

## MAU TO PREDICT PROGRESSION OF ATHEROSCLEROSIS

**P**redicting future cardiovascular (CV) events and monitoring the progression of atherosclerosis is no easy task. Stress testing has been used to this effect, but it is relatively imprecise, as it can only detect severe changes on a coronary angiogram. Proteinuria is one way of assessing and measuring the progression of atherosclerosis.

### *Microalbuminuria and CV Events*

Recently, data from multiple sources have suggested microalbuminuria (MAU) could be a predictor of future CV events. MAU is reported in roughly 30% of middle-aged patients with either Type I or Type II diabetes, and in approximately 10% to 15% of middle-aged, non-diabetic patients. MAU is associated with other CV risk factors, notably:

- older age,
- hypertension,
- renal insufficiency,
- obesity, and
- diabetes mellitus.

When blood sugar is ill controlled, there is an accordingly higher protein excretion rate. However, a problem with MAU is that it varies significantly on a day-to-day basis, and associated activity and illness have important implications.<sup>1</sup>

### **About the author ...**

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### *MICRO-HOPE Study Outline*

Albuminuria was measured in 97% of the Heart Outcomes Prevention Evaluation (HOPE) study participants. As part of the Microalbuminuria, Cardiovascular, and Renal Outcomes (MICRO) HOPE substudy, urinary albumin excretion was measured at baseline, 1 year, and study end (4.5 years) by measuring the albumin/creatinine ratio in a first morning urine.<sup>2</sup>

The combined primary end point was the development of myocardial infarction, stroke, or CV death, while total mortality, hospitalization for unstable angina or for congestive heart failure (CHF) were secondary end points.

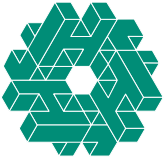
### *Results*

MAU was detected in 32.6% of patients with diabetes, and in 14.8% of patients without diabetes. MAU increased the adjusted relative risk of a major CV event to 1.83, and doubled the all-cause mortality relative risk to 2.09. Hospitalizations for CHF were relatively increased by approximately three-fold (3.32).

The gradient of albuminuria predicted future CV events; for every 0.4 mg/mmol increase in the urinary albumin/creatinine ratio above 0.22 mg/mmol, the adjusted hazard of a major CV event increased by 5.9%.<sup>1</sup> The HOPE investigators concluded that MAU is a strong, independent risk factor for CHF hospitalization, and for all-cause mortality in both diabetic and non-diabetic patients with no prior history of CV events.

The test is relatively inexpensive. It is a simple way to identify individuals at risk for future CV events, and could be targeted in a preventive strategy.

*Cont'd on page 2* →




## *Physician's perspective*

*Conventional cardiac risk factors account for at least 50% of vascular diseases. Although physicians treat many patients to decrease the risk of CV events, we lack the ability to monitor the progression of vascular disease.*

*There are many investigations for the progression of atherosclerosis, but none of the modalities are currently available, or should be recommended for use on a large-scale basis. Recently, the use of electron-beam computed tomography scans and rapid computed tomography scans, which examine coronary circulation microcalcification, has become more widespread. However, these types of scans are costly, and currently available data are not conclusive enough to promote their use. Similarly, nuclear magnetic imaging of the coronary circulation is an emerging modality, but cost is, again, a major limitation. Plaque temperature can be used invasively as a predictor of future CV events, but data supporting its use are limited. Some physicians have advocated the use of brachio-radial reactivity, but this is an*

*oversensitive technique that requires extensive training. Carotid ultrasonography, examining either plaque burden or intimal thickness, is also coming into the scene. The changes in arterial and plaque size, however, are so minuscule, that whether or not this modality can ever be used to monitor the progression of atherosclerosis on a long-term basis is questionable.*

*The MAU test is relatively inexpensive, and can be repeated over time. There is a strong correlation between the degree of protein leak and future CV events; the test can predict the latter more effectively than conventional risk factors. The HOPE study results suggest MAU testing may also be an effective means of monitoring the progression of atherosclerosis over time.* 

### References

1. Gerstein HC, Mann JF, Yi Q, et al: Albuminuria and risk of cardiovascular events, death, and heart failure in diabetic and nondiabetic individuals. *JAMA* 2001; 286(4):421-6.
2. Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: Results of the HOPE study and MICRO-HOPE substudy; Heart Outcomes Prevention Evaluation Study Investigators. *Lancet* 2000; 355(9200):253-9.

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