RESUME

HOW TO USE COMPUTER ANALYSIS OF HEART RATE IN SPORT
Prof. Dr. Sv. Danev doct. med. sc., NIHPZ-Med. Acad. Sofia

Computer analysis of heart rate variability becomes recently a very useful tool for assessment of the common and special functional stage in professional and amateur sport activity. This method was developed by us for the needs of work, sport and transport psychophysiological investigations. The hardware of the method represents a module converting the ECG signal to cardiointervals, operating with PC Apple-2, IBM-AT (resp. XT) or any other type of PC. The software includes a complex of computer programs allowing to elicit more than forty different HRV parameters, including the distribution of the R-R intervals; power frequency spectrum; cardiogram; scattergram etc. It is possible to elicit all contained in the HRV information by means of a single digit named classification index (CI). It is obtained by singular decomposition in the space of Karunen-Loew (classification with linear discrimination function). Two classes were used to adjust a numerical scale with different values: -100 arbitrary units for persons with "bad" functional state, and +100 a.u. for normals. The method has been verified by means of parallel follow-up of a wide range of additional physiological, psychological, biochemical and clinical investigations. The whole diagnostic system consists in: a module (hardware) to be inserted in the PC with no more specialist aid; standard ECG electrodes; a soft minidisk containing the computer program and a nomogram, which matches the specific values of CI with the corresponding sub-scales of the ongoing functional stage. Our 10-years experience in assessment of the level of training in pre and post competition period as well as in doping control by means of the method will be discussed.
METHODE D'ORDINATEUR POUR DETERMINER L'ETAT FONCTIONNEL DES INDIVIDUS SAINS ET MALADES

Le méthode comprend une analyse d'ordinateur de l'information contenue dans le rythme cardiaque. Elle a été crée par nous pendant les années 50 lors de mon séjour de plusieurs années en Prague et Laide. Par la suite, cette méthode a été développée jusqu'au bout en Hollande, USA, Angletre et Allemagne. Ces derniers temps, elle est très populaire en Union soviétique.

La méthode est basée sur le phénomène physiologique bien éclairé suivant: chez des personnes dont les réserves d'adaptation sont diminuées, la fréquence de pouls augmente; la déviation standard diminue; la distribution de fréquence des cardiointervales devient plus organisée et le mode se déplace à gauche de l'abside; l'amplitude de la mode augmente en nombre et en pourcentage par rapport à l'extra-it général des cardiointervales; la part lentement ondulée dans le spectre de fréquence du rythme cardiaque augmente quant à l'amplitude et la puissance spectrale; la fonction d'autocorrélation a tendance à la baisse; le skatogramme/le nuage de corrélation est plus dense et situé plus près du début du système de coordination.

Le degré d'expression de ces changements statistique est utilisé pour diagnostiquer plus objectivement l'état fonctionnel, pendant un enregistrement de 15 min. du signal ECG et son usinage statistique à l'aide du paquet spécialiste de produits descriptifs destinés à pour le travail avec d'ordinateurs de toutes les classes. Tout une multitude d'index, d'indices et de monogrammes, prouvés dans la pratique ont été créés. Un moyen d'indiquer que chaque personne, nouvellement examinée peut être classifiée d'après la continue "sante-maladie" par seule valeur numérique, nommé "classification index"/CIF/.

Le système propose peut être utilisé par des personnes sans une instruction médicale pour les besoins du contrôle de tous les jours et par mois sur leur propre état de santé. Le système est très utile pour le contrôle sur le degré de narcose lors d'une intervention chirurgicale; pour un diagnostic précoce de l'hypertension, du diabète, des processus néoplasiques et des autres maladies somatiques qui ont une influence sur le statut somatique général. Il est prouvé comme tres efficace dans la médecine cosmique/pour les besoins de la sélection préliminaire; dans le sport/pour diagnostiquer l'effet physiologique du dopage; dans le médecine de transport et de travail/pour apprécier le degré de fatigue et de surmenage; dans la pratique médicale-militaire/pour établir l'aptitude physique générale/etc.

L'utilisation du système est très réussi; pendant les examen prophylactiques de la population/pour le contrôle de l'état de santé chez des personnes des groupes de risque etc.

Les résultats obtenus lors de cette méthode ont l'avantage de représenter l'état d'adaptation générale et ressources physiologiques de l'organisme tout entier; la découverte precoce du déséquilibre physiologique; le lien corrélatif avec un grand nombre de dimensions psychologiques comme la névrose, la depression, l'asténie psychique etc.
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de même qu'avec plusieurs indices cliniques et paracliniques, ces derniers ne se manifestant pres si tot.
Outre chez des personnes en repos, la méthode est utilisée pour caractériser l'activité des différents étages du centre cardiaque pendant un chargement physique dose pour le dépistage des troubles du rythme de l'activité cardiaque, etc.

La continuité de l'enregistrement varie de quelques secondes à quelques heures.
La manipulation avec le système est facile, accessible et rapide.
Toutes les exigences quant à la sûreté électrique sont observées par la division galvanique entre l'individus et l'ordinateur.

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![Graph](image-url)