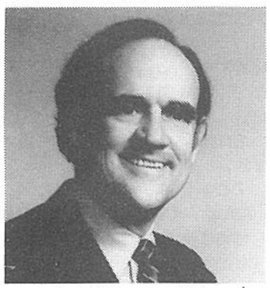
"Effect of EDTA Chelation and Supportive Multivitamin/Trace Mineral Supplementation with and without Physical Activity on the Heart Rate"

Emanuel Cheraskin M.D., D.M.D., Doug G. Wussow, Edward W. McDonagh, D.O., F.A.C.G.P. and Charles J. Rudolph, Jr. Ph.D., D.O.[1]

Emanuel Cheraskin, M.D., D.M.D., Professor Emeritus, University of Alabama, Birmingham, has published hundreds of articles and authored or contributed to numerous books, including Psychodietetics, Diet and Disease, Predictive Medicine and The Vitamin C Connection; Bibliography in Two Thousand Men of Achievement.



Edward W. McDonagh, D.O., F.A.C.G.P. attended La Salle College, Temple University and Kansas City College of Osteopathy & Surgery. He is founding member of the International Academy of Preventive Medicine; Advisory Board Secretary of the American Academy of Medical Preventics; President of Board of Directors and Chief of Staff at Doctors Hospital; Fellow in the American College of General Practitioners and a member of the Missouri State Association for Osteopathic Physicians and Surgeons, Western Missouri Association for Osteopathic Physicians, American Osteopathic Association, and the Internatinal Foundation for Preventive Medicine.

D.G. Wussow, graduated from Saint Cloud State University, Minnesota and received his Masters degree in cardiac rehabilitation from the University of Wisconsin, La Crosse. He is the Director of the Midwest Cardiac Center at the McDonagh Medical Center.

Charles J. Rudolph, Jr., Ph.D., D.O. is a Doctor of Philosophy and Doctor of Osteopathy. He specializes in labaoratory medicine; trace mineral analysis and metabolism, allergies and ecological medicine; nutrition and metabolic medicine.

He has received the Campbell Soup Fellowship; American Oil Chemists Society Honored Student Award; Graduate Excellence Award; Graduated Summa Cum-laude, Ph.D.; Phil Lambda Upsilon, honorary chemical society; Phi Kappa Phi, honor society; Outstanding basic science teacher, Texas College of Osteopathic Medicine; and Who's Who in American Colleges and Universities.

ABSTRACT

It is well-known that an aerobic exercise program will alter heart rate favorably, meaning there will be a reduction. What has not been appreciated is that similar results can be accomplised by EDTA chelation therapy with multivitamin/trace mineral support.

INTRODUCTION

The following four items serve as an excellent introduction to and justification for this report. First, the evidence is abundant that cardiovascular pathosis is now of epidemic proportions. Second, the salutory effects of physical activity upon cardiovascular function in health and sickness are becoming rapidly and increasingly more apparent. Third, what is also becoming more clear is that exercise, like all other treatment modalities, has its limitations. Fourth, finally, and not too well appreciated and, therefore, more controversial, is the

1 McDonagh Medical Center, Inc., 2800 Kendallwood Parkway, Gladstone, MO 64119, U.S.A.

possibility of utilizing EDTA chelation as an effective cardiotherapeutic tool.

This is the first in a series of articles designed to cast additional light on the overall relationship of physical activity, and chelation therapy with multivitamin/trace mineral support in the management of cardiovascular syndromes by answering the following three questions:

1. What are the posttherapy effects of EDTA chelation upon submaximal heart rate:
2. What are the posttherapy effects of EDTA chelation plus an aerobic exercise program on submaximal heart rate?
3. What are the philosophic and clinical conclusions which can be derived?

REVIEW OF THE LITERATURE

One variable which is frequently employed to assess cardiovascular fitness is an individual's heart rate response to physical activity. There is general agreement that physical training in humans and lower animals will eventuate in lower heart rate at submaximal work loads (Ahlborg, Bergstrom, Ekelund, & Hullman, 1967; Hanson & Tabakin, 1965; Hartley, Ormby, Kilburn, Nilson, Astrand, Byrne, Ekblom, & Saltin, 1969; Kavanaugh, Kertala, & Muscala, 1957; Steinhouse, 1933; Tripton, Casey, Easten, & Erichsen, 1974). For example, Skinner (1970) stated, "that at any given submaximal workload following training, the heart rate (oxygen cost) is lower, and thus, causes less myocardial stress".

The slowing of the heart rate following an exercise program appears to be associated with an increase in stroke volume to maintain cardiac output, especially at higher workloads. Stroke volume can be increased by cardiac dilatation and hypertrophy, by augmented cardiac contractility or by their combination. Cardiac dilatation and hypertrophy have been reported following an endurance training program (Ekblom, 1969). Cardiac contractility has also been shown to increase subsequent to an exercise training series (Mole & Robb, 1973).

Other possible explanations for heart rate reduction with exercise include autonomic control (circulating catecholamines) or a possible change in the integrating ability of the central nervous system.

What is especially noteworthy and relevant here is that no studies have been identified which report on the effect of EDTA and/or multivitamin/trace mineral supplementation upon the heart rate response to submaximal work.

In short, it is commonly accepted that, following an exercise training program, heart rate will be lower. This functional bradycardia is usually mediated through an increase in both cardiac dilatation and hypertrophy as well as an increase in cardiac contractility. Parenthetic mention should be made that parasympathetic stimulation may also play a role in the heart rate decrement.

METHOD OF INVESTIGATION

Fifty routine patients participated in this experiment. The subjects were divided into two groups: exercisers and nonexercisers. Exercisers participated in at least three exercise sessions per week: each session a minimum of 20 minutes in duration and this was maintained throughout the course of treatment. The exercise sessions consisted of continuous activity such as walking, rowing and/or cycling at 70% to 85% of the subject's maximal heart rate.

All participants had either a medically-established history of cardiac problems or were considered cardiac-prone based on family history, elevated blood pressure, and/or obesity. All subjects underwent two maximal multistage stress tests on a motor-driven treadmill. One test was administered prior to the onset of the treatment program. The protocols employed for the maximal tests were varied based on the age and work capacity of the patient. Most subjects underwent a standard Bruce test, but on certain individuals a modified Bruce, Naughton or Ellstad test was performed. All subjects underwent the same protocol on both their pre- and post-test.

Heart rate, blood pressure, and S-T segment depression on a standard 12-lead EKG were recorded at the end of each stage. End points of the maximal tests were either reported angina, 2 mm S-T segment depression, systolic blood pressure greater than 250 mmHg, a diastolic blood pressure greater than 110 mmHg, or a patient request to stop the testing prcedure. All participants were verbally encouraged to achieve their highest possible work loads. All tests were administered by the same individual.

The treatment program for all subjects consisted of infusions of EDTA (chelation) along with supportive multivitamin/trace mineral supplementation approximately 5X to 10X the Recommended Dietary Allowance (RDA) previously reported (McDonagh, Rudolph, & Cheraskin, 1981, April 1982, Spring 1982, Fall/ Winter 1982, Spring/Summer 1982, December 1982).

The patients were compared at each work load throughout the testing event. The heart rate was recorded at the end of each stage and pre- and posttherapy comparisons made. The student t-test was utilized to analyze for differences at each stage. The 5% level of confidence was the delineating point to test for statistical significance.

The general data for this experiment are summarized in Table 1. It is clear that there are no statistically significant differences of the means for age and number of EDTA infusions. The number of days in the two groups is statistically significant.

TABLE 1

general data

	chelation n=27		exercise & chelation n=23		t score
	mean	S.D.	mean	S.D.	
age	61.4	8.6	58.6	9.3	1.68
number of infusions	34.3	10.4	31.2	14.9	1.51
number of days pre- to post-test	239.6	156.2	109.6	88.2	3.68*

*significant differences between the means

RESULTS

Question One: Table 2 summarizes the heart rate finding for the chelation group prior to the onset of therapy and at the end of the treatment regime as determined at all three stages. The findings are clear. At each stage there is a statistically significant decline in heart rate. Second, the decrement increases with the stage (6.2%, 7.2% and 9.0%). Hence, in answer to the first question, it is evident that EDTA chelation plus multivitamin/trace mineral supplementation significantly reduces heart rate at all stages as judged by a graded exercise test technique.

TABLE 2

heart rate response

stage	exercise & chelation (n=23) pre	post	percentage change	t	chelation (n=27) pre	post	percentage change	t
I	97.8 ±16.7	89.3 ±14.5	-8.7%	3.30 P<0.005*	97.2 ±15.8	91.2 ±11.9	-6.2%	2.36 P<0.050*
II	108.9 ±23.9	98.9 ±18.1	-9.2%	3.05 P<0.010*	109.2 ±19.8	101.3 ±16.7	-7.2%	3.43 P<0.005*
III	125.5 ±31.9	114.0 ±23.1	-9.2%	3.57 P<0.005*	127.0 ±24.3	115.5 ±20.8	-9.0%	4.69 P<0.001*

*statistically significant difference of the means

Question Two: Table 2 also summarizes the heart rate finding for the chelation plus exercise group prior to the onset of therapy and at the termination of the treatment regimen as established at all three stages. The findings are clear. At each stage, there is a statistically significant decline in heart rate. Secondly, the decrement increases only slightly with the stage (8.7%, 9.2%, and 9.2%). Thus, in reply to the second question, it is clear that EDTA chelatin with multivitamin/trace mineral support plus exercise significantly reduces heart rate at all stages as judged by a graded exercise test technique.

DISCUSSION

Question Three: The critical question is whether adding physical exercise to the chelation/multivitamin-trace mineral regime makes a significant difference. Table 3 summarizes the results. Utilizing the student t-test, there are no differences, though on a mean basis, there appears to be a slightly greater change when physical activity is incorporated into the regime.

TABLE 3

significance of t scores between groups

	chelation	exercise & chelation	percentage difference	t score
stage I				
pre	97.1	97.3	2.0	0.12
post	91.3	89.3	2.0	0.52
stage II				
pre	109.2	108.9	0.3	0.05
post	101.3	98.9	2.0	0.49
stage III				
pre	127.0	125.5	1.0	0.18
post	115.5	114.0	1.0	0.23

no significant differences at .05 level

It is of interest that there is general agreement that there is a linear relationship between heart rate and incresing work (Figure 1) (Miller & Allen, 1979).

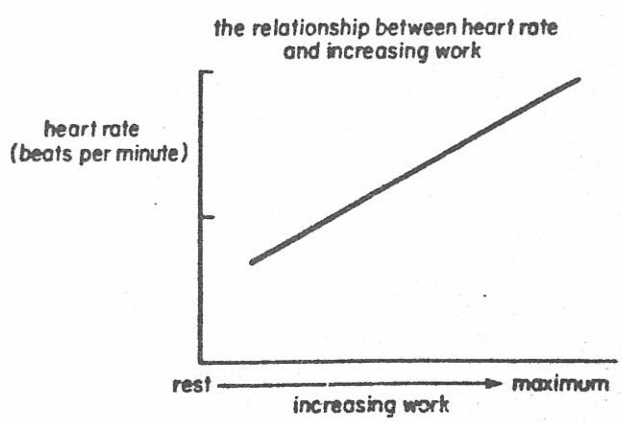


Figure 1

This is also borne in our study (Figure 2).

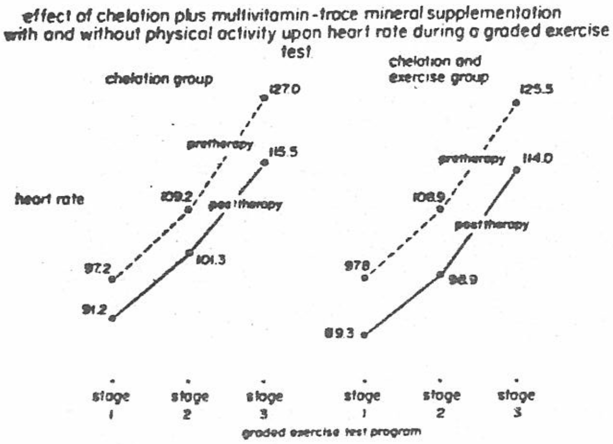


Figure 2

Heart rate during exercise is clearly a measure of cardiovascular fitness. Physical training (exercise) has been shown to reduce heart rate during submaximal work (Ahlborg, Bergstrom, Ekelund, & Hullman, 1967; Hanson & Tabakin, 1965; Hartley, Ormby, Kilburn, Nilson, Astrand, Byrne, Ekblom & Saltin, 1969; Kavanaugh, Kertala, & Muscala, 1957; Steinhouse, 1933; Tripton, Casey, Easten, & Erichsen, 1974). This reduction in heart rate allows the same amount of work to be performed with less cardiac strain or stress. This very fact is highly beneficial to "normal healthy" people, but to a patient with heart problems, this decrease in cardiac strain can be vital.

Surely, it appears from our observations, within the limits of this study, that chelatin therapy with multivitamin/trace mineral support significantly reduces heart rate during submaximal work, a point which, as far as we can ascertain, has never been previously reported. Our work suggests that there is an additional potential mean reduction in submaximal heart rate when an aerobic program is incorporated into the chelation program. However, this increment is not statistically significant in this experiment. Based on previously published literature, one would expect a reduction in heart rate with this type of exercise program. It would appear that EDTA may serve as a useful additional tool in the mangement of certain cardiac syndromes.

While this brief investigation answers some questions, it clearly generates others. One would hope that this report would catalyze interest in pursuing the role of EDTA chelation on other important cardiovascular variables. For one, a report to follow will examine the relative effects of EDTA chelation plus multivitamin/trace mineral therapy upon another barometer of cardiovascular well being, specifically blood pressure (Wussow, Rudolph, McDonagh, & Cheraskin in press).

REFERENCES

Ahlborg, B, Bergstrom, J, Ekelund, LG, and Hullman, E. Muscle glycogen and muscle electrolytes during prolonged physical exercise. Acta Physiol. Scand. 70:#4, 129-142, June 1967.

Ekblom, B. Effect of physical training on oxygen transport system in man. Acta Physiol. Scand. (supple.) 328: #1, 9, April 1969.

Hanson, JS and Tabakin, BS. Comparison of the circulatory response to upright exercise in 25 "normal" men and 9 distance runners. Br. Heart J. 27:#5, 211-219, May 1965.

Hartley, LH, Ormby, G, Kilburn, A, Nilson, NJ, Astrand, I, Byrne, J, Ekblom, B, and Saltin, B. Physical training in sedentary middle-aged and older men. Scand. J. Clin. Lab Invest. 24: #5, 335-344, June 1969.

Kavanaugh, MJ, Kertala, E, and Muscala, O. The effects of training on heart rate. Amer. Med. Exp. Found. 35: #8, 307-315, Spring 1957.

McDonagh, EW, Rudolph, CJ, and Cheraskin, E. Serum cholesterol and the aging process. Med. Hypotheses 7: #6, 685-694, June 1981.

McDonagh, EW, Rudolph, CJ, and Cheraskin, E. The effect of intravenous disodium ethylenediaminetetraacetic acid (EDTA) upon blood cholesterol in a private practice environment. J. Int. Acad. Prevent. Med. 7: #1, 5-12, April 1982.

McDonagh, EW, Rudolph, CJ, and Cheraskin, E. The homeostatic effect of EDTA with supportive multivitamin-trace mineral supplementation upon high-density lipoproteins (HDL). J. Osteopath. Physicians & Surg. Calif. 8: #2, 34, Spring Issue 1982.

McDonagh, EW, Rudolph, CJ, and Cheraskin, E. An oculocerebrovasculometric analysis of the improvement in arterial stenosis following EDTA therapy. J. Holistic Med. 4: #1, 21-23, Spring/Summer 1982.

McDonagh, EW, Rudolph, CJ, and Cheraskin, E. The effect of EDTA salts plus supportive multivitamin-trace mineral supplementation upon renal function: A study in serum creatinine. J. Holistic Med. 4: #2, 146-151, Fall/Winter 1982.

McDonagh, EW, Rudolph, CJ, and Cheraskin, E. The influence on EDTA salts plus multivitamin-trace mineral therapy upon total serum cholesterol/high-density lipoprotein cholesterol. Med. Hypotheses 9: #6, 643-646, December 1982.

Miller, DK and Allen, TE. Fitness, a lifetime commitment. 1979. Minneapolis, Burgess Publishing Company. p. 117.
Mole, PA and Robb, C. Force velocity relations in exercise induced hypertrophied rate heart muscle. Med. Sci. in Sports 5: #1, 69, Spring 1973.
Skinner, J. The cardiovascular system with ageing and exercise. In Brunner, D and Jake, E, ed. Physical activity and aging. 1970. Baltimore, University Park Press. pp. 100-108.
Steinhouse, AH. Chronic effects of exercise. Physiol. Rev. 12: #2, 103- 147, November 1933.
Tripton, CM, Casey, RA, Easten, WC, and Erichsen, HH. A submaximal test for dogs; Evaluation of effects of training, detraining and cage confinement. J. Appl. Physiol. 37: #4, 271-275, May 1974.
Wussow, DG, Rudolph, CJ, McDonagh, EW, and Cheraskin, E. Effect of EDTA chelation and supportive multivitamin/trace mineral supplementation with and without physical activity upon blood pressure. Submitted for publication.

INDEX TO ADVERTISERS