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EDITORIAL

Heart Rate as Marker of Cardiovascular Risk : The New Kid on the Block

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A considerable number of observational studies showed faster heart rates to be associated with cardiovascular morbidity and mortality. Several questions regarding the significance of a resting heart rate as marker of cardiovascular risk are still obscure. The inclusion of this variable in the list of cardiovascular risk factors is still unclear.

Background: The association between tachycardia and heart disease was observed since over 60 years, subjects with resting tachycardia were found to have more tendency to become hypertensive (1).

Over 40 subsequent studies (including Framingham) showed that tachycardia independently predicts cardiac and total mortality (2-5).

This association between tachycardia and cardiovascular events:

- Is present at all ages and even over 70 years (2),
- occurs with and without cardiovascular complications (2,4,6-8) and,
- is independent of other risk factors for the atherosclerosis.

Nevertheless, some unaddressed questions (Table 1) prevent including tachycardia among other cardiovascular risk factors. A recently published Consensus Document of the European Society of Hypertension (9) provides a good description of the current situation.

Is tachycardia an Independent Risk Factor?

The resting heart rate correlates with blood pressure, body weight, triglycerides, insulin, and glucose levels, raising doubt that the ability of this variable to predict events is – at least in part – dependent on other well known cardiovascular risk factors.

However, two recent surveys showed an association between heart rate sudden death and acute coronary events that remained significant after adjustment for age, body mass index, smoking, blood pressure, lipid profile, diabetes and history of cardiovascular disease (10-11). In these studies the predictive power of heart rate for fatal events was :

- Often greater than that of hypertension and/or hypercholesterolemia (12),
- manifest in patients with ischemic heart disease, heart failure, hypertension and diabetes (12).

Two issues related to the prognostic significance of tachycardia remain to be solved. The first is lack of information on a cut-off normality value for heart rate and definition of a resting tachycardia. The second is the threshold heart rate at which the risk starts to increase.

Pathogenesis:

Several explanations were given to the relationship between tachycardia and cardiovascular risk. Two of them have been confirmed by experimental and clinical studies.

The first is that the heart rate represents an overall index of autonomic function; tachycardia is – thus – a marker of adrenergic overdrive, which – particularly with ischemia, hypertrophy or heart failure – is proarrhythmic and increases the risk of sudden death (13).

The second explanation says that tachycardia increases shear stress, impairs arterial compliance and thus favors the development of atherosclerosis.

Therapeutic Implications:

The evidence so far imply that lowering heart rate should have a favorable prognostic relevance.

However, all data on the clinical impact of a pharmacologically-induced heart rate reduction is retrospective and used drugs that have other effects besides modulating the heart rate.

Benefits in terms of prognosis of reducing heart rate by drugs are limited to myocardial infarction and heart failure, two conditions in which beta-blockers were shown to reduce mortality (9,12).

No study so far addressed this issue in hypertension and thus no evidence is available on the benefits of the heart rate reduction in this condition.

In making practical recommendations, Consensus Document of the European Society of Hypertension suggests that, despite the lack of conclusive data, “heart rate reduction by antihypertensive agents may have beneficial effects”(9). This latter part of the statement is not based on sufficiently strong data. As already mentioned, it is strongly recommended to reduce tachycardia in the post-myocardial phase and in heart failure patients.

Heart rate and cardiovascular risk: unresolved issues

- Are data on prognostic importance of heart rate consistent?
- Does evidence pertain only to hypertensive or to the general population?
- Is it really an independent risk factor?
- Are all cardiovascular event types involved?
- Do data hold for both genders / all ages / all ethnic groups / all comorbidities, etc?
- Can the contribution of heart rate to risk be quantified? Is it linear?
- How should heart rate be measured?
- Is there evidence of benefit independently related to heart rate reduction?

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REFERENCES

1. Levy RL, White PD, Stroud WD, et al. Transient tachycardia: Prognostic significance alone and in association with transient hypertension. *JAMA* 1945; 129:585-8.
2. Kannel WB, Kannel C, Paffenbarger Jr RS, et al. Heart rate and cardiovascular mortality: The Framingham study. *Am Heart J* 1987; 113(6):1489-94.
3. Dyer AR, Persky V, Stamler J. Heart rate as a prognostic factor for coronary heart disease and mortality: Findings in three Chicago epidemiologic studies. *Am J Epidemiol* 1980; 112(6):736-49.
4. Gillman MW, Kannel WB, Belanger A, et al. Influence of heart rate on mortality among persons with hypertension: The Framingham Study. *Am Heart J* 1993; 125(4):1148-54.
5. Gillum RF, Makuc DM, Feldman JJ. Pulse rate, coronary heart disease, and death: The. *Am Heart J* 1991; 121(1 I):172-7.
6. Palatini P, Thijs L, Staessen JA, et al. Predictive value of clinic and ambulatory heart rate for mortality in elderly subjects with systolic hypertension. *Arch Intern Med* 2002; 162(20):2313-21.
7. Diaz A, Bourassa MG, Guertin M C, et al. Long-term prognostic value of resting heart rate in patients with suspected or proven coronary artery disease. *Eur Heart J* 2005; 26(10):967-74.
8. Chang M, Havlik RJ, Corti M C, et al. Relation of heart rate at rest and mortality in the Women's Health and Aging Study. *Am J Cardiol* 2003; 92(11):1294-9.
9. Palatini P, Benetos A, Grassi G, et al. Identification and management of the hypertensive patient with elevated heart rate: Statement of a European Society of Hypertension Consensus Meeting. *J Hypertens* 2006; 24(4):603-10.
10. Greenland P, Daviglius ML, Dyer AR, et al. Resting heart rate is a risk factor for cardiovascular and noncardiovascular mortality: The Chicago Heart Association Detection Project in Industry. *Am J Epidemiol* 1999; 149(9):853-62.
11. Jouven X, Desnos M, Guerot C, et al. Predicting sudden death in the population: the Paris Prospective Study I. *Circulation* 1999; 99(15):1978-83.
12. Palatini P, Julius S. Heart rate and the cardiovascular risk. *J Hypertens* 1997; 15(1):3-17.
13. Grassi G, Vailati S, Bertinieri G, et al. Heart rate as marker of sympathetic activity. *J Hypertens* 1998; 16(11):1635-9.
14. Sega R, Facchetti R, Bombelli M, et al. Prognostic value of ambulatory and home blood pressures compared with office blood pressure in the general population: follow-up results from the Pressioni Arteriose Monitorate e Loro Associazioni (PAMELA) study. *Circulation* 2005; 111(14):1777-83.