrate as control diet vs. casein/milk, in parallel design

				groups received casein/milk or carbohydrate					15.10 to -2.06) and DSP -5.24 (-9.40 to -1.08) and for Normotensives SBP-2.27 (-3.77 to -0.76) and DBP -1.21 (-2.19 to -0.23)		and with intervention duration of at least 12 weeks
Liu et al., 2002 (37)	Meta-analysis	11 cross-sectional (US and multi ethnic, 35% Chinese/Japanese) and two longitudinal studies (US)	Systolic blood pressure (SBP) and diastolic blood pressure (DBP)		Mainly 24-h dietary recall and 24-h urine collection, few FFQ and 3-d records	9 cross-sectional studies Men: n=19,954 for SBP and 19,982 for DBP) women: n=950 for SBP and DBP Both sexes: n=12,716 for SBP and 12,508 for DBP) and 2 longitudinal studies, one with adults and one with children	Energy percentage (E%) or g per day of total , protein intake		Cross-sectional pooled regression coefficients (SE) Men: SBP 0.03 (0.001), p = 0.01 DBP 0.025 (0.01), p= 0.01 Women: SBP 0.014 (0.01) , p = 0.022 DBP 0.021 (0.00), p = 0.01. Both sexes: SBP 0.029 (0.01), p = 0.01 DBP 0.016 (0.00), p = 0.01		**C** Mainly cross sectional studies. No information about level of protein intake Inverse association between dietary protein intake and blood pressure in both men and women. The association was depending on the dietary assessment method. Evidence from the longitudinal studies was limited.
Stamler et al., 2002 (36) USA	Cohort	Chicago Western Electric Study Male employees 40-55 y	Body weight (BW) and blood		The mean of two dietary histories (DH) with 1	Baseline n=2,107 At follow up	E% total , animal and vegetable protein	8 y	Inverse relation of vegetable protein for both SBP and DBP	Age, education, height, smoking,	**B** No information about salt

			pressure, Systolic (SBP) and diastolic (DBP)		year apart at baseline, intake during the preceding 28 days. Limited reproducibilit y	n=1,714 (81%)					alcohol, weight change	intake. Limited reproducibility of the two DH thus an underestimate strength of relation to BP. Baseline protein intake 15 ±1.9 E%. Vegetable protein is a marker of potassium, magnesium and fibre and may not be related independently to BP

Appendix 3. Evidence tables

Table 9. Evidence table, protein intake and lipoproteins

Reference	Study design	Population	Outcome measures	Intervention/exposure	Results	Study quality and relevance, Comments A-C
Anderson et al., 2011 (40)	Meta-analysis	43 RCT with 59 treatment arms (20 parallel design and 23 crossover studies), graded for quality, primarily hypercholesterolemic men and women	Netto changes (soy minus control) of lipoproteins (LDL- and HDL-cholesterol, measurements obtained between 4 and 8 weeks of intervention	Soy consumption vs. non-soy control diets, less than 65 g soy protein/day, median 30 g/day	Parallel studies scored higher in study quality than crossover studies. Parallel: LDL-change -0.23 mmol/l (95%CI -0.28to -0.18) a 5.5% reduction. HDL-change 0.044 (0.014-0.074, a 3.2% reduction Crossover: LDL-change -0.16 mmol/l (95%CI -0.22 -0.11) a 4.2% reduction. Hypercholesterolemic individuals show greater reductions in LDL-cholesterol values (-8.6% to -20.3%) than normocholesterolemic (+0.8 to -2.1%)	**A** Results depend on study design. 15-30 g soy protein (1 to 2 servings per day) had a positive impact Studies with highest baseline LDL had greater reductions than studies with the lowest values, thus the effect may be smaller in normocholesterolemic subjects
Harland et al., 2008 (39)	Meta-analysis	30 RCT with 42 treatment arms (n= 2,913, 28% men) and	Se-lipids: total cholesterol, LDL and HDL, and	Daily intake of app. 25 g soya protein (range 15-40 g) from	Decrease in total cholesterol -0.22 mmol/L (95%CI -0.142 to -0.291), p<0.0001 and in LDL cholesterol -0.23 mmol/L (-	**B** High quality study but missing information about conflict of interest.

		average intake of 26.9 g soya protein Healthy volunteers, or mildly hypercholesterolaemic, weight loss < 2kg/d, BMI< 30,duration min. 4 weeks	trigycerides (TG) Secondary outcomes: ApoA-I and ApoB	isolated soya protein, soya protein concentrates or soya foods	0.160 to -0.306), p<0.0001 HDL non-significantly increased 0.071 (0.002 to 0.144) p=0.057 TG -0.087 mmol/L (-0.004 to -0.158), p = 0.04	The reduction in LDL corresponds to app. 6% reduction in the general population, after inclusion of app. 25 g soya protein per day

Appendix 3. Evidence tables

Table 10. Evidence table, protein intake and bone health

Reference	Study design	Population	Outcome measures	Intervention/ exposure	Time between baseline exposure and outcome assessment	Dietary assessment method	No of subjects analysed	Intervention	Follow- up period, drop-out rate	Results	Confoun-ders adjusted for	Study quality and relevance, Comments A-C
Beasley et al., 2010 (41) USA	Cross sectional and longitudinal study. Only longitudinal results included	631 women, age 14-40 y at baseline.	Annual change in hip, spine, and whole body bone mineral density (BMD)	Baseline protein energy percentage (E%) in tertiles of total, animal and vegetable protein		Semiquantitative FFQ from Women's Health Initiative. Implausible energy intakes (<500 or >5000 kcal) excluded, n=44	560		2-3 y	No longitudinal relation of total, animal or vegetable protein E% to changes in BMD	Age, BMI, physical activity, smoking recent contraceptive (DMPA) use, intake of energy intake, phosphorous, and magnesium.	**C** Women only. The study had main focus on contraceptive use (DMPA) and BMD. Relation to protein intake was a secondary analysis. Not sufficient information about recruitment and response rate. Energy intake low. No data to evaluate lower and upper limits of recommended ranges of intake because interquartile range of protein

												intake at baseline was 13.4-17.6 E%.
Dargent-Molina et al., 2008 (45) France	Prospective cohort	The E3N (Etude Epidémiologique de femmes de la Mutuelle Générale de l'Educatoin Nationale [MGEN] prospective cohort. 100,000 women, 40-65 y at baseline. Only postmenopausal women included in this study (n=40,224)	Fracture risk (Variation according to calcium intake in the association between protein intake and overall acid-base equilibrium (as renal net acid excretion [RNAE] estimate) of diet and fracture risk)	Intake of protein in g/kg BW and energy adjusted (per 1000 kcal) intake of total, animal and vegetable protein in quartiles combined with calcium intake		Validated FFQ. Two parts: questions on quantity and frequency of food groups, and questions detailing the food groups into 208 food items. Booklet to facilitate portion sizes	36,217 and 2,408 fractures		15 y and 8.37 y in average	No overall association between fracture risk and total protein or RNAE. In the lowest quartile of Calcium (<400 mg/1000 kcal), high total protein intake was associated with increased fracture risk RR 1,51 (95% CI: 1.17-1.94) and also for animal protein RR1.66 (95% CI: 1.29-2.13), while for vegetable protein the opposite direction was found : RR 0.68 (95% CI: 0.53-0.87) . Expressed by	BMI, physical activity at the dietary data assessment (METs) parity, maternal history of hip fracture, postmenopausal hormonal therapy smoking, alcohol intake , total daily non-alcoholic energy intake	**B** Women only. Self-reported height, weight and PAL, but high quality study. No information about vitamin D and no control for baseline BMD and weight loss during follow up. Only increased fracture risk in the presence of low calcium intake for energy adjusted total and animal protein and also expressed as g per kg bodyweight The population had a habitual high protein intake.

										body weight (g/kg) no overall association to fracture risk but increasing fracture risk in the lowest quartile of calcium RR 1.46 (95% CI: 1.03-2.06)		
Darling et al., 2009 (44)	Systematic review and meta-analysis	Healthy human adults. 61 studies: 31 cross-sectional and cohort studies (22 from Western countries), and 19 randomized controlled trials (14 from Western countries) examining BMD ,BMC and bone markers, 11 cohort and case-control studies (9 from Western countries, one from China and one cross-cultural) examining fracture risk	Bone mineral density (BMD), bone mineral content (BMC), bone markers and fracture risk	Total protein intake (g/kg BW or g/day		11 studies used FFQ, 13 studies used dietary records 7 studies used recall or other methods. The 11 studies examining fracture risk used FFQ in 8 studies and national survey data in 3 studies. Overall no detailed information about quality assessment of the dietary methods				15 Cross-sectional surveys found a positive relation between protein intake and BMD while 18 found no significant correlation. The meta-analysis of RC Trials found a positive influence of protein on lumbar spine BMD but not on risk for hip fractures. No significant effect of		**B** The overall impression is a small benefit of protein on bone health but less clear conclusion on reducing fracture risk

										protein on fracture risk was found in the cohort studies.		
Fenton et al., 2011 (47)	Systematic review and a meta-analysis	55 studies: 22 RCT, 2 meta-analysis, 11 cohort studies and 19 in vitro cell studies	Osteoporosis (BMD, bone resorption markers)	Dietary acid load						The analysis did not find support for the hypothesis that "acid" from the diet causes osteoporosis or that an "alkaline" diet prevents osteoporosis. Higher protein intakes and animal protein were not detrimental to calcium retention. The ideal protein intake for bone health could not be determined	Most cohort studies not adjusted for important risk factors like weight loss during follow up, family history of osteoporosis, baseline BMD and estrogen status	**C** Focus on acid load (including protein). Fine systematic review but not sufficient information about the dietary intervention/intake
Harrington et al., 2004 (48) Ireland	Randomized cross-over trial	26 postmenopausal women (50-67 y).	Bone and calcium metabolism: Urinary Na, K, Ca, nitrogen and NTx	High Na-high protein diet vs low Na-usual-protein diet. Protein and sodium provided as protein-Na-		4 d estimated diet record data quantified using average portion sizes and a photographic	24 (2 women excluded)	High Na (180 mmol/d), high protein (90 g/d) intake (i.e., calciuric diet) vs low Na (65 mmol/d), usual protein (70g/d) (basal diet).	Two successive intervention periods each of 4 weeks No "wash out" period	Calciuric diet: Increase in mean urinary Na, N, K, Ca, and NTx vs basal diet. No differences in serum		**B** Women only. Both high Na and high protein, thus difficult to separate the effect from protein

			(marker of bone resorption) Fasting blood samples: PTH, s-25(OH)D3,, 1,25 (OH)2D3, osteocalcin, B-Alk. phosfatase	rich bread		album 24h-urine nitrogen collection at baseline and at the last two days of each intervention period		Calcium intake at normal levels in both diets (ca 800 mg/d)	Four weeks in each intervention	markers of urinary minerals between diets in either VDR genotype groups. Calciuric diet increased urinary NTx in the *f* + VDR groups (n = 10)		
Hunt et al., 2009 (49) USA	RCT, feeding study, 2x2 factorial cross-over	34 healthy postmenopausal women (50-69 y)	Calcium retention Blood and urinary biomarkers of calcium and bone metabolism	Low or high calcium intake combined with low or high protein intake		Controlled experimental diets using foods in a 2-d menu cycle. 48h urine collections at weeks 0,1,2,3,5 and 7. Fasting blood samples at week 1 and 7	27 N=7 dropped out	675 or 1510 mg calcium/d combined with: Low protein 10 E% (0.85 g/kg BW)) or high protein 20E% (1.66 g/kg BW)	2 x 7 weeks with each diet, 3 weeks washout period	High vs low protein intake increased calcium retention from low calcium diet (29.5% absorbed), but not high calcium diet (18% absorbed). For low-calcium diet the increased retention nearly balanced a protein related 0.5 mmol/l greater urinary calcium excretion.		**A** Women only. High protein (meat) intake was not detrimental to calcium retention, and resulted in an increase in IGF-1 which may be beneficial for bone formation

										High protein also increased IGF-1 with 27%		
Sahni et al., 2010 (46) USA	Cohort study	Framingham Offspring Study Baseline 5,124 men and women and 3,724 completed FFQ. Mean age app. 55 y	Self-reported fractures, confirmed by review of medical reports	Intake in tertiles of total, animal and plant protein (g/d) and also as a continuous variable. Then stratified by total calcium intake in low (< 800 mg calcium) and high > 800 mg calcium) intake		126-item semi-quantitative FFQ. Implausible energy intakes (< 600 kcal and > 4000 kcal) excluded. No further information about validation	3656 (53% women) and 44 hip fractures		12 y	No statistically significant associations between protein in tertiles and fracture risk. In the low calcium intake group highest vs. lowest tertile of animal protein had increased risk of fracture: HR 2.84 (95%CI 1.20-6.74). In the high calcium intake group the highest vs. lowest tertile of animal protein had reduced risk of fracture: HR 0.15 (95%CI 0.02-0.92).	Sex, height, body weight, energy intake, physical activity, smoking, menopause status, intake of total calcium and vitamin D	**B** Animal protein was related to fracture risk depending on the calcium intake level

Sellmeyer et al., 2001 (42) USA	Prospective cohort	1061 postmenopausal white women. Aged >65 y The Study of Osteoporotic Fractures. Multi-centre	Bone mineral density (BMD), self-reported hip fractures confirmed by radiologist reports	Energy adjusted protein intake (E%) and the ratio of animal to vegetable protein (A/V ratio) in tertiles	3.6 years later. Hip fractures were assessed every 4 months.	63 item FFQ from the second NHANES study. Food models to estimate portion sizes. No information about validation	1,035 n = 26 had no food data. Hip fractures n=48. Repeat BMD (bone loss) n = 742	Median protein intake 17E%	Mean of 7 y	Baseline BMD not related to A/V ratio, but bone loss positively related to A/V ratio. Risk of hip fracture related to high animal protein intake and high A/V ratio	Age, weight, oestrogen use, tobacco use, exercise, energy intake, total calcium intake, total protein E%	**C** Women only EI quite low (≈ 5MJ), indicating under-reporting When adjusted for BMD in the model the relation of A/V ratio to fracture risk was NS ($p=0.07$)
Tucker et al., 2001 (43) USA	Prospective cohort. The cross-sectional analyses at baseline not included	Men and women 69-97 years at baseline, participants in the Framingham Osteoporosis Study (FOS). N = 855 cohort members. (Originally 5,209 men and women in FOS)	Bone mineral density (BMD) at femoral neck , lumbar spine and radius	E% of total and animal protein and in quartiles	Baseline and 4 y BMD.	Validated 126-item semi-quantitative FFQ at baseline Implausible energy intakes (< 600 kcal and > 4000 kcal) excluded. No sufficient information about validation	615		4 y .	Lower E% of total and animal protein was associated with higher BMD loss at femur and spine after 4 years and likewise the lowest quartile of E% from total and animal protein showed the greatest bone loss. The highest quartile of total protein intake (1.2-2.8 g/kg body	Body weight, weight change, BMI, PA, alcohol use, smoking, oestrogen use by women, dietary intake of Ca, vitamin D, and Ca and/or vit D supplements, total EI intake at baseline, total EI, sex, caffeine,	**C** No information about the total energy intake, thus the absolute intakes cannot be assessed

										weight) showed the least BMD loss over four years		

Appendix 3. Evidence tables

Table 11. Evidence table, protein intake and energy intake

Reference	**Study design**	**Population**	**Outcome measures**	**Intervention/ exposure**	**Dietary assessment method**	**No of subjects analysed**	**Intervention**	**Follow- up period, drop-out rate**	**Results**	**Confoun-ders adjusted for**	**Study quality and relevance, Comments** A-C
Koppes et al., 2008 (50) The Netherlands	Cohort The Amsterdam Growth and Health Longitudinal Study	698 13 y-old boys and girls followed up at ages 14,15,16,21,32 and 36 y (some only at the age of 32 and 36)	Energy intake, macronutrient distribution, body fatness (skinfolds) and at age 36 DEXA	E% of total protein intake	Face-to-face dietary history method providing information about the preceding 4 weeks. At age 36 the method was computer-assisted. Inter-period correlations ranged from 0.31 to 0.62	N=350 (50%) 168 men and 182 women			Longitudinal development of the protein E% was inversely related to total energy intake. Men: -0.125 MJ per E%. Women: -0.152 MJ per E%. Protein E% at the ages 32 and 36 y was positively related to total fat mass at the age of 36	Age, education, smoking, physical activity, energy intake	**B** The paper only reported the total energy at age 36 y. Maybe obesity-related underreporting. The association between protein and energy intake was about 3 times larger than the association for fat and energy intake.
Rumpler et al., 2006 (51) USA	Controlled crossover study	12 volunteers, men only, 39±9 y, normal weight and weight-stable	*Ad libitum* intake, body weight and body composition (DEXA)	Different macronutrient composition of *ad libitum* diets. The protein drink provide 50% of RDA	All foods were provided by the research centre. Subjects choose foods from menus.	12 Men	Two of three treatments in two 8 weeks periods: Drinks providing 2.1 MJ included in an *ad libitum*		During week 1 and 2 the average energy intake was significantly lower for CHO than		**B** Strictly controlled. Small study and young men only. Only 8 weeks duration of each diet

				(addition of 27 g protein/day)	During week days breakfast and dinner were eaten at the centre while lunch and weekend foods were packed and eaten outside centre. All uneaten food was returned, weighed and recorded		diet: High carbohydrate (CHO) High fat (FAT) and high protein (PRO)		FA, but the effect disappeared after week 3. No effect on EI of the macronutrient composition over the prolonged period of time		
Weigle et al., 2005 (52) USA	Strictly controlled study	19 healthy (3 M and 16 F) volunteers, 27-62 y , weight-stable for ≥ 3 month before enrolment and lifetime maximal weight. BMI > 30 Two research centres	Appetite, body weight, energy intake, Plasma insulin, leptin and ghrelin,. Resting metabolic rate (RMR)	Normal vs. high protein diet with constant carbohydrate (CH) content	All meals prepared at the research centres. Typical food from a mixed American diet in 3-d cycle menus. 2-3 times a week body weight and pick up the prepared meals for the next 2 or 3 days. Daily food log and appetite related questions	19 RMR only n=11. BMI 26.2 ± 2.1	Weight-maintaining diet: 15 E% protein, 35 E% fat, 50 E% CH for 2 wk, Isocaloric diet: 30 E% protein, 20 E% fat, 50 E% CH for 2 wk. *Ad libitum* diet: 30 E% protein, 20 E% fat, 50 E% CH for 12 wk		Stable body weight during weight maintenance and isocaloric diet periods. During *ad libitum* diet weight loss 4.9±0.5 kg (body fat 3.7±0.4 kg) , decreased energy intake and decreased appetite		**B** Small study but strictly controlled, only 12 weeks of *ad libitum*) Actually a high protein-low fat diet and thus difficult to separate the effect of protein *per se* No information about side effects (renal function and calcium balance)

Appendix 3. Evidence tables

Table 12. Evidence table, protein intake and body weight and body composition

Reference	**Study design**	**Population**	**Outcome measures**	**Intervention/ exposure**	**Dietary assessment method**	**No of subjects analysed**	**Intervention**	**Follow- up period, drop-out rate**	**Results**	**Confoun-ders adjusted for**	**Study quality and relevance, Comments** A-C
Adams & Rini, 2007 (53) USA	Cohort	116 college students 18-31 y	1-y change in BMI	Protein consumption frequency (per day/per week)	Short FFQ as a part of a health risk questionnaire	116		1 y	NS for protein intake as a predictor for BMI change	Age, months between screening, pain, chronic conditions, medical visits, smoking, body fatness, perceived health	**C** Not a dietary survey, only one frequency question about protein consumption
Bujnowski et al., 2011 (54) USA	Cohort	The Chicago Western Electric Study 2,107 healthy employed men aged 40-55 y in 1957/58	BMI ≥25 = overweight, BM ≥30 = obesity	Quartiles of E% animal and vegetable protein intake	Burkes dietary history method, obtained twice with one year between, the mean of the two examinations	1,730 (82%)		7 y	Lowest vs. highest quartile, animal protein: overweight 2.09 (95% CI 1.55-2.81) and obesity 4.62 (2.68-7.98). vegetables protein obesity 0.58 (0.36-0.95)	Age, energy intake, education, smoking, heavy alcohol, energy percentage of saturated fat and carbohydrate, history of	**C** Old data with some missing information. Animal and vegetable protein have different relations to BW

											chronic disease, diabetes	
Ferrara et al., 2006 (59) Italy	Randomized controlled study	15 physically active weight stable male volunteers 18-36 y	Body weight (BW), BMI, body composition (impedance), Blood pressure, Total cholesterol, HDL and TG	High protein diet (HP): 1.9 g/kg BW (22 E%) vs. Normal diet (NP): < 1.3 g /kg BW (15 E%)	7-day food record	7 on HP 8 on NP		6 months	During intervention HP group had a decrease in BW of 2 kg (3.5% of baseline BW) vs NP group of 0.7 kg (1% of baseline BW). No change in FFM and BMI		**C** Small study. Main focus and power calculation on vascular reactivity. The dietary intervention method not well described. Probably underreporting. (reported EI around 10 MJ for physically active young men) Prestudy diet was high in protein (21 E%)
Halkjær et al., 2006 (55) Denmark	Cohort	Danish Diet, Cancer and Health Study 57,053 (35%) men and women 50-64 y. 44,897 (83% of eligible) in the follow study	5-y change in waist circumference (WC)	E% of total, animal and vegetable protein	192-item FFQ designed for the study. Validated against two 7-d weighed diet records. No further information about the validation	42,969 (47% men)		5 y	Men and women combined, total and animal protein were inversely associated with change in WC: RR (95% CI) : 0.26 (-0.49;-	Age, physical activity, smoking Baseline WC, BMI, alcohol	**B** Low response rate.

									0.04 and -0.28 (-0.51;-0.05) respectively		
Halkjær et al., 2011 (56) Europe	Cohort	EPIC Six cohorts from 5 countries and also participating in the Diogenes project 146,543 M & W	Change in body weight in g per year and waist circumference (WC) in cm per year	Total, animal and vegetable protein in kcal per day and per 150kcal per day increments (equalling 37.5 g protein)	Country specific FFQ from the past year Evaluated against a 24-h recall in a subpopulation: Correlations ranged from 0.24 (animal protein) to 0.40 (plant protein)	89,432 (58% women)		6.5 y	Total and animal protein associated with weight gain: 52.9 g per year (95% CI: 25.9-79.9) and 56.2 g per year, respectively, especially in women and mainly form red and processed meat and poultry rather than form fish and dairy products. NS association to WC	Baseline weight, height and WC, age, follow-up time, smoking, physical activity, education, menopausal status and hormone use	**B**
Iqbal et al., 2006 (57) Denmark	Cohort	Glostrup Population Studies and MONICA1 2025 M &W at base ages 30, 40,50 and 60	Change in BW Baseline BMI and follow up BW	Protein E%	Weighed 7-day food record. No information about validation	1,762 (51% W)		5 y	NS association between protein and change in BW	Baseline BMI, age, physical activity, smoking, education, cohort, volume and energy intake	**B**

Koppes et al., 2008 (50) The Netherlands	Cohort	The Amsterdam Growth and Health Longitudinal study 698 13 y-old boys and girls followed up at ages 14,15,16,21,32 and 36 y (some only at the age of 32 and 36)	Energy intake, Macronutrient distribution, body fatness (skinfolds) and at age 36 DEXA	E% of total protein intake	Face-to-face dietary history method providing information about the preceding 4 weeks. At age 36 the method was computer-assisted	N=350 (50%) 168 men and 182 women			Longitudinal development of the protein E% was inversely related to total energy intake. Men: -0.125 MJ per E%. Women: -0.152 MJ per E%. Protein E% at the ages 32 and 36 y was positively related to total fat mass at the age of 36	Age, education, smoking, physical activity, energy intake	**B** Total energy intake only reported at age 36. Maybe obesity-related underreporting
Sammel et al., 2003 (58) USA	Cohort	The Penne Study of Ovarian Aging.Prospective Cohort study 1420 W, 75% of eligible, n= 436 Age at baseline 41 y	Body weight gain of ≥ 10 lb, yes or no	Protein intake in servings per day	FFQ with foods and transformed to food categories, e.g. "protein"	336 women, 51% Caucasian		4 y	NS association between weight gain and protein servings per day: 1.1 ±0.7 versus 1.7 ±2.6 and p= 0.086	BMI	**C** Only a very rough FFQ table used and protein only as "servings per day"
Weigle et al., 2005 (52) USA	Strictly controlled study	19 healthy (3 M and 16 F) volunteers, 27-62 y, weight-stable for ≥ 3 month before enrolment and lifetime maximal weight. BMI > 30	Appetite, body weight, energy intake, Plasma insulin, leptin and ghrelin,	Normal vs. high protein diet with constant carbohydrate (CH) content	All meals prepared at the research centres. Typical food from a mixed American diet in 3-d cycle menus.	19 RMR only n=11. BMI 26.2 ± 2.1	Weight-maintaining diet: 15 E% protein, 35 E% fat, 50 E% CH for 2 wk, Isocaloric diet: 30 E% protein,		Stable body weight during weight maintenance and isocaloric diet periods. During *ad libitum* diet		**B** Small study but strictly controlled, only 12 weeks of *ad libitum* No information about side

		Two research centres	Resting metabolic rate (RMR)		2-3 times a week body weight and pick up the prepared meals for the next 2 or 3 days. Daily food log and appetite related questions		20 E% fat, 50 E% CH for 2 wk. *Ad libitum* diet: 30 E% protein, 20 E% fat, 50 E% CH for 12 wk.		weight loss 4.9±0.5 kg (body fat 3.7±0.4 kg) , decreased energy intake and decreased appetite		effects (renal function and calcium balance)

Appendix 3. Evidence tables

Table 13. Evidence table, protein intake and renal function

Reference	**Study design**	**Population**	**Outcome measures**	**Intervention/ exposure**	**Time between baseline exposure and outcome assessment**	Dietary assessment method	**No of subjects analysed**	**Intervention**	**Follow- up period, drop-out rate**	**Results**	**Confoun-ders adjusted for**	**Study quality and relevance, Comments** A-C
Frank et all., 2009 (61) Germany	RC Cross-over study.	24 healthy young men. Incl.: No clinical or laboratory evidence of kidney, heart, liver or endocrine disease. Excl.: hypertension, body mass ≥25, microalbuminuria, antihypertensive treatment, regular alcohol consumption, smoking.	GFR (glomerular filtration rate; sinistrin ≈ inulin) FR(Filtration fraction) RPF (renal plasma flow; PAH) RVR (renal vascular resistance) urinary albumin excretion. Blood pressure BP), renin, angiotensin,	7 days dietary intervention by dieticians instruction, subjects living at home NP (Normal Protein) 1.2 g/kg per d. HP (High Protein) 2.4 g/kg per d. Mainly animal incl. dairy	7 days	Food records at home with assistance of dieticians. 24 h urinary N on day of examination. No correction for possible loss of urine (PABA).	24	Dose interval: 1.2 g/kg per d. Duration: 7 d. Compliance: Based on difference between measured 24 h urinary N excretions (increase from 9.1 g/d to 13.9 g/d) it can be calculated that the increase in intake was about 0.4 g protein/kg per d. This is much less than the planned increase of 1.2 g/kg per d**.**	No drop-outs	HP considerably increased GFR (124 → 141 ml/min), FR (25 → 28 %), and urinary albumin (9 → 18 mg/24 h). No changes in RPF, RVR, BP or RAA.	None (cross-over design)	**B**

			aldosterone (RAA)									
Halbesma et al., 2009 (11) The Netherlands	cohort	All inhabitants of a city in the Netherlands invited. 48% responded. From these a random sample of 7768 with 24 h urinary albumin ≥10 mg/L (6000 participated) and another sample of 3394 with 24 h urinary albumin < 10 mg/L (2592 participated). Total in the two samples: 8592. Gender distribution not given. Avg. Base-line age: 49-50 yrs. Exclusion criteria: Type 1 diabetes, pregnancy, known kidney disease	Cardiovascular morbidity and mortality. Non-cardiovascular mortality. Renal outcome = slope of decline in estimated glomerular filtration rate eGFR (from gender, age, race and serum creatinine).	Quintiles of estimated baseline protein intake	7.0 y and 7.2 y for different outcomes.	Protein intake estimated from 24 urinary N. No correction for possible loss of urine (PABA).	5778 of 8592 (373 deaths), i.e. 70% of survivors	None	7.0 y and 7.2 y for different outcomes. Follow-up: 70% of survivors.	Mean protein intake = 1.20 g/d. No association with eGFR Event rates: significant trend for high cardiovascular and non-cardiovascular mortality with low intake (univariate analysis). Apparently a U shaped association. Similar results in Cox regression analyses adjusted for age, gender and cardiovascular risk factors. No association between protein intake and rate of decline in eGFR. At base-line (≈ cross-sectional), a	Age, gender cardiovascualor risk factors incl. sodium intake.	**C**

										positive relationship between protein intake and 24 h urinary albumin excretion.		
Jakobsen et al., 2011 (63) Denmark	RCT	Inclusion: Healthy males, aged 20-40 yrs. Exclusion: smoking, BMI ≥ 25, use of any medication, strenuous physical activity > 4 h/week, chronic disease, impairment of shoulder, arm and/or hand. Setting: free living with daily visits to the laboratory 24 participants at base-line. All male. Mean age ± SD: 24 ± 4 yrs. Anthropometry: Mean BMI ± SD: 22 ± 1	N-balance, muscle function, cognitive function, creatinine clearance, urinary albumin excretion	Randimized to continuation of usual protein intake (UP: 1.5 g/kg per d) or a high protein diet (HP: 3.0 g/kg per d), mainly by increasing animal protein.. Isoenergetic diets by reduction of carbohydrate in high protein group	3 weeks	All food was prepared by the metabolic kitchen of the department. Lunch was eaten in the department on week-days and other meals for the day were provided as a package. For the week-ends, a package for all meals were provided. Leftovers were brought back for weighing. Energy provision was adjusted in increments of 0.5 to 1.0 MJ/d to keep body weight	23	After the 3 weeks' intervention period, the measured urinary N loss in the usual protein group corresponded to a protein intake = 1.3 ± 0.2 g/kg per d (mean ± SD) and in the high protein group= 2.6 ± 0.2 g/kg per d	One of 12 participants in the high protein group dropped out due to flu	No effect on renal function (creatinine clearance or albumin excretion). No effect on muscle function. A slight improvement in cognitive function (P = 0.015)	None. Baseline characteristics quite similar in the two groups	**A**

						stable. Protein intake was validated by collection of 24 h urinary N. Urine collection was validated by PABA tablets						
Knight et al., 2003 (60) USA	Cohort	A selected group from the 121.700 participants in the Nurses' Health study. The present 1624 women constitute a random sample among those who gave blood samples in 1989 and 2000 and who had no history of of analgesic abuse. Exclusion criteria: cancer, cardiovascular disease, pre-existing high plasma creatinine (estimated GFR <55 ml/min) or a history of abnormal kidney function. questionnaires and collection of	Questionnaires and collections of blood samples eGFR estimated from plasma creatinine	Total protein intake, also of type of protein (vegetable, animal non-diary, diary) at baseline and at 4 y interim follow-up, analysed as a continuous variable and in quintiles	11 y	FFQ during previous year. Pearson r by correlation of FFQs with 4 y interval: 0.5. No further information about validation	1624 (selected because of compliance)	No independent control of actual food intake	11 y follow-up, only of those with end of study blood sample	No association between protein intake, or type of protein intake, and rate of decline in estimated GFR among women with normal kidney function at baseline. Among women with mild kidney insufficiency at baseline, the decline in GFR was related to protein intake,	Age, weight, animal fat intake, phosphorus intake, alcohol intake, hypercholesterolemia, diabetes, hypertension, smoking	**C** No information about the energy intake

		blood samples. Average age: 56 y Anthropometry: Average body weight: 70 kg								significant also for non-dairy protein intake		
Walrand et al., 2008 (9) USA	RCT in cross-over design.	Inclusion 10 young and 10 elderly participants. Healthy as judged from history, physical examination and laboratory tests. Exclusion: BMI ≥ 32, smoking, pregnancy, excercise > 30 min x 2/week, medications affecting metabolism . Setting: All food prepared by the metabolic kitchen of the department. Participants living at home (probably) but admitted to research unit for measurements. 10 young and 10 elderly. 5 women in each group. Age: y young: 24 ± 1 (mean ± SE),	N balance, insulin sensitivity glomerular filtration rate, by iothalamate meglumine (GFR); protein metabolism measured by stable isotopes. A number of other metabolic variables	Random allocation to Usual Protein intake (UP: 1 g/kg per d) or High Protein intake (HP: 2 g/kg per d), but adjusted for the differences in FFM. Followed by cross-over to opposite diet with 2-8 weeks' wash-out period. Isoenergetic diets by reduction of fat in high protein group	10 days	Food was provided to the participants from the metabolic kitchen and participants were weighed daily. Compliance was checked by (one?) 24 h urinary excretion at the end of each dietary period. No independent control of urine collection. Compliance was also evaluated from measured leucine oxidation, recalculated to total protein oxidation	19. One elderly participant dropped out for unknown reasons	24 h urinary N excretion data are not given. HP did increase calculated total protein oxidation, but the increase is only about 40% of reported increased intake (young) and 20% (elderly). A calculation of N balance is provided, but it is unclear whether this is calculated from N data or from stable isotope data. The N balance improved almost twice as much as the increase in protein intake and the absolute values are approximately twice as high as the reported	1 drop-out of 10 participants.	GFR increased significantly in young participants and decreased (insignificantly) in elderly. Insulin sensitivity was unaffected by HP. Other metabolic results are not considered relevant for the present review	None. Not necessary in this cross-over design.	**B**

		elderly: 70 ± 2 y. Anthropometry, BMI: young: 23 ± 1 (mean ± SE), elderly: 27 ± 2; Fat free mass (FFM), kg: young: 49 ± 4 (mean ± SE), elderly: 46 ± 4;						intakes. In summary it is difficult to evaluate the adherence to dietary targets, but the data do suggest an increase in protein intake				

Appendix 3. Evidence tables

Table 14. Evidence table, protein intake and kidney stones

Reference	Study design	Population	Outcome measures	Intervention/ exposure	Dietary assessment method	No of subjects analysed	Intervention	Follow- up period, drop-out rate	Results	Confoun-ders adjusted for	Study quality and relevance, Comments A-C
Curhan et al., 2004 (64) USA	cohort	A selected group from the 116.671 participants in the Nurses' Health Study II. The present 96.245 were those who had completed at least 1 FFQ. Exclusion criteria: date for stone formation not available, stone formation before first FFQ. Setting: Baseline and 4 y FFQ Missing FFQ .and biennial self-reporting of kidney stones. Age: 27-44 y, avg.: 36 y. Anthropometry: Average BMI: 25	Self-reported kidney stone formation	Spontaneous food intake with analyses of intakes of nutrients judged to be relevant for kidney stone formation, including energy adjusted g/day of protein and type of protein (animal) at baseline, analyzed in quintiles.separately for the 0-4 y and the 4-8 y periods	FFQ. Validity referred to in references, but no data given in this paper. Knight et al 2003 (**Fel! Bokmärket är inte definierat.**): Pearson r by correlation of FFQs with 4 yrs interval= 0.5	96,245	No independent control of actual food intake	8 y. Drop-out not specified	No association between animal protein intake and risk of kidney stone formation	Age, BMI, family history of kidney stone formation, dietary calcium, calcium supplements, potassium, sodium, sucrose, phytate, fluid intake	**C**
Taylor et al., 2004 (65)	Cohort	45.619 male participants in the Health	Biennal Self-reported	Spontaneous food intake with analyses	FFQ. Validity referred to in	45.619	No independent control of actual food	Avg 10 y. Only complete	Overall, no association between	BMI, alcohol, diuretics,	**B**

USA		Professionals Follow Up Study who provided full information on their diet. About 2000 of original eligible sample did not provide full information. Exclusion: history of kidney stone. Avg age not given, range of age groups: 40-≥70. Anthropometry: Avg or range of BMI not given	kidney stone formation accompanied by pain or hematuria	of intakes of nutrients judged to be relevant for kidney stone formation, including animal protein at 4 yrs intervals. Corrected for total Energy intake. Analyzed in quintiles .	references, but no data given in this paper		intake	FFQs included	animal protein intake and risk of kidney stone formation. Among those with a BMI <25, a significantly higher RR for developing a kidney stone. Not clear whether this is only the age-adjusted analysis or the multivariate analysis	calcium supplements, intakes of fluid, potassium, calcium in food, sodium, magnesium, vitamin C	

Appendix 3. Evidence tables

Table 15. Evidence table, protein intake and diabetes

Reference	Study design	Population	Outcome measures	Intervention/ exposure	Time between baseline exposure and outcome assessment	Dietary assessment method	No of subjects analysed	Intervention	Follow- up period, drop-out rate	Results	Confoun-ders adjusted for	Study quality and relevance, Comments A-C
Bowden et al., 2007 (70) USA	RCT	108 healthy, free-living, sedentary university students. No at baseline: 108. Of 94 who completed: 66% women, 34% men. Mean age ≈ 20 y (SD ≈ 1.5) Ethnicity not provided	Fasting blood glucose. Anthropometry: BMI or similar not given. Initial body fat estimated by DEXA	Participants were stratified for initial % body fat < or ≥ 30% and then randomized into 2 groups. One group followed the AHA (American Heart Association) recommendations: 15 E% protein, 30 E% fat, 55 E% carbohydrate and the other group had more protein (25 E% protein, 30 E% fat and 45 E% carbohydrate)	12 weeks	Instruction and supervision in university department. Participants used software to record dietary intake 3 days/week (2 weekdays and 1 week-end day in consecutive order). Participants kept logs of their physical activity. For validation , participants met a counsellor every 2 weeks. The counsellor	94 out of 108 completed the trial	Participant groups who aimed at keeping their body weight stable, did keep their body weight and those meant to reduce body weight had a non-significant weight loss of 1 kg. Apart from this, no data on compliance	94 out of 108 completed the 12 weeks' trial (13% drop out). However, the four study groups ended with a large variation in number of participants with completed trials: from 7 to 34	Participants with body fat <30% and a high protein E% had a significant 6% decrease in 12 hours' fasting blood glucose, as compared to baseline (N = 15). Participants with body fat ≥ 30% and a high protein E% had a similar decrease in blood glucose, but not significant due to small number of participants who completed	None	**C** Small numbers, especially in group 4. Low and not commented energy intakes. No information about body weight

				Those with % body fat < 30% were asked to maintain their usual total energy intake and those with % body fat ≥ 30% were asked to reduce their usual total energy intake by 500 kcal/d. All participants were instructed to follow exercise recommendations: 30 min/day and 4-6 times/week of aerobc exercise which stimulated heart rate to 60% - 85% of of maximum heart rate. Duration of intervention was 12 weeks		checked the completeness of recordings of food intake and exercise logs. Participants were removed from the study, if logs were not completed, or if they did not adhere to the dietary and exercise protocols. No biomarker validation was applied (e.g. 24 h urine collection)						
de Koning et al., 2011 (66)	cohort	Health Professionals Follow Up Study	Biennal Self-reported	Spontaneous food intake with analyses	Follow-up time: max 20 yrs.	131-item FFQ. Validity	40,475 and 2,689 cases	No independent control of actual food	Max follow-up time: 20 yr	Highest versus lowest quintile of the	Age, smoking, physical	**B** Average or range of BMI

USA		51,529 M (40-75 y) Exclusion:, history of T2D, CVD, or cancer at baseline	health status incl. new type 2 diabetes (T2D)	of intakes of macronutrients. Data rearranged in 'Carbohydrate scores': max score = 30 = lowest intake of carbohydrate and highest intake of protein and fat based on E% and also based on animal or vegetable sources of fat and protein. Data analysed in quintiles of scores		examined in a small subsample by comparison to two 7 days' food recordings. Pearson correlations varied from 0.4 (protein) to 0.7 (CH) Those with implausible energy intake (<800 kcal or > 4200 kcal) excluded		intake	40.475 of 51.529 in the original cohort were included in the analysis	low carbohydrate/high total protein and fat score was associated with higher frequencies of T2D (P for linear trend < 0.01 in a multivariate analysis). Same results for animal based scores, but not for vegetable based scores. Within animal protein, the association was mainly with red and processed meat	activity, coffee, alcohol, family history of T2D, total energy intake and BMI	not given
Halton et al., 2008 (67) USA	cohort	A selected group from the 121,700 participants in the Nurses' Health study aged 30-55 y. The present sample of 85,059 women were selected by exclusion of those with: ≥ 10 items blank in the semi-quantitative food-	Report of new incidence of type 2 diabetes in 2 y follow up questionnaires, extended with a more detailed questionn	Spontaneous food intake with analyses of intakes of macronutrients. Data rearranged in 'Carbohydrate scores': max score = 30 = lowest intake of carbohydrate	20 y follow-up, but each 2 years' incidence of T2D related to previous 4 years' SFFQ	FFQ. Validity stated as 'reported elsewhere (ref to a book)'. Those with implausibly high (< 3500 kcal) or low (<500 kcal) energy intakes	85,059 and 4,670 cases	Spontaneous food intake. No independent control of actual food intake	20 y follow-up, but each 2 y incidence of T2D related to previous 4 y SFQQ. Follow-up of 85,059 out of original 121,700	With 'low carbohydrate intake + high protein and fat intake' (high carbohydrate score), a higher risk for T2D. This association disappeared when BMI	Age, smoking, hormone use, physical activity, alcohol, family history of T2D, BMI	**B** Energy intake app. 6 MJ and thus indication of some underreporting

		frequency questionnaire (SFFQ), implausibly energy intakes, history of diabetes, cancer or cardiovascular disease at baseline, Setting: FFQs every 4 years and questionnaire on disease status every 2 years for a 20 yrs period. Anthropometry: Average BMI at baseline: ≈ 24	aire to confirrn diagnosis. Type 1 diabetes and gestational diabetes excluded	and highest intake of protein and fat . Data analysed in deciles of scores		excluded			participants Unknown how many dropped out *versus* were excluded by other exclusion criteria	was included in multivariate analysis and also when data were analyzed separately in strata of obese and nonobese women. The higher risk for T2D was related to 'low carbohydrate intake + high animal protein and animal fat intake' (disappeared with BMI). However, with 'low carbohydrate intake + high vegetable protein and vegetable fat intake', there was a lower risk for T2D (persisted with BMI) RR 0.82 (95% CI: 0.71-0.94) For individual		

										macronutrients, multivariate analysis did not show any relation to protein intake, neither animal nor vegetable		
Schulze et al., 2008 (68) Germany	Cohort	Part of EPIC study (Potsdam, Germany). 10,904 M (40-65 y) and16,644 W (35-65 y) Exclusion: DM at baseline, missing follow-up, missing baseline info on diet or confounders, Baseline values: BMI ≈ 27, Waist circumference ≈ 95 cm (M), 80 cm (F)	New type 2 diabetes (T2D) reported in questionnaires every 2-3 years and confirmed by diagnosing physician	Intakes of macronutrients in g/day and E%. Protein E% intake, substituted isoenergetically by 5 E% higher carbohydrate intake	9 y	148-item FFQ during 12 months before examination, calibrated according to earlier correlation analysis of FFQ *versus* 24 h recalls of food intake. Results presented in quintiles of protein intake. Those with implausible low or high energy intake excluded	9,702 M and 15,365 W and 844 cases	No independent control of actual food intake	9 y 10% drop out	Lower protein intake, substituted by higher carbohydrate intake, associated with decreased diabetes risk For each 5 energy% substitution of protein with carbohydrate: RR: 0.77 (95% CI: 0.64-0.91)	Age, sex, BMI, waist circumference, education, activity, smoking, total energy intake, fibre intake, magnesium intake	**B**
Sluijs et al., 2010 (69) The Netherlands	Cohort	Part of EPIC study (NL), merged by two cohorts: Prospect-EPIC:	New type 2 diabetes (T2D) reported in questionn	Protein intake per 10 g of intake and Quartiles of protein E% intake	10 y	79-item FFQ Earlier study showed a correlation between protein	38,094. Missing follow-up: 931 (2.5%) and 918	No independent control of actual food intake.	10 y drop-out 2.5%	Higher protein intake associated with higher risk of T2D. Univariate	Sex, age, , energy-adjusted intake of saturated fat,	B

		17,357 W (40-79 y) MORGEN-EPIC: 22,654 M & W (21-64 y) Total N = 38,094 26% M. Exclusion: DM at baseline, missing follow-up, Baseline values: BMI ≈ 25, Waist circumference ≈ 55 cm (M & F)	aires every 3-5 y and confirmed by diagnosing physician. Same as in Schulze et al 2008 (68) but more details on animal *versus* vegetable protein	substituted isoenergetically by 5 E% lower carbohydrate intake		intake by FFQ and by 24 h recall (r = 0.69). Those with implausibly high (< 5000 kcal) or low (<6000 kcal) energy intakes excluded	cases			analysis: Highest quartile of protein intake *vs.* lowest: HR: 2.15 (95%CI: 1.77-2.60). Intake per 10 g increased protein intake increased risk HR: 1.16 (95% CI: 1.06-1.26) and also in animal based protein HR 1.13 (95% CI: 1.04-1.22) Higher protein intake, substituted by lower carbohydrate intake, associated with higher diabetes risk For each 5 energy% substitution of carbohydrate with protein: RR: 1.28 (95% CI: 1.01-1.61) Association	monounsaturated fat, polyunsaturated fat, cholesterol, vitamin E, magnesium, fiber, glycemic load, diabetes risk factors (alcohol, physical activity, blood pressure, education, parental history of DM), BMI, waist circumference	

										attenuated with inclusion of adiposity in multivariate analysis (BMI & waist circumference). In stratified analysis association only present in lean individuals. Risk approximately the same with total protein and animal protein but absent with vegetable protein. Comment: Range of vegetable protein intake in quartiles: 22-33 g *versus* range of animal protein intake in quartiles: 35-62 g		

Appendix 3. Evidence tables

Table 16. Evidence table, protein intake and exercise

Reference	**Study design**	**Population, subject characteristics,**	**Outcome measures**	**Intervention/ exposure**	**Time between baseline exposure and outcome assessment**	**Dietary assessment method**	**No of subjects analysed**	**Intervention**	**Follow- up period, drop-out rate**	**Results**	**Confoun-ders adjusted for**	**Study quality and relevance, Comments** A-C
Gaine et al., 2005 (71) USA	Clinical trial	Untrained men (n=3) and women (n=4), 18–25 y	Whole body protein turnover. Substrate oxidation, DEXA, N-balance, fitness	Diet and exercise intervention (6 weeks) Protein 0.8 g/kg BW per day or 10 E%	4 weeks (pre- and post-training)	Diet records, length not indicated. During the study period, all meals were provided and assistants present	Seven (men and women grouped)	2 week dietary adjustment period followed by 4 week progressive aerobic exercise training program. Weight maintaining diet with 0.88 g protein/kg BW per day or 11E%	6 weeks	Post-training: Resting protein oxidation reduced, N-retention improved. Correlation between fitness and N-balance (more positive, when more fit) No changes in body composition, increased REE The observed energy intake was 9,688 kJ and the estimated PAL≈ 1.4	None	C Small study. Some mentioning about power calculations in discussion in relation to the finding of no statistical significance in change of rate of appearance of leucine (estimate of protein breakdown) and non-oxidative leucine disposal. No non-exercise control group. Maybe some underreporting. No check of completeness of urine collections

Hartman et al., 2005 (72) Canada	Clinical trial	Healthy, young untrained men	Nitrogen flux, protein synthesis (PS), protein breakdown (PB), and net protein balance (NB = PS-PB), muscle strength and body composition	Whole body split resistance training, 12 weeks, 5 d/wk. Diet 15 E% protein. Periods of 5 days with strictly controlled diets (1.2 g/kg BW per day)	12 weeks. Measurements pre-and post	3-day diet records at 6 and 11 wks	Eight	12 weeks whole body resistance training and diet with 1.2 g protein/kg BW		Muscle strength and LBM increased. N-flux, PS and PB decreased, but net protein balance increased. Increase in N-balance. 7% increase in energy intake	None	B Periods with strictly controlled diet. N-balance only assessed with urine
Thalacker-Mercer et al., 2009 (73) UK	Clinical trial	Healthy untrained men and women; 20-35 y, and 60-75 y	Change in m. vastus lateralis myofiber cross-sectional area (CSA) from before-after resistance training (RT). Protein intake in various groups of RT	Self-selected dietary intake and 16 wk Resistance training		4-day diet records	60 (32M, 28F; Non responders, n=16; Moderate resp, n=29; and extreme resp, n=15)	16 wk, 3-d/wk Resistance training. Three lower body exercises. Habitual protein intake in three clusters: medium and extreme responders, and non-responders		60% myofiber hypertrophy in extreme responders. No effect of RT in non-resp. Mean daily intake of total, animal and, vegetable protein, essential amino acids, BCAA, or leucine NS between groups	Age, sex	B Probably substantial underreporting in all 3 clusters: BW of 71-81 kg and reported energy intake of 7.4-8.2 MJ

			responder s							Mean total protein intake ≈ 1 g/kg BW		