Peer Reviewed Articles on Alkaline Water

Research on the need for maintaing the body's acid/alkaline balance is now beginning to surface in the West.
In Japan there is a large body of scientific evidence from the last 20+ years as to the importance of body pH to good health and wellbeing, and the challenges our bodies face in keeping it in balance.
And now in the USA independent researchers are making some significant discoveries.
Here is a selected list of some of the peer-reviewed articles.

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1. Lonergan, E. Aging and the kidney: adjusting treatment to physiologic change, Geriatrics 43: 27-30, 32-33, 1998.
Changes in renal physiology and function with aging put the elderly patient at risk for adverse effect of drug therapies due to the incidence of common problems like metabolic acidosis.
2. Frassetto, L. and Sebastian, A. Age and systemic acid-base equilibrium: analysis of published data, Journal of Gerontology, Advanced Biological Science and Medical Science, 51: B91-99, 1996.
Authors examined peer-reviewed literature to determine whether systemic acid-base equilibrium changes with aging in normal adults humans. Using linear regression analysis, they found that with increasing age, there is a significant increase in the steady-state blood H+ indicating a progressively worsening low-level metabolic acidosis in what may reflect, in part, the normal decline of renal function with increasing age.
3. Alpern, R. and Sakhaee, K. The clinical spectrum of chronic metabolic acidosis: homeostatic mechanisms produce significant morbidity, American Journal of Kidney Disease 29: 291-302, 1997.
Chronic metabolic acidosis is a process whereby an excess acid load is placed on the body due to excess acid generation or diminished acid removal by normal homeostatic mechanisms. Excessive meat ingestion and aging are two clinical conditions often associated with chronic metabolic acidosis. The body's homeostatic response to this pathology is very efficient. Therefore, the blood pH is frequently maintained within the "normal" range. However, these homeostatic responses engender pathologic consequences such as nephrolithiasis, bone demineralization, muscle protein breakdown and renal growth.
4. Bushinsky, D. Acid-base imbalance and the skeleton, European Journal of Nutrition 40: 238-244, 2001.
Humans generally consume a diet that generates metabolic acids leading to a reduction in the systemic bicarbonate and a fall of pH. Chronic metabolic acidosis alters bone cell function; there is an increase in osteoclastic bone resorption and a decrease in osteoblastic bone formation. As we age, we are less able to excrete metabolic acids due to the normal decline in renal function.
5. Frassetto, L.; Morris, R.; Sellmeyer, D.; Todd, K. and Sebastian, A. Diet, evolution and aging: the

pathophysiologic effects of the post-agricultural inversion of the potassium-to-sodium and base-to-chloride ratios in the human diet, European Journal of Nutrition 40:5 200-213, 2001.
Dietary changes over the last two centuries have resulted in a mismatch between genetically-determined nutritional requirements in humans. Excess sodium chloride, a deficiency of potassium and excess dietary acids that are not mediated by dietary bicarbonates lead to chronic low-grade metabolic acidosis that amplifies the age-related pathophysiological consequences in humans (such as loss of bone substance, increase in urinary calcium, disturbance in nitrogen metabolism, and low levels of growth hormone).
6. Frassetto, L.; Morris, R. and Sebastian, A. Effect of age on blood acid-base composition in adult humans: role of age-related renal functional decline, American Journal of Physiology, 271: 1114-22, 1996.
Otherwise healthy adults manifest a low-grade, diet-dependent metabolic acidosis, the severity of which increases with age at constant rate described by an index of endogenous acid production, apparently due in part, to the normal age-related decline of renal function.
7. Alpern, R. Trade-offs in the adaptation to acidosis, Kidney International 47: 1205-1215, 1995.
Excessive dietary intake of protein with consequent increase in metabolic acid production result in compensatory mechanisms that lead to progression of kidney stones, bone disease, renal disease and a catabolic state.
8. Krapt, R. and Jehle, A. Renal function and renal disease in the elderly, Schweizerische Medizinische Wochenschrift, 130:11 398-408 2000.
Age-induced decline in renal functions explains, at least in part, clinically important age-related conditions including metabolic acidosis.
9. Adrogue, H. and Madias, N. Management of life-threatening acid-base disorders, New England Journal of Medicine 338: 26-34, 1998.
Acid-base homeostasis exerts a major influence on protein function, thereby critically affecting tissue and organ performance. Deviations in body acidity can have adverse consequences and when severe, can be life-threatening.
10. Maurer, M.; Riesen, W.; Muser, J.; Hulter, H. and Krapf, R. Neutralization of Western diet inhibits bone resportion independently of K intake and reduces cortisol secretion in humans, American Journal of Physiology and Renal Physiology 284: F32-40, 2003.
The acid load inherent in the Western diet results in mild chronic metabolic acidosis in association with a state of cortisol excess. An alkali balanced diet modulates bone resorption and the associated alterations in calcium and phosphate homeostasis.
11. May, R.; Kelly, R. and Mitch, W. Metabolic acidosis stimulates protein degradation in rat muscle by glucocorticoid-dependent mechanism, Journal of Clinical Investigations 77:614-621, 1986.
Chronic metabolic acidosis increases net muscle protein degradation in rat muscle tissue.
12. Meghji, S.; Morrison, M.; Henderson, B. and Arnett, T. pH dependence of bone resoption: mouse calvarial osteoclasts are activated by acidosis, American Journal of Physiological and Endocrinological Metabolism 280: E112-E119, 2001.

Osteoclast activity is modulated by small pH changes and is a key determinant of bone resorption in mouse calvarial cultures.
13. Nabata, T.; Morimoto, S. and Ogihara, T. Abnormalities in acid-base balance in the elderly, Nippon Rinsho 50: 2249-53, 1992.
Decline in the ability to adjust acid-base balance is a feature of aging. Regulation of pH ultimately depends on the kidneys and lungs, however, the ability of these organs is decreased with physiological aging. Renal insufficiency and/or chronic obstructive pulmonary disease and various drugs, such as diuretics, often affect the acid-base balance in the elderly.
14. Robergs, R. Exercise-induced metabolic acidosis: where do the protons come from?, Sport Science 5(2) sportsci.org/jour/0102/rar.thm, 2001.
The physiology of intense exercise that produces acidosis is far more complex than originally thought. In the transition to higher exercise intensity, proton release is even greater than lactate production which indicates acidosis is only partially related to production of "lactic acid."
15. Sebastian, A.; Harris, S.; Ottaway, J.; Todd, K. and Morris, R. Improved mineral balance and skeletal metabolism in postmenopausal women treated with potassium bicarbonate, New England Journal of Medicine 330:25 1776-81 1994.
Endogenous acid produced by the metabolism of foods in ordinary diets abundant in proteins may contribute to the decrease in bone mass that occurs normally with aging. The oral administration of potassium bicarbonate at a dose sufficient to neutralize endogenous acid improves calcium and phosphorus balance, reduces bone resorption and creases the rate of bone formation.
16. Sebastian, A.; Frassetto, L.; Sellmeyer, D.; Merriam, R. and Morris, R. Estimation of the net acid load of the diet of ancestral preagricultural Homo sapiens and their hominid ancestors, American Journal of Clinical Nutrition 76:6 1308-1316, 2002.
Estimates of the net systemic load of acid in ancestral pre-agricultural diets as compared to contemporary diets reflect a mismatch between the nutrient compositions of the diet and genetically determined nutritional requirements. The result is that contemporary diets generate diet-induced metabolic acidosis in contemporary Homo Sapiens.
17. Wiederkebr, M. and Krapf, R. Metabolic and endocrine effects of metabolic acidosis in humans, Swiss Medical Weekly 2001:131, 127-132, 2001.