

## Influence of Low-Rate Respiration on Human R-R Interval Power Spectra

Roman Cobiletchi

Academic adviser: Andrei Ganenco, M.D., Vicor Vovc, M.D., Ph.D., Professor  
State Medical and Pharmaceutical University "Nicolae Testemitanu", Chisinau, Republic of Moldova

Influence of respiration on human R-R interval power spectra was studied using controlled respiration of 6-15 breaths per minute. Our study was designed to test how the influence of lower-rate respiration than 6 breaths per minute could increase Power Spectra of Human R-R interval. Fourteen men and one woman, ages 17-26 years, participated in this study. Before the recording each subject was trained how to breath so as to obtain the necessary results. Measurements. We recorded digital data (ECG and pneumotachogram) using Biopac Student Lab system at respiration rate of 4 and 15 (normal rate of respiration) breaths per minute. Experimental protocol. Subjects remained supine throughout the recording and breathed in the following 6 fixed sequence each of 3 minutes including: 1) Normal respiration; 2) Normal thoracic respiration; 3) Normal abdominal respiration; 4) Low-rate respiration 4 breathes/minute; 5) Low-rate thoracic respiration 4 breathes/minute; 6) Low rate abdominal respiration 4 breathes/minute. Tidal volume was maintained at 1 liter for normal respiration and between 2,2-3 liters for low-rate respiration. Data analysis. Power spectra of human R-R interval was derived using custom program based on Matlab 7.0. There were not recorded major differences on how age or/and weigh influenced power spectra on R-R interval. For men it was much harder to maintain Low-rate thoracic respiration, none of them had better results than woman. Influence of mouthpiece. The Tidal Volume increased by reason of mouthpiece dead space (about 100 ml). This resulted mainly at the start of the registration. Influence of self-awareness. Even if all subjects had a 5 minute training on respiration pattern, breathing errors were recorded, mostly at low-rate thoracic respiration of 4 breathes/minute. No statistically significant differences were present among mean R-R interval in all respiratory tests. Power spectra of R-R interval was significantly greater ( $p < 0.05$ ) at respiratory rate of 4 breaths per minute than at normal rate of 15. Low frequency power spectra of R-R interval (0.06- 0.14Hz) also were significantly greater at low respiratory rate. Types of respiration (usual, mostly thoracic or mostly abdominal) hadn't influenced the R-R interval power spectra. Complains. All of the subjects complained about the breathing through mouthpiece (not being able to breathe in fully and shortness of breath). Respiratory recording methods that require a mouthpiece are known to alter the ventilation. Therefore tidal volume rose. It was noticed more breathing irregularities (sighs and pauses) when self-awareness increased (by reason of noise, move, etc). This also altered respiratory pattern.

## Isothioureic-Benzyturon Derivative with Hypotensive Action

Valeriu Esanu, Diana Popa, Tatiana Chiriac

State Medical and Pharmaceutical University „Nicolae Testemitanu”, Chisinau, Republic of Moldova

Benzyturon substance was used in the experimental study in dose of 2 mg/kg dissolved in 1,5 ml fiziological solution, which was administrated intravenously to 11 normotensive cats, with weight 2-4 kg, anesthesiated with urethane solution of 30% (1g/kg), administrated intraperitoneal, and subsequent with monitorization of blood pressure, the frequency of heart contraction and breath, at different intervals of time during 7hours. Initially, the blood pressure was 135 mmHg, the frequency of heart contractions (FHC) -157,2 beats/minute, breathe -96,9 breaths/minute. After administration of benzyturon substance the level of blood pressure was reduced and frequency of heart contractions compensatory increased. The results after administration of medication at various time intervals were the following: on 2 minutes with -7,1% and +9,6%; on 15 minutes with -10,3 and +20,2%; on 30

minutes with -17,1% and +19,1%; on 60 minutes with -21,8% and +18,7%; on 120-240 minutes, reduced blood pressure was stable with -29,4 and the frequency of heart contraction remain in initial limits; at 300-360 minutes was found a maximum hypotensive effect of -38,9%, return to the initial level to the 6<sup>th</sup> hours the same FHC. Breath initially shows a tendency to tachypnea to over 30 minutes, which reaches over 2 hours the initial fissures following that and then to shrink over 5 hours till the minut values (54,7 +/- 7,6 compared with 96,6 +/- 7,8;  $1 < 0,05$ ). Isothioureic-benzyturon derivative shows marked hypotensive action, slow and long with maximum effect and stable between 2-7 hours after administration, with a moderate reflectory tachycardia.

## Prospects for the Development of Chemotherapeutic Drugs on the Basis of Humic Substances Silt Muds

Yury Zhernov

Academic adviser: Nadezhda Petrovna Avvacumova, M.D. Ph.D.

Samara State Medical University, Center for Hygiene and Epidemiology, Russian Federation

**Purpose:** Study of the influence of drugs peloid humic series and their derivatives on various types of microorganisms, as a promising basis for the development of chemotherapeutic drugs. **Materials and methods:** We investigated the various fractions of humic substances low mineralized silt sulphide muds (peloids) lake Molochka sanatorium "Sergievsk mineral water": hymatomelan [HMA], fulvic [FA], humic [HA] and humus [HsA] acid (concentrations 0,25%, 0,1%, 0,01%). We investigated the chelate complexes of humic substances peloids with ions of mercury (II), silver ions, iron ions (II), zinc ions in the same concentrations. To determine the antimicrobial activity of substances was used the test-cultures of microorganisms: 1) Gram-negative bacteria - *Escherichia coli* (ATCC 25922), *Pseudomonas aeruginosa* (ATCC 27853). 2) Gram-positive bacteria - *Staphylococcus aureus* (ATCC 25293), *Bacillus subtilis* (ATCC 6633). 3) Yeast-like fungi - *Candida utilis* (LIA-01). Antimicrobial activity of peloids preparations was determined by their diffusion in Mueller-Hinton agar, which was carried out payment of the investigated test-culture. Active component of the derivatives of humic substances is a metal cation. Options humic components: 1. Masking bactericidal component; 2. Tropism drug to microorganisms; 3. Increased permeability through biological membranes; 4. Reducing the toxic effect of metals on macro-organisms. The results showed that hymatomelan, fulvic, humic, humus acid peloids not have lytic activity against the studied microorganisms. But often a static activity to an increase in *E. coli*, *Ps. aeruginosa*, that is, all that we have studied Gram-positive microorganisms. Stimulate the growth of the investigated Gram-positive microorganisms - *St. aureus*, *B. Subtilis* with respect to the control. Also show catalytic activity to the growth of *C. albicans* at concentrations of less than 0.1%, and no effect at concentrations more than 0.1%. All investigated chelate complexes of humic substances with ions of mercury (II), silver ions, iron ions (II), zinc ions in all investigated concentrations exhibit lytic activity against the test-cultures of microorganisms. The lowest antimicrobial activity among the studied peloids preparations showed fulvic acid chelate complexes with ions of zinc and iron (II) - a zone of suppression of microbial growth less than 9 mm. The greatest antimicrobial effect of chelate complexes have 0,25% of humic substances: *E. coli* (zone growth suppression  $20 \pm 0,1$ mm) -  $HsA * Hg^{2+}$ ; *Ps. aeruginosa* ( $20 \pm 0,1$ mm) -  $HA * Ag^{+}$ ; *St. aureus* ( $24 \pm 0,1$ mm) -  $HA * Hg^{2+}$ ; *B. subtilis* ( $16 \pm 0,1$ mm) - chelate complexes of humic substances \*  $Ag^{+}$ ; *C. utilis* ( $25 \pm 0,1$ mm) -  $HA * Ag^{+}$ . The results characterize several humic preparations and their chelate complexes, as the optimum components for further elaboration on their basis of chemotherapeutic drugs of natural origin.