relevant since all available highly technological methods may be employed[9]. In general, several studies, including the one from Blanc and co-workers, have clearly shown that effective care delivery can be difficult, while a significant percentage of patients with syncope are still discharged from hospital without a diagnosis. Consequently, a cost-effective management of syncope should rely upon the implementation of specific clinical guidelines, such as those recently developed by the Task Force on Syncope of the European Society of Cardiology[10], in order to avoid erratic clinical behaviour.

The effectiveness of an approach guided by clinical algorithms has already been shown in the recently published OESIL-2 study[11]. In this multicentre trial a simplified two-step diagnostic algorithm was developed and implemented in nine community-based hospitals of the Lazio region of Italy, in order to improve the diagnostic performance of the practicing physicians, thereby reducing the number of undiagnosed cases. The systematic implementation of such a simple diagnostic strategy resulted in a striking reduction of undiagnosed cases (the percentage of undiagnosed patients decreased from about 50% to 17.5%). Further studies are needed to define which specific clinical approach may be effective in reducing the number of syncope patients remaining undiagnosed despite an appropriate work-up.

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A step further in inter-institutional agreement in interpretation of dobutamine stress echocardiograms

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Recent past

Dobutamine stress echocardiography has emerged as a useful non-invasive test for the diagnosis of coronary artery disease in patients with chest pain, especially those who are unable to exercise[11]. Chest pain, which may or may not signify ischaemic heart disease, is extremely common and the prevalence and significance of ischaemic heart disease makes its recognition of great importance to physicians and patients. With the increasing population of elderly and those with concomitant disease, a large number of patients are unable to perform adequate
exercise testing, mainly because of deconditioning or neurological, respiratory, peripheral vascular or orthopaedic limitations.

Dobutamine stress echocardiography has also been used for risk stratification in patients undergoing non-cardiac surgery[2] early after myocardial infarction[3], in patients with stable angina[4,5] and in patients with unstable angina who remain asymptomatic for at least 48 h[6]. It has also been successfully used for detection of myocardial viability[7]. In addition, dobutamine-atropine stress echocardiography is attractive in terms of health care costs.

Although clinically useful in its present form, a major limitation of dobutamine stress echocardiography study is the subjective visual interpretation of endocardial motion and wall thickening, which is only semiquantitative. Adequate training is mandatory to distinguish between segmental thickening and passive motion due to heart translation or tethering by adjacent normal segments. A previous report showed low inter-institutional observer agreement in the interpretation of dobutamine stress echocardiography, illustrating the low reliability of dobutamine stress echocardiography at that time[8].

Inter-institutional observer agreement in the interpretation of dobutamine stress echocardiography for the diagnosis of angiographic coronary artery disease

In this issue, an experienced group of investigators report that harmonic imaging in combination with standardized digital image processing and uniform reading criteria improve inter-institutional observer agreement in the interpretation of dobutamine stress echocardiography[9] compared with a previous report performed by the same group of investigators some years ago[10]. However, the agreement between experienced observers is only moderate and remains disappointing despite the improvement: kappa value 0.55, the variation between centres in the interpretation of dobutamine stress echocardiography as positive was significant for harmonic as well as fundamental imaging, and complete agreement on dobutamine stress echocardiography as being positive or negative was obtained in 45% of cases.

Several facts emerged. There was a trend toward lower sensitivity and agreement for patients with lower endocardial visibility. However, this did not reach statistical significance, in contrast with the results reported from the first study on inter-observer variability in the interpretation of dobutamine stress echocardiography[8]. The higher level of endocardial visibility may explain this. Diagnostic accuracy is largely a function of experience and for a given diagnostic accuracy every observer has his own sensitivity and specificity curve. There are readers with high sensitivity and low specificity who aggressively analyse images as abnormal, and readers with low sensitivity and high specificity. These differences exist even between experienced observers and are illustrated in Table 4 of the article to which this editorial refers. The number of patients with three-vessel disease was low, limiting the conclusion on the dependency of reader agreement on severity of coronary artery disease. Seventy four percent of the population were men, and thus, special consideration of this test is needed for women.

Differences in interpretation are limitations in most diagnostic techniques. Low levels of inter-observer agreement have also been reported for exercise electrocardiography[11], myocardial perfusion imaging[12] and coronary angiography[13]. Limitations of other non-invasive tests include low sensitivity (exercise electrocardiography) and specificity rates (exercise thallium scintigraphy and dipyridamole thallium scintigraphy).

How to improve inter-observer variability today?

Although modern echocardiographic technology was used in this valuable study, subjective interpretation of dobutamine stress echocardiography remains a problem. Patients with suspected coronary artery disease scheduled to undergo coronary angiography were included in the study. A pre-test likelihood of coronary artery disease was unknown to the observers, but has to be taken into account in the day-to-day interpretation of dobutamine stress echocardiography. Joint reading sessions with several observers in each centre are recommended.

The conventional criteria for positivity of dobutamine stress echocardiography is an increase in score from rest to stress in at least one segment. During stress echo, wall motion abnormalities that cover a wide area and are severe mean greater ischaemia certainty. Deterioration in wall motion by one grade in one segment gave a positive predictive value of 85% compared with angiographic findings[14]. If the deterioration by one grade occurred in two or more segments the positive predictive value was 90%, it was 94% for three or four segments. Deterioration of wall motion by two grades in one segment had a positive predictive value of 96%. Thus, the degree of positivity

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should be reported in addition to the classification of a test as positive or negative. However, we are still left with the difficult problem of a minimally positive test.

Finally, left ventricular opacification is now routinely used in the stress echo laboratory to enhance endocardial border delineation during harmonic imaging and to improve diagnostic interpretation.

How to improve inter-observer variability tomorrow?

Recent techniques allowing objective quantitative analysis of wall motion have the potential to decrease inter-observer variability and increase inter-institutional agreement: tissue Doppler echocardiography, colour kinesis and myocardial contrast echocardiography for myocardial perfusion assessment. Tissue Doppler echocardiography allows direct measurement of myocardial velocity in real time as an objective assessment of left ventricular wall motion. This technique provides additional quantitative information compared with conventional echocardiography. However, optimal parameters are yet to be defined for dobutamine stress echocardiography. Promising results have been reported using peak systolic myocardial velocity measured on spectral pulsed wave Doppler traces obtained from the post processing of a high frame rate cineloop of a cardiac cycle[15], and using early systolic myocardial velocity gradients across the thickness of each segment[16].

This latter image processing method is relatively independent of the frame rate. Transmyocardial velocity gradient is an indicator of regional myocardial function separate from the translation motion of the heart and gives information similar to strain rate imaging.

Colour kinesis is an alternative approach that colour encodes endocardial motion online, relying on border detection using acoustic quantification. Although favourable results have been reported, suboptimal image quality remains a significant limitation. Myocardial contrast echocardiography for myocardial perfusion assessment during stress is promising because a perfusion abnormality would be expected to occur before a regional wall motion abnormality during the ischaemic cascade. At the present time, off-line image analysis is mandatory and only a limited number of centres have gained expertise in the use of these techniques at rest and during stress. Further standardization of the methodology used to perform these studies must be established.

In addition, inter-observer agreement will increase as technology improves image quality and provides dedicated automatic software for image analysis.

Conclusion

Dobutamine stress echocardiography is a safe, cost-effective non-exercise-dependent stress modality that provides diagnostic and prognostic information on myocardial ischaemia and viability. This stress modality is of great value for patients with limited exercise capacity and contraindications to dipyridamole or adenosine stress. It remains, however, an operator-dependent technique. Quantification of regional wall motion abnormalities may reduce the expertise needed for interpretation of dobutamine stress echocardiography and improve the inter-institutional observer agreement.

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Towards prevention, and not just postponement, of atherosclerotic disease

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For the last 30 years, the number of men and women developing coronary heart disease for the first time has been declining gradually in most western countries[1–3]. These countries have begun to enter the so-called fourth and, we hope, final transitional stage of the cardiovascular (and ischaemic heart) disease epidemic. This fourth stage follows the third transitional phase, the age of degenerative and man-made diseases, where unhealthy lifestyles including reduced physical activity promote the early development of clinically manifest atherosclerotic disease. The subsequent fourth stage is the result of the recognition that atherosclerotic disease is caused by a combination of known risk factors amenable to modification. In this final phase of the epidemic then, human beings and society are acting so as to reduce the magnitude and influence of these modifiable risk factors, with the result that the number of men and women developing heart disease will decrease to below 50%. While this description is adequate for many countries, this scenario is, unfortunately, too rosy for all European countries, in particular for those located in central and eastern parts of Europe, where average life expectancy is low, and where atherosclerotic disease accounts for more than 50% of all deaths.

The observed decrease in coronary heart disease incidence that has been observed in many countries has, so far, been documented mainly in younger and middle-aged men and women. The MONICA study, for instance, in which trends and determinants of atherosclerotic disease were studied in 37 regions of the world, and in which significant reductions in coronary heart incidence and mortality were documented, was limited to men and women aged between 35 and 65 years of age[4,5]. Relatively little is known about the changes in heart disease incidence in elderly people. From observations in our daily clinical practice, most of us believe that the overall number of patients that we treat is on the rise. It is our impression that efforts to curb the development of coronary heart disease in the early stage of our patients’ lives merely delays its onset to a more advanced age. We are not preventing coronary heart disease, but we are postponing its earliest clinical sequelae. In a recent issue of the journal, new and interesting data are presented that shed additional light on this subject and are a cause for cautious optimism. In issue 23/5 of the journal, Kesteloot and colleagues depict and explain recent changes in cardiovascular, other and total mortality in elderly men and women[6]. The authors describe patterns of mortality from 1970 to 1996, based on WHO countrywide age-standardized mortality data. Most interestingly, they focused their analysis on men and women of 75–85 years of age. Data from 35 countries were analysed, including the regions of Northern America, Western and Eastern Europe, Australia, New Zealand and Japan. Mortality rates were calculated for all-causes, cardiovascular (total cardiovascular death rate including ischaemic heart disease and stroke) and remaining (including cancer) mortality. Significant differences for all causes of mortality were apparent between countries. Mortality was lowest in Japan, France and Canada, and highest in the Ukraine, the Russian Federation and the CSSR. Total cardiovascular mortality was less than 50% of the total death toll in most Western and