

## Vitamin D status, metabolic syndrome and cardiovascular disease

Yi-Jen Hung, M.D.

Tri-Service General Hospital

The worsening worldwide trend toward nutritional insufficiency and the emerging knowledge of the nonhormonal actions of vitamin D and its metabolites have increased interest in the synthesis, metabolism, and action of vitamin D. Current International Osteoporosis Foundation guidelines define vitamin D insufficiency as 25-(OH) D levels < 50 nmol/L (20 ng/ml) and deficiency as levels < 25 nmol/L (10 ng/ml). Vitamin D deficiency is prevalent worldwide, particularly at northern latitudes, because of the low levels of ultraviolet B light in winter at these latitudes. A 2009 study of global vitamin D status found levels < 75 nmol/L prevailed in every region. Levels < 75 nmol/L ranged from 42% in postmenopausal Brazilian women to 92% in postmenopausal women in South Korea. Very deficient levels (25 nmol/L) are most prevalent in South Asia and the Middle East.

Vitamin D deficiency has been linked with hypertension, myocardial infarction, metabolic syndrome and stroke, as well as other cardiovascular-related diseases, such as diabetes, congestive heart failure, peripheral vascular disease, atherosclerosis, and endothelial dysfunction. Several pathways have potential harmful to cardiovascular health, including effects on parathyroid hormone, the renin-angiotensin-aldosterone system, vascular endothelial growth factor and cytokine production, as well as direct effects on endothelial cell function and myocyte calcium influx.

Despite mechanistic and observational data that suggest a protective role for vitamin D in cardiovascular disease, intervention studies to date are less promising. Large trials using cardiovascular events as a primary outcome are needed before vitamin D can be recommended as a therapy for cardiovascular disease.