CHAPTER VII

PHYSICAL ACTIVITY AND DIABETES MELLITUS IN THE ELDERLY

Raffaello Molino Lova - Claudio Macchi

VII.1 Aging and diabetes mellitus

Diabetes mellitus is characterized by a pathological increase in the concentration of glucose in the blood. This is due to a relative or absolute lack of insulin or a deficit or total absence of insulin at the tissue. Insulin is a hormone produced and secreted by pancreatic beta cells and is essential for the metabolism of sugars.
Values of glycemia before meals are considered normal to 110 mg / dl; values between 111 and 125 mg / dl define the condition of impaired glycemia before meals; values equal or higher than 126 mg / dl of glycemia before meals define the condition of diabetes mellitus.

There are three main types of diabetes:

1. Type 1 diabetes;
2. Type 2 diabetes;
3. Diabetes in pregnancy.

In 1985 people with diabetes, without distinction of type, were 30 million; in 1995 they were 135 million; in 2001 they were approximately 177 million; in 2030 about 370 million people are supposed to suffer from diabete[1].

Diabetes mellitus type 1 is a multifactorial and polygenic pathology characterized by specific and selective autoimmune destruction of pancreatic beta-cells.

The prevalence of this type of diabetes in Italy seams to be between 0.1 and 0.3%; the incidence is between 6 and 10 cases per 100,000 per year in the age groups from 0 to 14 years, while it is estimated in 6.7 cases per 100,000 per year in the age groups from 15 to 19 years [2].

Diabetes mellitus type 2 is not characterized by an absolute insulin deficiency, but by a relative deficit and a resistance to the action of insulin for a reduced response of the tissues. It is the result of a complex interaction between the genetic profile of the individual and many enviromental factors [3].

Endocrine-metabolic disorder is the most widespread in the world, affecting 5-10% of the population in industrialized countries and representing 90% of all forms of diabetes. It is estimated that over the next 10 years, patients with this type of diabetes in the world will be about 220 milions[4].

The reasons for this increase are to be found in the profound changes in lifestyle which has occurred in recent decades: high-fat diet and low in fiber, physical inactivity and obesity.

The symptoms are represented by polyuria, polydipsia, drowsiness. The complications are the macroangiopathy (involvement of coronary, supra-aortic trunks, abdominal aorta and leg arteries), microangiopathy (renal and retinal involvement)

and neuropathy.The pancreas is a gland mixed in secretion, endocrine (internal secretion) and exogenous (external secretion).

Endocrine function is linked to the production by the islets of Langerhans of four hormones:

1) insulin (beta cells);
2) glucagon (alpha cells);
3) somatostatin (delta cells);
4) pancreatic polypeptide (F cells).

Insulin and glucagon have opposite action:

•The first is anabolic, it increases the reserves of glucose, fatty acids and amino acids;
•The second is catabolic, mobilizing glucose, fatty acids and amino acids from storage and putting them in a circle.

Insulin reduces the concentration of glucose in the blood by inhibiting production in the liver (glycogenolysis and / or gluconeogenesis), facilitating the recruitment and metabolism of glucose in muscle and adipose tissue; it determines the entry of the glucose in the cells and selectively accelerates the entry of that portion of glucose that enters in cells by simple concentration gradient directed inward, at the level of adipocytes inhibits the hydrolysis of stored triglycerides; it stimulates furthermore the protein metabolism by inhibiting protein degradation of muscle proteins.
The lack of insulin causes hyperglycemia as well as increased gluconeogenesis and ketone bodies.
Too much insulin causes hypoglycemia leading to coma, an excess of glucagon causes hyperglycemia.

The table below (Tab.IV) describes the factors that influence the secretion of insulin.

Factors stimulating the secretion	**Factors inhibiting the secretion**
Glucose	Somatostatin
Amino Acids	Insulin
Glucagon	Adrenaline and noradrenaline
Acetylcholine	Hypokalaemia
Intestinal hormones (CCK, GIP, secretin, gastrin)	Drugs: beta blockers, thiazide diuretics
Drugs: beta stimulants, theophylline	

Table I.V

It seems that with age the reduction of hormone production (except for changes caused by menopause) is partly attributable to vascular or degenerative diseases of the neuroendocrine ways of the hypothalamus and the suprachiasmatic nucleus.

The limitation of hormone production is of fundamental importance in physical activity, especially in intense physical activity.

In fact hormones regulate:

- the volumes of the circulating liquid;
- cardiovascular performance in hot environments;
- mobilization of "energetic" substances necessary to repair the body structures by the synthesis of new proteins.

The evidences on the subject are contrasting . There is agreement on reduced insulin secretion, the response delay in its secretion, the decrease in insulin sensitivity (resistance) in the tissues and its reduction in the rate of elimination.

Approximately 20% of men and 30% of women that are 70 years old show abnormal glucose tolerance curves for the most part due to reduced insulin tolerance (for decrease in peripheral insulin sensitivity predominantly at post-receptor level).

The decrease in physical activity, the reduction of body mass for the storage of glycogen, the increase in adiposity and a reduced amount of Chromium in diet may contribute to increase reduced insulin tolerance.

There has also been an increase in sympathetic nerve activity, the slow blood clearance of insulin and the reduction of pancreatic beta-cell response to stimulating and inhibiting hormones. The levels of glucagon are poorly altered in the elderly.

VII.2 Physical activity, exercise and diabetes: didactics guidelines

Normally, the exercise leads firstly to the use of muscle glycogen with release of glucose; once depleted the reserves of glycogen, blood glucose (from the liver glycogen) and fatty acids are used, subsequently the glucose produced in the liver through the gluconogenesi (the use of amino acids, lactate and glycerol) is utilized.

Glucose production is adequate to supply-demand balance and muscle uptake. In the case of high stress the muscle uses glucose cytoplasmic, in moderate stress the use of fatty acids prevails (released from adipose tissue for the decrease of insulin levels and the increase of concentrations of catecholamines).

In the case of intense physical activity energy production by the liver is regulated by catecholamines, whose concentration increases up to 15-20 times. Physical activity increases glucose uptake by muscle independently of insulin (increased amount of transporter proteins).

In diabetic person there are numerous endocrine adaptations, mainly a marked adrenergic stimulation with downward trend of plasma insulin and an increase of catecholamines, cortisol, and glucagon.

The incidence of diabetes is higher in those who do not practice regular physical activity.

It has been demonstrated the effectiveness of the diet (healthy in subjects of normal weight and able to induce a loss of 1 kg per month in the obese) and physical exercise (30 minutes a day of walking or 20 minutes of fast walking or 10 minutes of running) in reducing the onset of new cases of diabetes.

There has been a reduction in the incidence of type 2 diabetes by 31% with diet alone and 46% with exercise. Thereby, improving the lifestyle, including an aerobic exercise of moderate intensity and body weight loss of 5%, may be reduced the incidence of diabetes mellitus type 2.

Intensive lifestyle changing can delay the incidence up to 58% [5,6,7,8].

Cohort studies have confirmed that ongoing and high level physical activity is associated with a significant reduction in cardiovascular and general mortality [3, 5].

In type 2 diabetes, physical exercise against resistance, associated with weight loss, is effective in improving glycemic control and some parameters of metabolic syndrome as well as in preventing the loss of muscle mass. So, mixed programs of aerobic exercise and against resistance give an additional benefit to glycemic control, avoiding some risk factors [9,10,12,13,14,15].

The social and psychological factors have a great impact on physical activity. It is documented that, younger age, a high cultural level, the absence of motivational barriers, a high degree of perceived health and performance expectations, correlate with the degree of practiced physical activity [16].

Physical activity counteracts the insulin resistance that can be observed in inactivity and insulinemia is reduced at the same blood glucose levels. The exercise also induces insulin affinity changes in skeletal muscle receptors and in the amount of glucose and amino acids taken from the cell (cytoplasmic metabolic disorders).

In not controlled type 2 diabetes, physical exercise produces a further rise in blood sugar, fatty acid and ketone bodies in plasma (gluconeogenesis, glycogenolysis, decreased glucose utilization).

When it is controlled by appropriate insulin therapy, physical exercise usually provokes hypoglycemia and hyperinsulinemia (increased insulin action at the tissue, acceleration of the insulin absorption), which may require the intake of carbohydrates or reduction of insulin dose.

In type 2 diabetes aerobic physical exercise of moderate intensity reduces blood sugar levels (increased glucose transport across the cell membrane and increased insulin sensitivity), often accompanied by a reduction of the associated obesity.

In the elderly, of course, grade and extent of the effort, for the same activity, are different: for example, the same effort that provokes in a 50 years old person a consumption of 420Kcal / h (7 MET) in a 80 years old person can mean the use of 180 Kcal / h (3 METs).

Before starting a physical activity of intensity higher than a fast walk is necessary to exclude conditions of high cardiovascular risk (in particular, uncontrolled hypertension) and the presence of complications that contraindicate the practice of certain exercises for the high risk of evolution of the disease (severe vegetative

neuropathy, severe peripheral neuropathy, retinopathy, pre-proliferative or proliferative and macular edema).

For the adult and elderly diabetic person in good metabolic balance (with proper insulin dose if suffered from diabetes type I °) there are not contraindications to physical activity, but before starting any type of activity should be diagnostically excluded the frequent neurological and cardiovascular implications [17].

In this regard, the following controls are recommended:

• resting ECG and exercise ECG (or ECO-stress test or myocardial perfusion to dipyridamole);

• study of the retina (proliferative retinopathy predisposes to retinal hemorrhages under stress);

•cardiac and of supra-aortic trucks echocolordoppler;

• arterial doppler of the lower limbs;

• blood sugar split before, during and after physical activity at the beginning of the program (to avoid dangerous hypoglycemia), possibly by changing diet and insulin dosage or oral agents (in patients who use it);

• assessment of the sensitivity (neuropathy, and thereby reduce sensitivity to pain, may lead to lately recognize skin lesions);

It is important that the subject brings with him/herself a supply of carbohydrates (preferably high in fructose sweets which keep the blood sugar levels more constant compared to glucose).

BIBLIOGRAPHY

1. Abramson JL, Vaccarino V. Relationship between physical activity and inflammation among apparently healthy middle-aged and older US adults. Arch Intern Med 2002; 162: 1286-1292.

2. ACSM Position Stand. The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscolar fitness and flexibility in healthy adults. Med Sci Sports Exerc 1998a;30:975-991.

3. ACSM. Guidelines for Exercise testing and Prescription, 4th Ed.. Philadelphia: Lea & Fabinger, 1991.

4. ACSM. Position Stand on Exercise and Physical Activity for Older Adults. Med Sci Sports Exerc 1998;30(6): 992-1008.

5. Adams KF, et al. Overweight, obesity, and mortality in a large prospective cohort of persons 50 to 71 years old. N Engl J Med 2006; 355: 763-78

6. Agostoni PG, Bianchi M, Moraschi A, Palermo P, Cattadori G, La Gioia R, et al. Work rate affects cardiopulmonary exercise test results in heart failure. Eur J Heart Fail 2005, 7: 498-504.

7. Agostoni PG, Cattadori G, Apostolo A, Contini M, Palermo P, Marenzi GC. Non invasive measurement of cardiac output during exercise by inert gas re-breathing technique: a new tool for heart failure evaluation. J Am Coll Cardiol 2005; 46: 1779-1781.

8. Agostoni PG, Pellegrino R, Conca C, Rodarte J, Brusisco V. Exercise hyperpnoea in chronic heart failure: relation to lung stiffness and exercise flow limitation. J Appl Physiol 2002; 92: 1409-1416.

9. American College of Obstetricians and Gynecologists: Technical Bulletin. Exercise during pregnancy and the post-partum period. Washington DC: ACOG, 1994.

10. American College of Sports Medicine and American Heart Association. ACSM/AHA Joint Position Statement: Recommendations for cardiovascular screening, staffing, and emergency policies at health/fitness facilities. Medicine and Science in Sports and Exercise 1998:1018.

11. American College of Sports Medicine Position Stand. Exercise and physical activity for older adults. Med Sci Sports Exerc. 1998 Jun;30(6):992-1008.

12. American College of Sports Medicine/American Heart Association Recommendations. Physical activity and public health in older adults. Nelson M.E., Rejeski W.J., Blair S.N., Duncan P.W., Judge J.O., King A.C., Macera C.A., Castaneda-Sceppa C. Circulation 2007;116:1094-1105.

13. American Diabetes Association. Position statement: "Physical Activity Exercise and Diabetes Mellitus". Diabetes Care 2003 ; 26: S 73 - S77.

14. ATS Board of Directors, March 2002. ATS Statement: Guidelines for the six-minute walk test. Am J Respir Crit Care Med 2002; 166: 111-117.

15. Baratto L, Morasso PG, Re C, Spada G, A new look at posturographic analysis in the clinical context: sway-density vs. other parametrization technique, in Motor Control, 2002.

16. Blair SN, Kohl HW 3rd, Barlow CE, Paffenbarger RS Jr, Gibbons LW, Macera CA. Changes in physical fitness and all-cause mortality. A prospective study of healthy and unhealthy men. JAMA 1995; 273: 1093-1098.
17. Booth FW, Gordon SE, Carlson CJ, et al. Waging war on modern chronic diseases: primary prevention through exercise biology. J Appl Physiol 2000: 88; 774-787.
18. Booth FW, Gordon SE, Carlson CJ, Hamilton MT. Waging war on modern chronic diseases: primary prevention through exercise biology. J Appl Physiol 2000; 88:774-87.
19. Bricot B, La riprogrammazione posturale globale, ed Statipro:Milano, 1998.
20. Bugnariu N., Fung J. (2007). Aging and selective sesorimotor strategies in the regulation of upright balance. Journal of NeuroEngineering and rehabilitation,4:19;
21. Buizza A, Schmid M, Secco EL, Lombardi R, Gandolfi R, La coordinazione intersegmentaria in posturografia, workshop Posturologia clinica e controllo posturale, Arenzano April 8-9, 2002.
22. Cappello, Cappozzo A, Prampero PE, Bioingegneria della postura e del movimento, Pàtron editore:Bologna, 2003.
23. Carle F, Gesuita R et al.: Diabetes incidence in 0- to 14- year age-groupi n Italy: a 10- year prospective study. Diabetes Care 27: 2790-2796, 2004.
24. Castaneda C, Layne JE et al. A radomize controlled trial of resistance exercise training to improve glycemic control in older adults with type 2 diabetes. Diabetes care 25: 2335-2341, 2002.
25. Cecchi F, Ceppatelli S, Pini ME, Corradini ML, Benvenuti E, Corigliano A, Debolini PL. Riabilitazione ed esercizio fisico nell'anziano affetto da patologia muscolo-scheletrica. Europa Medicophysica, 2001; 37: 190-192.
26. Church TS, Cheng YJ et al. exercise capacity and body composition as predictors of mortality among men with diabetes. Diabetes Care 27: 83-88, 2004.
27. Coats AJ, Adamopoulos S, Radaelli A, McCance A, Meyer TE, Bernardi L, et al. Controlled trial of physical training in chronic heart failure. Exercise performance, hemodynamics, ventilation, and autonomic function. Circulation 1992; 85: 2119-2131.
28. Consensus Statement of Multisocietary Task Force Prescription of physical exercise in the cardiological environment (First part). Monaldi Arch Chest Dis 2007; 68: 13-30
29. Cremonini G, Cavazzuti F, Testoni Becia M, Anziani invecchiamento e attività motoria, Casa editrice Ambrosiana: Milano, 1991.
30. Di Loreto C, Fanelli C et al.: Validation of a counseling strategy to promote the adoption and the maintenance of physical activity by type 2 diabetic subjects. Diabetes Care 26: 404-408, 2003.
31. Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med 2002; 346: 393-403.

32. Dunstan DW, Daly RM et al. High-intensity resistance training improves glycemic control in older patients with type 2 diabetes. Diabetes Care 25: 1729-1736, 2002.
33. Ellis S. R. (1996).What Are Virtual Environments? IEEE Computer Graphics and Applications, 14(1),17-22;
34. Emmerik RE, Wegen EE, On the functional aspect of variability in postural control, Exercise and sport science reviews 30, 2002.
35. Era P, Heikkinen E, Postural sway during standing and unexpected disturbances of balance in random samples of men of different ages. Journal of Gerontology 40,1985.
36. Erikssen G, Liestol K, Bjornholt J, Thaulow E, Sandvik L, Erikssen J. Changes in physical fitness and changes in mortality. Lancet 1998; 352: 759-762.
37. Evans WJ. Exercise training guidelines for the elderly. Med Sci Sports Exerc 1999;31(1):12-7.
38. Executive summary of the clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. Arch Intern Med 1998; 158: 1855-67
39. Flegal KM, et al. Excess deaths associated with underweight, overweight, and obesity. JAMA 2005; 293: 1861-7
40. Gerich Je.: The genetic basis of type 2 diabtes mellitus: impaired insulin secretion versus impaired insulin sensitivity. Endocr Rev 19: 491-503, 1998.
41. Haskell WL. Cardiovascular complications during exercise training of cardiac patients. Circulation 1978;57:920-924.
42. Haslam DW, James WP. Obesity. Lancet 2005; 366: 1197-209
43. Hass J, Waddell Dwight E, Wolf SL. , Juncos JL., Gregor RJ, Gait initiation in older adults with postural instability, Clinical Biomechanics 23, 2008, 743–753.
44. Hayashi R, Miyake A, Watanabe S. (1998). The functional role of sensory inputs from the foot: stabilizing human standing posture during voluntary and vibration-induced sway. Neurosci. Res; 5:203-213;
45. Hays LM, Clark DO. Correlates of physical activity in a sample of older adults with type 2 diabetes. Diabetes Care 22: 706-712, 1999.
46. Heasley k, Buckley JG, Scally A, Twigg P, David BE, Falls in Older People: Effects of Age and Blurring Vision on the Dynamics of Stepping, Investigative ophthalmology & visual science, 2005 Oct;46(10).
47. Hernandez A, Silder A, Heiderscheit C, Darryl G, Thelen, Effect of age on center of mass motion during human walk ing, Gait & Posture 30, 2009, 217–222.
48. Hoberg E, Schuler G, Kunze B, et all. Silent myocardial ischemia as a potential link between lack of premonitoring symptoms and increased risk of cardiac arrest during physical stress. Am J Cardiol 1990;65:583-589.
49. Hu FB, Stampfer MJ et al. Physical activity and risk for cardiovascular events in diabetic women. Ann Intern Med 134: 96-105, 2001.
50. Ivy JL. Role of exercise training in the prvention and treatment of insulin resistanceand non-insulin-dependent diabetes mellitus. Sports med 24: 321-336, 1997.

51. Jones TF, Eaton CB. Cost-benefit analysis of walking to prevent coronary heart disease. Arch Fam Med 1994; 3: 703-710.
52. Keshner EA, Kenyon RV (2004). Using immersive technology for postural research and rehabilitation. Assist Technol , 16:54-62.
53. Keshner EA, Kenyon RV, Dhaher Y(2004). Postural research and rehabilitation in an immersive environment. Proceedings of the 26th Annual International Conference of the IEEE EMBS:4862-4865;
54. Keshner EA, Kenyon RV, Langston JL (2004). Postural responses exhibit multisensory dependencies with discordant visual and support motion. J Vestib Res , 14:307-319;
55. Kokkinos PF, Narayan P, Colleran JA, Pittaras A, Notargiacomo A, Reda D, et al. Effects of regular exercise on blood pressure and left ventricular hypertrophy in African-American men with severe hypertension. N Engl J Med 1995; 333: 1462-1467.
56. Laufs U, Wassmann S, Czech T, Munzel T, Eisenhauer M, Bohm M, et al. Physical inactivity increases oxidative stress, endothelial dysfunction and atherosclerosis. Arterioscl Throm Vasc Biol 2005; 25: 809-814.
57. Lenzi D, Cappello A, Chiari L, Influecnce of body segment parameters and modelling assumption of the estimate of center of mass trajectory, Journal of biomechanics, 36, 2003.
58. Leslie, D. Mature stuff: Physical activity for the older adult Reston VA: Council on Aging & Adult Development of the Association for Research, Administration, Professional Councils & Societies and the American Alliance for Health, Physical Education, Recreation and Dance, 1990. Publication of surgeon general's report on physical activity and health. MMWR Morb Mortal Wkly Rep 1996 Jul 12 45 591-592
59. Lombard and Ditton (1997) At the Heart of It All: The Concept of Presence. Journal of Computer-Mediated Communication 3(2).
60. Lord Susan E, Weatherall M, Rochester L, Community Ambulation in Older Adults: Which Internal Characteristics Are Important?, Arch Phys Med Rehabil. 2010 Mar;91(3):378-83.
61. Macchi C, Cecchi F. Attività Motoria dell'adulto e dell'anziano. Firenze: Polistampa, 2002.
62. Maki B, Holliday P, Topper A, A perspective study of postural balance and risk of falling in an ambulatory and independent elderly population. Journal of Gerontology 49, M72—M84, 1994.
63. McArdle W, Katch FI, Katch VL. Exercise physiology – Energy, Nutrition and Human Performance, Fourth edition. Baltimore: Williams and Wilkins, 1996.
64. Medved V, Measurement of human locomotion,Crc Press LLC: U.S.A. 2001
65. Morganti F., Riva G.(2006). Conoscenza, comunicazione e tecnologia. Ledonline.;
66. Munro J, Brazier J, Davey R, Nicholl J. Physical activity for the over 65s: could it be a cost-effective exercise for the NHS? J Public Health Med 1997; 19: 397-402.

67. Paffenbarger RS Jr, Hyde RT, Wing AL, Hsieh CC. Physical activity, all-cause mortality, and longevity of college alumni. N Engl J Med 1986; 314 (10) :605-13.
68. U.S. Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.
69. Fox KR. The Influence of physical activity on mental well-being. Public Health Nutr. 1999, 2 (3A):411-8.
70. Weyerer S, Kupfer B. Physical Exercise and Psychological Health. Sports Med 1994; 17(2) :108-16.
71. Thayer RE. The biopsychology of mood and arousal. New York: Oxford University Press, 1989.
72. BS Hale, KR Koch, JS Raglin. State anxiety responses to 60 Minutes of cross training. Br J Sports Med 2002; 36 (2) :105-7.
73. Taylor CB, Sallis JF, Needle R. The relation of physical activity and exercise to mental health. Public Health Rep. 1985; 100 (2) :195-202.
74. Teske JA, Billington CJ, Kotz CM. Neuropeptidergic Mediators of Spontaneous Physical Activity and non-exercise activity thermogenesis .. Neuroendocrinology. 2008, 87 (2):71-90.
75. Thompson D, Batterham AM, Bock S, Robson C, Stokes K. Assessment of low-to moderate-intensity physical activity thermogenesis in young adults using synchronized heart rate and accelerometry with branched-equation modeling. J Nutr. 2006 APR 136 (4) :1037-42.
76. Erlichman J, Kerbey AL, James WP. Physical Activity and Its Impact on health outcomes. Paper 1: The Impact of physical activity on cardiovascular disease and all-cause mortality: an historical perspective. Obes Rev. 2002.
77. Guyton Hornsby W Brynar RW. Clinical Exercise Psychology. In. Brown SP (ed.). Introduction to Exercise Science. Lippincott, Williams and Wilkins, Baltimore 2001.
78. Paffenbarger RS Jr, Kampert JB, Lee IM, Hyde RT, Leung RW, Wing AL. Changes in physical activity and other life way patterns influencing longevity. Med Sci Sports Exerc 1994; 26: 857-865.
79. Paffenbarger RS Jr, Lee IM. Intensity of physical activity related to incidence of hypertension and all-cause mortality: an epidemiological view. Blood Press Monit 1997; 2: 115-123.
80. Pale RR, Pratt M, Blair SN, et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. JAMA 1995; 273:402-7.
81. Pan XR, Li GW et al.: Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance. The Da Qing IGT and diabetes Study. Diabetes Care 20: 537-544, 1997.

82. Pischon T, et al. General and abdominal adiposity and risk of death in Europe. N Engl J Med 2008; 359: 2105-20
83. Pollock M L, Gaesser G A, Butcher J D. The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in healthy adults. Med Sci Sports Exerc 1998;30:975-991.
84. Puglisi F, Biomeccanica introduzione alle misure strumentali di postura e movimento,Marrapese editore: Roma 2007.
85. Puglisi F, Biomeccanica introduzione alle misure strumentali di postura e movimento,Marrapese editore: Roma 2007.
86. Pyykko I, Aalto H, Hytonen M, Starck J, Jantti P, Ramsay H.(1988). Effect of age on postural control. In: Amblard B, Berthoz A, Clarac F.(Eds), Proceedings of the ninth International Symposium on postural and gait research, International Congress series 812, Posture and Gait: development, Adaptation and Modulation. ExcerptaMedica, Marseille, France, Amsterdam, New York, Oxford, pp 95-104.);
87. Rocchi L, Chiari L, Horak FB, The effect of DBS and Levodopa on postural sway in subjects with Parkinson's Disease, Journal of Neurology Neurosurgery & Psychiatry, 73 2002.
88. Romero-Corral A, et al. Association of body weight with total mortality and with cardiovascular events in coronary artery disease: a systematic review of cohort studies. Lancet 2006; 368: 666-78
89. Sesso HD, Paffenbarger RS, Lee IM. Physical activity and coronary heart disease in men: the Harvard Alumni Health Study. Circulation 2000; 102: 975.
90. Sheridan T.B. (1992).Musings on telepresence and virtual presence. Presence: Teleoperators and Virtual Environments,1(1),120-126;
91. Snowling NJ, Hopkins WJ. Effects of different modes of exercise training on glucose control and risck factors for complications in type 2 diabtic patients: a meta-analysis. Diabetes Care 29: 2518-2527, 2006.
92. Steuer J.(1992)Defining virtual reality: Dimensions determining telepresence. Journal of Communication,42(4),73-93;
93. Strawbridge WJ, Deleger S, Roberts RE, Kaplan GA. Physical activity reduces the risk of subsequent depression for older adults. Am J Epidemiol 2002; 156: 328-334.
94. Streepey JW, Kenyon RV, Keshner EA. (2006). Field of view and base of support width influence postural responses to visual stimuli during quiet stance. Gait Posture, 25(1):49-55.
95. Stringer WW, Hansen JE, Wasserman K. Cardiac output estimated non-invasively from oxygen uptake during exercise. J Appl Physiol 1997; 82: 908-912.
96. Sveistrup H.(2004).Motor rehabilitation using virtual reality. Journal of NeuroEngineering and Rehabilitation,pp.1-8;
97. Taguchi K, Relationship between head's and the body's center of gravity during normal standing, in Acta Otoloryngol, 1980;90(1-2):100-5.

98. Taylor RS, Brown A, Ebrahim S, Jolliffe J, Noorani H, Rees K, et al. Exercise-based rehabilitation for patients with coronary artery disease: systematic review and metaanalysis of randomized controlled trials. Am J Med 2004; 116: 682-692.

99. The diabetes prevention program research group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med 346: 393-403, 2002.

Tuomilehto J, Lindstrom J et al.: Prevention of type 2 diabetes by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med 344: 1343-1350, 2001.

100. Tuomiletho J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P, et al. The Finnish diabetes prevention study group. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med 2001; 344: 1343-1350.

101. Urbinati S, Fattirolli F, Tramarin R, Chieffo C, Temporelli PL, Griffo R, et al. Gruppo Italiano di Cardiologia Riabilitativa e Preventiva. The ISYDE project. A survey on Cardiac Rehabilitation in Italy. Monaldi Arch Chest Dis 2003; 60: 16-24.

102. Virk et all. (2006). Virtual Reality Applications in Improving Postural Control and Minimizing Falls. Proceedings of the 28th IEEE EMBS Annual International Conference New York City, USA.

103. Vona M, Rossi A, Capodaglio P. Impact of physical training and detraining on endothelium-dependent vasodilation in patients with recent myocardial infarction. Am Heart J 2004; 147: 1039-1046.

104. Wang Y, Rimm EB, Stampfer MJ, Willett WC, Hu FB.Comparison of abdominal adiposity and overall obesity in predicting risk of type 2 diabetes among men. Am J Clin Nutr 2005; 81: 555-63

105. Wannamethee GS, Lowe GD, Whincup PH, Rumley A, Walker M, Lennon L. Physical activity and hemostatic and inflammatory variables in elderly men. Circulation 2002; 105: 1785.

106. Wasserman K, Hansen JE, Darryl YS, William WS, Brian JW. Principles of exercise testing and interpretation: including pathophysiology and clinical applications. Fourth Edition. Lippincott Williams & Wilkins Editors.

107. Wasserman K, Zhang Y, Gitt A, Belardinelli R, Koike A, Lubarsky L, et al. Lung function and exercise gas exchange in chronic heart failure. Circulation 1997; 96: 2221-2227.

108. Weber KT, Janicki JS. Cardiopulmonary exercise testing for evaluation of chronic cardiac failure. Am J Cardiol 1985; 55: 22A-31A.

109. Wei M, Gibbons LW et al. Low cardiorespiratory fitness and physical inactivity as predictors of mortalità in men with typ 2 diabetes. Ann Intern Med 132: 605-611, 2000.

110. Whit F, Rafique G: Diabetes prevalenceand projections in south Asia. Lancet 360: 804-805, 2002.

111. Wild S, Roglic G et al.: Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care 27: 1047-1053, 2004.
112. Winstein C J. (1991). Knowledge of the results and motor learning: implications for physical therapy. Physical therapy, 71:140-149;
113. Winter D, Human balance and posture control during syanding and walking, Gait & Posture 3, 1995.
114. World Health Organization. The World Health Report 2002: reducing risk, promoting healthy life.
115. Yusuf S, Hawken S, Ounpuu S, Bautista L, Franzosi MG, Commerford P, Lang CC, Rumboldt Z, Onen CL, Lisheng L, Tanomsup S, Wangai P Jr, Razak F, Sharma AM, Anand SS. Interheart Study Investigators. Obesity and the risk of myocardial infarction in 27.000 participants from 52 countries: a case-control study. Lancet 2005; 366: 1640-9
116. Zinman B, Ruderman N et al. American Diabetes Association. Physical activity/exercise and diabetes. Diabetes Care 27 (suppl I): s58-s62, 2004.

GLOSSARY

A-

Abasia: is the inability to walk

Above bulbar or pseudo bulbar syndrome: neurological syndrome characterized by impairment of phonation (nasal tone of voice), swallowing (dysphagia), and gait.

Absolute risk: incidence of a disease among individuals exposed to a particular risk factor

Abulia: refers to a lack of will or initiative

Accelleration: vector quantity that identifies the changes in speed per unit time. A centrifugal tendency of a body to move toward the exterior of a curvilinear path. A centripetal (ac) vector quantity that expresses the changes in angular velocity.

Acclimatization: it is the process of an individual organism adjusting to a new and hard to bear situation as the acclimatization to high altitude and in stressful conditions, heat, cold, low oxygen pressure and drought.

Ace: angiotensin converting enzyme

Acetylcholine: ester of choline. Chemical mediator of the transmission of the nerve impulses at the neuromuscular junction and of the parasympathetic autonomic nervous system. It strengthens the contractions of the digestive tract, causing bronchoconstriction, capillary and arterial vasodilation, bradycardia.

Acidosis: is a physiological condition characterized by low pH in body tissues and blood and increase in H + ions.

Acne: pilosebaceous unit inflammation.

Acro asphyxia: cyanosis with painful anesthesia of the extremities.

Acro cyanosis: cyanosis of the extremities more rarely of the ears, nose and cheekbone.

Acromegaly: abnormal enlargement of the facial bones and of the extremities due to pituitary dysfunction.

Acromelalgia: paroxysmal pain, often at night, of the limbs. It is frequent in obstructive arterial disease.

Acroparesthesias: syndrome characterized by, tingling, numbness at night, pain mainly of the upper limbs.

ACSM: American College of Sports Medicine

Actin: contractile protein present in all striated muscles.

Actomyosin: complex formed by the combination of actin and myosin.

ADA: American Diabetes Association

Adenoma: benign epithelial tumor in which cells form recognizable glandular structures or are derived from a glandular epithelium.

Adenosindifosfato (ADP): see adenosine triphosphate.

Adenosine triphosphate (**ATP**)**:** a substance that quickly gives way to two molecules of phosphoric acid / phosphate (ADP becoming adenosindifosfato adenosinmonofosfato amp), and thus give chemical energy necessary for most assets.

Adenosinmonofosfato (amp): see adenosine triphosphate.

ADL (Activities of Daily Living): evaluation of the normal activities characterizing the functional status of the elderly related to their need of help in walking, getting out of bed and going to bed, bathing, dressing, eating, carrying out normal physiological functions..

Adrenaline: a hormone secreted by the adrenal medulla and sympathetic ganglia, producing tachycardia, vasodilation, hypotension, bronchodilation, mydriasis, sweating, hyperglycemia

Afterload: load that is encountered when the muscle begins to contract. It directly relates to peripheral resistance

Agnosia: inability to recognize objects, persons, sounds, shapes, or smells.

Akinesia: is the inability to initiate movement.

Aldosterone: hormone of the adrenal cortex. It causes reabsorption of sodium and potassium elimination, which consequent increase of the LEC and hypertension.

Alkalosis: a condition characterized by a decrease in the concentration of ions h and increase in pH.

Allergy: hypersensitivity reaction of the body to various immune substances.

Alpha fibers: nerve fibers that supply extrafusal muscle fibers with agonist and antagonist functions

Alpha-1 antitrypsin: a substance capable of antagonizing the action of trypsin.

ALS: amyotrophic lateral sclerosis. Degenerative disease of the 1st and 2nd motor neuron, there was a high prevalence in some subjects practicing sports at a competitive level

Amaurosis fugax: temporary loss of vision usually from one of the two eyes.

Amaurosis: blindness.

Amnesia: memory loss

Amyloidosis: a type of cell degeneration with accumulation of amyloid in various organs.

Analgesic : pharmaceutical drug used to relieve pain.

Anamnesis: collection of information regarding family history, physiology and pathology of the patient.

Ankylosis: welding of articular with complete fixation and immobility of the joint.

Anaphylaxis: generalized hypersensitivity reaction of the body to external substances of various

Anemia: reduction of the amount of hemoglobin in the blood.

Aneurysm: expansion of the arterial wall accompanied by alteration of the elastic and muscular constituent.

Angiectases: A generic term indicating dilation of a vessel.

Angina pectoris: syndrome characterized by violent painful chest crises mainly retro-sternal usually associated with coronary artery disease; unstable when more prolonged and frequent, at rest or with minimal effort, it often precedes a heart attack; variant or of Prinzmetal linked to coronary spasm, almost exclusively at rest

Angiography: X-ray of a vessel after intravenously or via arterial (using a catheter) injection of a radiopaque (usually iodine substance).

Angioma: benign tumor or congenital proliferation of neo-formed vessels.

Angioplasty: dilatation of a stenosed vessel with a balloon catheter. It often precedes the application of stents.

Angiotensin: decapeptide transformed, by the action of renin, angiotensin II, potent vasoconstrictor.

Angiotensinogen: plasma globulin from the liver which releases angiotensin I, after the action of renin.

Anosognosia: inability or refusal to recognize a neurological deficit such as hemiplegia.

Anorexia: eating disorder that is charcterized by an absolute refusal of food.

Anosmia: absent or reduced sense of smell

Anoxia: a lack of oxygen.

Antiphlogistic: synonymous with anti-inflammatory.

Aortic insufficiency: oppositional resistance to aortic flow.

Aphasia: lack or loss of ability of expression with words and writing, which is accompanied by a deficit of understanding.

Aphonia: loss of voice due to the default of sound apparatus (mainly due to disruption of the recurrent laryngeal nerve)

Ataxia: disease characterized by incoordination of muscle movements.

Atrium: the left and right, blood pumping at low pressure in the respective cardiac ventricles.

Astasia: inability to stand up.

Atrial fibrillation (AF): fibrillar activation of muscle fibers of the atria that causes rapid contractions (300-500 min) in an irregular and disorganized way as not to be able to produce systole. As it no longer exists as a sinus rhythm and the AV node discharges irregularly, the ventricles contract with an irregular, higher than normal frequency, (no rhythm). It is usually linked to atrial enlargement that provokes the formation of thrombi at the atrial level with possible embolic events.

Atrial flutter: ectopic atrial activity usually set at high frequency (250-350/min). Ventricular contraction usually has a regularfrequence because it is associated an atrioventricular block.

Atrophy: decrease of the size of a cell, tissue or organ.

Attributable risk: the difference between the frequency of incidence of a disease among exposed individuals to a risk factor and not exposed ones.

Autoimmunity: a condition characterized by a specific humoral immune response or cell-mediated immunity against the constituents of their body tissues.

AV block (BAV): atrioventricular heart block. It may be I, II and III degree AV block.

B-

Balance: status of a body in balance. The balance is called "static" when the body is at rest, and without motion. The balance is called "dynamic" when the body moves with uniform motion, ie at constant speed.

Beri-beri: disease characterized by a lack of vitamin B1 or thiamine.

Beta-adrenergic receptor ()**:** receptor sensitive to adrenaline. It is divided into beta1 (lipolytic and cardiostimulants) and beta2 (bronchus and vasodilators).

Beta-blocker: a substance that inhibits the effects of beta-adrenergic catecholamine receptors. They mainly cause brady cardia and reduction in blood pressure.

Bigeminy: the presence of a premature beat (extrasystole), ventricular or supraventricular, after each complex of the basic rhythm.

Biofeedback: a set of procedures for volunteer feedback control of normally involuntary physiological processes, created by electronic devices.

Blood pressure: the resistance of the arterial wall to blood pressure.

blood volume: total blood volume in the bloodstream.

Borg scale b.: scale assessing the subjective perception of stress in relation to its intensity..

Bradycardia: slow heart rate below 50 bpm.

Bruising: stain on the skin due to extravasation of blood from the vessels to tissue.

Bulimia: a condition characterized by a pathological increase of hunger also after ingestion of large amounts of food

Bundle branch block: see Rbb and Lbb.

Bypass: surgical procedure. It connects upstream and downstream segment of n clogged artery

C-

Cachexia: a condition of extreme decay characterized by strong physical weight loss.

Calorie (small calorie or symbol cal)**:** unit of energy; it is defined as the amount of heat required to raise from 14.5 to 15.5 ° C the temperature of the mass of one gram of distilled water at the level of Sea (pressure of 1 atm). In biology, or nutrition, large calorie (cal or kcal), equivalent to 1000 cal, is used to indicate the energy content of food. The determination of calorie intake should be made in reference to sugar (glucose), which is the natural food for easier assimilation, taking into account that a spread 3.92 kcal g sugar, one gram of protein and about 4 calories a gram of fat approximately 9 calories, all other foods must be related to them in order to calculate energy intake. The international system of units includes the use of joules instead of calories (kilojoules and instead of the large calorie).

Calorimetry: measurement of the heat produced by a living organism in a small closed room (direct); It calculates it from their consumption of oxygen and from the carbon dioxide and nitrogen (indirect).

Cancer: relating to neoplasia, cancer.

Capillaroscopy: microscopic examination of blood capillaries in the living subject.

Carbon dioxide: the most important gaseous product of the metabolism (and of the burning). It is the gas that dissolved in water, gives rise to carbonic acid (weak acid); it is a metabolic product that most directly controls the power of breathing.

Carboxyhemoglobin: hemoglobin combined with carbon monoxide, which occupies the sites that bind oxygen. The reaction is poorly reversible.

Cardiac tamponade: cardiac compression due to pericardial effusion with cardiac output to fall obstacle to ventricular filling.

Cardiomegaly: increase in heart size.

Cardiomyopathy: heart muscle disease, often of unknown cause. It may be distinguished in dilated, hypertrophic, obstructive, restrictive and obliterative cardiomyopathy.

Caregiver: English word that defines the person who takes care of another person.

Cartesian coordinates: conventional reference system used to describe the course relative to changes in position of a body on a plane or space.

Catalase: enzyme of the class of oxidoreductase that transforms 1 + 1 molecules of hydrogen peroxide in 1 molecule of o_2 and 2 of water.

Cataracts: eye condition characterized by opacity of the lens.

Catecholamines: substances with sympathetic activity, consisting of catechol + amine, as the adrenaline (epinefina), the noradrenaline (norepinephrine) and the dopamine.

Catheterization: Introduction of a catheter into a vessel or a cardiac cavity for diagnostic or therapeutic purposes.

CCK: cholecystokinin.

CCK: cholecystokinin. 33 amino acid polypeptide hormone, secreted by the mucosa of the upper intestine and hypothalamus; it stimulates gallbladder contraction and secretion of pancreatic enzymes. It is synonymous with pancreozymin.

Cellulose: carbohydrate, long-chain of polymer of glucose which is the backbone of many plant structures.

Center of gravity or center of mass: point of a body which acts on the resultant of the forces of gravity.

Chlamydia pneumonia: a genus of bacteria of the family of chlamydiaceae. It consists of Gram-negative, coccoid, which only multiply inside the host cell and have a unique growth cycle.

Cholangitis: inflammation of the bile.

Cholecystitis: inflammation of the gallbladder.

Cholinergic receptor ()**:** molecule with mail function on the cell surface receptor that binds the neurotransmitter acetilconlina mediating its action on the post-junctional cells.

Chondrocyte: mature cartilage cells housed within a gap in the cartilage matrix.

Congestion: accumulation of blood in an organ due to the expansion of the lumen of its blood vessels.

Chromaffin cells: cells that absorb and which stain strongly with chromium salts, which are found in the adrenal glands, coccygeal and carotid arteries along the sympathetic nerves and in various other organs.

Chronotropic: the frequency of a rhythm.

Clearance: speed with which a substance is removed from blood or other body. **Clonus:** contraction and relaxation of muscles alternating in quick succession.

Clot: mass of clotted blood in vitro, outside the body.

CNS: central nervous system.

Co-Contraction : simultaneous (synergistic) contraction of agonists and antagonists muscle for the purpose, primarily, of the setting of a body segment.

Collapse or shock: condition of varied etiology characterized by inadequacy of the cardiovascular system to ensure an adequate blood supply to tissues and elimination of waste. It is characterized by reduction in cardiac output, tachycardia, hypotension and decreased urine output.

Collapse: failure of the walls of an organ.

Compliance: distensibility, the ability to yield to pressure.

Congestive heart failure: a condition due mainly to a deficiency of the ventricular pump. It is characterized by dyspnea, venous stasis and edema (pulmonary and lower limbs).

Contracture: sustained contraction due to lack of relaxation in the absence of action potentials (inhibition of calcium transport).

COPD: chronic obstructive bronchopathy.

Core: the middle of something.

Couple of forces: system of two parallel vectors, of equal and opposite form, applied to a body whose action tends to rotate.

Creatinine: a substance produced by muscles and excreted by the kidneys in urine; its amount in the blood increases when the kidney is not working properly.

Crohn's disease: chronic granulomatous inflammatory disease of the gastrointestinaltract.

Crohn's disease: inflammatory bowel disease that tends to recur periodically.

Csa: cross sectional area or section of the muscle.

CT: computed tomography, diagnostic procedure based on the use of x-ray that allows the reconstruction of sections of a body area

Cubital angle: external angle formed by the arm and forearm extended at the elbow. Normal value = 168 °.

Cushing: Cushing's syndrome is secondary to hyperfunction of the adrenal cortex, characterized by hypertension, striae rubra (reddish stretch marks), collected fat in the neck and face, increased blood sugar.

Cyanosis: bluish discoloration of the skin and mucous membranes that appears when the rate of reduced hemoglobin in the blood is equal or greater than 5 g / dl.

Cyclooxygenase (COX)**:** enzyme that acting on acidity arachidonic acid, catalyzes the synthesis of prostaglandins.

Cyclooxygenase 1 (COX-1)**:** enzyme association, and always active in the body, which is responsible for the synthesis of prostaglandins with physiological functions in different organs, including stomach, kidney, and platelets.

Cyclooxygenase 2 (cox-2)**:** "inducible"enzyme, which is only activated in the presence of an inflammatory process and is responsible for the synthesis of prostaglandin mediators of inflammation. This enzyme is the target of specific inhibitors designed to lock in a highly selective inflammatory prostaglandins.

Cyclothymia: alternating episodes of depression and mental excitement.

D-

Defibrillator: apparatus capable of blocking the cardiac fibrillation by electric shock.

Delirium: psychopathological condition characterized by the production of thoughts, words or actions without meaning

Diabetes insipidus: disease characterized by the emission of large amounts of urine from the kidney due to difficulties in retaining water

Diabetes mellitus: disease caused by insufficient secretion of insulin from the pancreas or tissue resistance to insulin.

Diathesis: preparation of the body to specific diseases diffusion. Process by which a gas or a substance in solution expands due to the movement of its particles to fill all space at disposal.

DIC: disseminated intravascular coagulation.

Digital: Digitalis lanata extract used in heart failure. Normally it reduces the heart rate but in overdose can cause various types of arrhythmias.

Diplopia or amblyopia: double vision.

Disorientation: loss of space-time orientation.

Dissecting aneurysm: aneurysm in which an arterial intimal tear is produced, with dissection of the tunica media.

DNA: abbreviation of deoxyribonucleic acid. It is present in the nucleus of every cell, as a carrier of genetic information.

Dopamine. (Dopa): 3,4-dihydroxyphenylalanine, derivative of phenylalanine. Neurotransmitter in the central nervous system. Direct precursor of adrenaline and noradrenaline.

Doppler (cardiac or vascular): cardiac and vascular ultrasound. It also allows the study of the velocity of blood (quantity, quality and direction).

Doppler ultrasound: cardiac and vascular ultrasound. It also allows the study of the velocity of blood and the color display of blood flow .

Doppler: ultrasound for the determination of blood velocity.

Dromotropic: it matters the intracardiac conduction of the excitatory stimulus.

Drop attack: syndrome, characterized by falling to the ground for vertebral artery stenosis**.**

Dynamics: study of bodies in motion.

Dysarthria: imperfect articulation of speech due to disturbances of muscular control member to its production.

Dyskinesia: alteration of the movement.

Dyslexia disorder: difficulty to read and understand what you read.

Dysphasia: alteration of the language with lack of coordination and inability to have the words in the right order.

Dyspnea: difficulty in breathing. Subjective sensation of breathlessness**.**

E-

e.a.s: Left-front hemiblock (block of the conduction of the anterior-superior hemibranch of the bundle of his.

E.c.g: electrocardiogram or registration of electrical events of the heart.

Eating style: food style does not mean a "diet" but a method of balanced nutrition made of basic elements that should always be present in the right dose.

ECC: extra corporeal circulation.

ECG T wave: part of the complex ventricular that corresponds to the repolarization of the ventricles.

Echocardiogram: cardiac ultrasound that allows to record the echoes caused by ultrasound probes for the study of dimensions and movements of cardiac structures.

Echocardiography: cardiac ultrasound after administration of substances able to identify motion abnormalities not otherwise obvious.

ECST: european carotid surgery trial.

Ectropion: overthrow outside of the eyelid.

Elastase: enzyme that degrades elastin.

Elastin: yellow scleroprotein, essential constituent of yellow elastic connective tissue. It is fragile when dehydrated, elastic and flexible when wet.

Electrolytes: substances in solution (eg blood plasma) dissociate into ions (sodium, chlorine, potassium, magnesium ...).

Embolus: free particle in the bloodstream of various kinds (thrombotic, gas, fat, cancer, septic, mycotic material) immiscible with the blood vessel; it can lead to obstruction.

Emphysema: pathological accumulation of air in tissues or organs

Endocarditis: endocardium inflammation.

Endocrine system: term referring to organs or structures whose function is to secrete into the blood or lymph a substance (hormone) with specific effects on other organ.

Enzyme: protein molecule that catalyzes (speeds up) chemical reactions.

Epilepsy: paroxysmal transient disturbance of brain function manifested by episodes of deterioration or loss of consciousness, such as abnormal motor phenomena, mental or sensory disturbances or central nervous system perturbations.

Epistaxis: bleeding from the nose.

Erythropoietin: glycoprotein hormone secreted by the adult kidney and liver in fetal life; it stimulates stem cells from bone marrow to produce red blood cells.

Exocrine: secreting outward through a duct.

Exophthalmos: protrusion of the eyeball.

Extrasystole or premature beat: cardiac contra-action of premature ectopic, supraventricular or ventricular origin.

F -

Fainting : situation characterized by clouding of the consciousness accompanied by neurodegenerative disorders (cold sweat, nausea), reduction in blood pressure, tachycardia, difficulty in breathing.

Fans: Non-steroidal anti-inflammatory drugs.

FEV1: forced expiratory volume in 1 second.

FFA: free fatty acids.

Fibrinogen: coagulation factor, it is transformed into fibrin by the addition of thrombin.

Fibrosis: production of fibrous tissue; fibrous degeneration.

Filariasis.:disease mainly spread in the tropics, transmitted by certain types of mosquitoes that host larvae. The adult worm can invade the lymphatic system producing obstruction.

Folate: anionic form of folic acid.

Folic acid: also known as vitamin B 9 vitamin B c or folacin) and folate (the naturally occurring form), as well as pteroyl- L-glutamic. It is a vitamin complex which serves as a conveyor of the monocarboniose units in many metabolic reactions.

Framingam: American town where a major epidemiological study on cardiovascular diseases was made.

Frequency: number of cycles of a periodic motion or number of waves passing through a point per unit time (seconds) or number of oscillations of a pendulum in a minute.

Friction: the force that opposes or favors the slow movement.

Fsh: a hormone produced by the pituitary, which stimulates in women the growth of the ovarian follicle and sperm production in men.

FVC: forced vital capacity.

G -

Gamma fibers: nerve fibers from the gamma motor neurons located in the anterior horn of the spinal cord. Their function is to stimulate the elongation of the neuromuscular spindles. These fibers are divided into dynamic or gamma fiber 1 and static gamma 2 with the task, respectively, to vary **Gaba:** γ-aminobutyric acid.

Gangrene: tissue necrosis due to the stop of blood supply, usually located at the extremities

Gastrin: polypeptide hormone released in the gastric antrum by the action of peptidergic fibers of the vagus nerve on cells g of pyloric glands.

Gene: a unit composed of DNA responsible, with other genes, of the transmission of hereditary characteristics.

Genome: it is the entirety of an organism's hereditary information. In a eukaryote it is a set of chromosomes, in bacteria it is a single chromosome and in viruses it is a molecule of DNA or RNA.

Genotype: entire genetic makeup of an individual.

Gestosis: any toxemic manifestation in pregnancy.

Glaucoma: increased intraocular pressure.

Glomerulonephritis: inflammatory disease that affects the renal glomerulus.

Glucagon: polypeptide hormone secreted by alpha cells of pancreatic islets of Langerhans in response to hypoglycemia or to stimulation by the growthof the hormone of the anterior pituitary. It has the opposite action to that of insulin.

Glucocorticoid: each of a group of corticosteroids of 21 carbon atoms which act primarily on the metabolism of carbohydrates.

Gluconeogenesis: formation of glucose from glycogen.

Glutathione: tripeptide that contains an unusual peptide linkage between the amine group of cysteine and the carboxyl group of the glutamate.

Glutathione-peroxidase: enzyme belonging to the oxidoreductase. It reduces hydrogen peroxide, which is formed inside cells and is toxic.

Glycogen: glucose polymer that is formed in the liver where it is stored. It is found to a lesser extent also in the muscle. In case of need it is turned into glucose (gluconeogenesis).

Glycogenesis: production of glucose in the body, especially in the liver.

Glycosaminoglycan: mucopolysaccharide without the protein.

Glycosuria: the presence of glucose in urine.

Grazing Friction: the force that opposes or reduces the sliding of a body or surface against another.

Gout: disease caused by the increased excess of uric acid that causes a painful deposition of salts in the joints.

Ground substance anista (SFA): amorphous material similar to a gel in which are embedded the cells and the fibers of connective tissue

H-

Hallucination: distorted perception of objects, sounds or images.

Hallux valgus: deviation of the big toe outward.

Hallux varus: deviation of the big toe inward.

Heart failure: clinical syndrome characterized by the inability of the heart to ensure the needs of oxygen to the tissues.

Helicobacter pylori: gram-negative bacteria whose environment is best represented by the stomach. It is resistant to acid, is the most important causative agent of chronic gastritis and ulcer disease.

Herpes zoster (or area)**:** virus responsible for a unilateral vesicular eruption along the course of a nerve, very itchy and painful.

Hematocrit: analysis of the elements and the characteristics of the blood (red cells, white cells, platelets).

Hematuria: loss of blood in the urine.

Hemianopia: unilateral or bilateral blindness of half visual field

Hemiplegia: partial or complete paralysis of one half of the body.

Hemolysis: rupture of red blood cells to leak hemoglobin.

Hemoptysis: leaking of blood from the mouth coming from the breathing apparatus.

Heparin: physiological anticoagulant. It has mainly antithrombin action. Therapy using calcium or low molecular weight heparins (LMWH), especially for preventing embolism (trauma, immobility that predispose to venous thrombosis).

Herniated disc: protrusion of the pulpous nucleus or fibrosis annulus of the spinal disc, which can damage the nerve roots.

Holter (system, method h.)**:** registration for at least 24 hours of the electrocardiogram (Holter ECG).

Homocysteine: product of transmethylation of methionine; an intermediate product in the synthesis of cysteine.

Homocystinuria: accumulation of homocysteine in plasma and urine secondary to aminoacidopatia inherited as an autosomal recessive trait.

Hypercapnia: Increasing of the concentration of carbon dioxide

Hyperemia: increased amount of blood present in the capillaries of an organ.

Hyperesthesia: increased sensitivity to a stimulus.

Hyperkalemia: pathological increase in the concentration of potassium in the blood.

Hyperplasia: increase in the number of cells of an organ.

Hypertrichosis: excessive growth of ha**ir.**

Hypertrophy: enlargement of an organ or a part related to an increase in the size of its cells.

Hypokinesia: restriction of movement**.**

Hyponatremia: pathological reduction of the concentration of sodium in the blood.

Hypoplasia: incomplete development or underdevelopment of an organ or tissue.

Hypoxia: reduction of oxygen content.

Hypothermia: temperature reduction.

I -

IADL (Instrumental Activities of Daily Living)**:** activities related to the degree of independence of the elderly in instrumental skills of daily living such as the use of means of transport, in shopping, in the use the phone or of drugs.

Iatrogenic: it is related to a drug treatment.

Idiopathic: of unknown origin or self-originated.

Ig: immunoglobulins. Glycoproteins with antibody activity divided into five classes**:** IgM, IgA, IgG, IgD, IgE.

Illness or disease: any alteration or interruption of the normal structure or function of an organ, system or part of it. It is manifested by a characteristic group of signs and symptoms.

Infarction: cell necrosis at the expense of an organ (eg heart, lung, intestine, kidney) due to vascular causes.

Interleukin (IL): group of proteins produced in response to antigenic stimulation or phytogenic, often inflammatory markers. IL is very similar to the indogen pyrogens

Incidence: It is said of events that are generated from scratch (eg disease) in a given period of time.

Ionotropic: is said of everything concerning the contractility of the myocardial fibers: positive if it increases, negative if it decreases.

Ischemia: situation of cellular suffering connected with the reduction in oxygen supply due to vascular causes.

Isokinetic: with constant angular velocity of contraction.

Isometric contraction: contraction at constant length (without an appreciable decrease in muscle length).

Isotonic contraction: contraction constant voltage (contraction against a constant load with shortening of the muscle).

J-

Jaundice: yellowing of the skin due to an increase of plasma bilirubin.

K -

Keratitis: inflammation of the cornea.

Ketone bodies: organic compounds containing carbonyl groups with carbohydrates linked to carbon atoms of the carbonyl (eg acetone). Ketone bodies can be seen in poorly controlled diabetes and fasting kinds

Analgesic: drugs with pain-relieving properties.

Kinematics: study of movement in terms of its trajectory and its spatiotemporal aspects, namely, f its relations between position, velocity and acceleration.

Kinetics: study of movement from the perspective of the forces that determine or restrict it.

Kinking: kinking of a vessel (common in carotid artery).

Kyphosis: pathological increase in the convexity of the thoracic spine.

L -

Lactate:. anionic form of lactic acid.

Lactic acid: acid substance produced by the muscle for anaerobic glycolysis during intense exercise. It can be transformed into glucose by the liver.

Laplace (Law): a principle of physics that the tension on the wall of a sphere is the product of the pressure times the radius of the chamber and the tension is inversely related to the thickness of the wall.

Lbbb: left bundle branch block; total, permanent or intermittent interruption of trasmission in the trunk of the right branch of His bundle before the first division in the two emibranche.

Lec: extracellular fluid.

Leukemia: malignant neoplastic proliferation of leucopoietic tissue (specialized in the production of white blood cells or leukocytes).

Leukocytosis: increase of leukocytes in the blood.

Leukopenia: reduction of leukocytes in the blood.

Leukotrienes: they are formed from arachidonic acid and are composed of a linear chain of carboxylic acids with 20 carbon atoms with one or two molecules of o2 to replace two or more conjugated bonds. It acts as regulators of inflammatory and allergic reactions.

Lien: denomination of the spleen.

Lipofuscin: lipid granular pigment cell degeneration resulting from oxidation and polymerization of membrane lipids.

Lipolysis: breaking down or splitting of the fat .

Listesis: slippage of one vertebra with or without displacement.

Locus of control: process of attribution of causality of events in life (itself) or outside (various causes).

Lordosis: curvature of the spine with anterior convexity. It refers both to the physiological and the pathological aspects.

Lymphedema: edema related to obstruction, disruption or compression of the lymphatic vessels.

Lymphoma: malignant neoplastic proliferation of lymphoid tissue.Lymphomas can be divided into Hodgkin's lymphoma and non-Hodgkin's type.

Lymphosarcoma: diffuse lymphoma.

M –

Macroglossia: excessive size or increased size of the tongue.

Macrophages**:** cells originating from bone marrow and entering the bloodstream as monocytes. Once it reaches the tissues get bigger and acquire phagocytic capacity (ie, able to incorporate, ingest certain substances), becoming macrophages.

Mediastinum: area bounded by the sternum, the spine and the thoracic aperture. It contains the organs, nerves and vessels including the heart, trachea, esophagus, bronchi.

Meta-analysis: statistical technique which combines quantitative data from several studies conducted on the same subject by creating a single data for the final answer to a specific clinical question.

Methacholine: cholinergic agonist that has a duration of action compared to acetylcholine. It has vasodilator and parasympathomimetic action.

Methemoglobin: it is formed when iron in hemoglobin is oxidized due to genetic disease or toxic agents and it provokes cyanosis when increasing above normal values (minimum).

Miomalacia: softening of a muscle.

Miopragia: decreased functional activity.

Mioressi: muscle rupture.

Miosis or cormiosi: contraction of the pupil.

Mirror neurons: they are a class of specific neurons that are activated when you perform an action and when you look someone else performing it. The neuron of the observer so "mirror" the behavior observed, as if performing the action himself. These neurons have been identified in primates, in some birds and in humans. Giacomo Rizzolatti of the University of Parma discovered the mirror neurons.

Mitral valve prolapse: Mitral valve (one or both edges) in the atrium that prolapses in systole. It may be accompanied by regurgitation; it can cause arrhythmias. It should be done antibiotic prophylaxis during surgical maneuvers or bacterial diseases.

Mole: molecular weight of a substance expressed in grams.

Moya-moya: vascular disease of unknown etiology that affects the cerebral arteries with development of collateral circulation and the onset of multiple infarcts.

MRI: diagnostic procedure that produces images of the body based on exposure to magnetic fields.

Multiple sclerosis: neurological disease that damages the myelin sheaths surrounding the brain and the spinal nerves.

Muscle flaccidity: it follows the lesion of the motor nerve in which the muscle does not provide tensile strength.

Muscle spurt.: muscle that has the item very close to the fulcrum. Functionally the rotary component of the motion prevails.

Muscle tone: the resistance offered by a muscle strain.

Mycosis: disease caused by parasitic fungi.

Mydriasis or corectasia: pupil dilation.

Myocarditis: myocardial inflammation.

Myogelosis:. a condition in which there are hardened areas or nodules within muscles, especially the gluteal muscles ..

Myogenesis: development of muscle tissue, in particular the embryo.

Myoglobin: O_2 muscle pigment transporter. It is like a single unit of hemoglobin, being composed of a globin and heme group with an iron atom. It delivers O_2 released from erythrocytes to the mitochondria of muscle cells.

Myoglobinuria: presence of myoglobin in the urine. In some diseases it may occur also after prolonged and intense exercise.

Myolysis: disintegration or degradation of muscle tissue.

Myoma: tumor consisting of muscular elements.

Myonecrosis: necrosis of individual muscle fibers.

Myopathy: generic muscular disease.

Myoplastica: plastic surgery of a muscle.

Myosin: contractile protein present in skeletal muscle.

Myositis: inflammation of a voluntary muscle.

Myotasic: on the proprioception of the muscles.

Myotatic: performed or produced by muscle strain.

Myotomy: incision or dissection of a muscle or muscle tissue.

Myotonia: increased irritability and contractility with reduced muscle relaxation, a tonic spasm of the muscle.

Myotrophy: nutrition of the muscle.

N-

NASCET: North American Symptomatic endarterectomy trial.

Natriuretic factor: agent that causes elimination of sodium in the urine.

Necrosis: cell death, tissue destruction.

Negative predictive value: it expresses the probability that the person with negative test has to be sick. The higher it is, the greater the specificity of the test is.

Neurosis: mental disorder in which the perception of the reality is intact.

Nitric oxide or nitric oxide: substance produced by the vascular endothelium in vasodilating action.

Noradrenaline (norepinephrine): secreted catecholamine by the adrenal medulla and post-ganglionic adrenergic fibers. Potent vasoconstrictor.

NYHA:. See classes no.

NYHA classes.:heart failure may be acute or chronic, which may be classified into 4 classes as proposed by the New York Heart Association (NYHA) based on the relationship between symptom and effort required to provoke it.

O-

Obla: onset blood lactate accumulation. Lactate threshold, which corresponds to his store when it reaches the plasma concentration of 4 mmol / l.

Opioids: series of natural peptides such as enkephalins, which exert effects similar to those of opioids interacting with specific receptors on cell membranes.

Organ of Corti: Spiral organ. ortopnea body. respiration affected by the upright position, with greater difficulty breathing in the supine position.

Orthopnea: respiratory difficulty except in an upright position.

Orthostatic hypotension: reduction of blood pressure in the transition from a lying or sitting to a standing position of at least 40 mm Hg for systolic and 30 mmHg for diastolic.

Osmolality: number of osmolytes per kg of solvent.

Osmosis: phenomenon corresponding to the diffusion of solvent molecules to a region of greater solute concentration at which the membrane is impermeable.

Osteitis: bone inflammation.

Osteoblasts: fibroblast cells that reached the mature phase are associated with the production of bone.

Osteochondritis: inflammation of bone and cartilage.

Osteoclasts: large multinucleated cells that deal with the absorption and the reshaping of the bones

Osteoma: tumor composed by bone tissue.

Osteomalacia: condition characterized by bone softening (due to imperfect mineralization), with excess osteoid staff. It is the equivalent of rickets in adults.

Osteomyelitis: inflammation of bone and bone marrow caused by germs pyogenic (pus-producing germs).

Osteopenia: reduction of bone mass. osteoporosis. reduction in bone mass with a higher percentage than the depletion osteopenia (with standard deviation> 2.5 compared to normal).

Osteosarcoma: malignant neoplasia of bones.

P -

P wave of the ECG: corresponds to the depolarization (contraction) of industry.

Palpitations: sudden, transient sensation of altered functioning of the heart

Paralympics: the Paralympic Games, or Paralympic Games, are the equivalent of the Olympics for athletes with physical disabilities, visual or intellectual. Thought as parallel Olympics, they take their name from the merger of the prefix para Olympics with the word and its derivatives. The Law no. 189, July 15, 2003 ("Rules for the promotion of sport by disabled people ") refers to the Italian Federation of Sports for the Disabled as Italian Paralympic Committee (CIP).

Paraparesis: paresis of both lower limbs.

Paraplegia: paralysis of both lower limbs.

Parasympathetic effect: see parasympathetic.

Parasympathetic: effect of p. set of changes induced by the vagus nerve: pupillary constriction, salivation, bradycardia, sweating.

Paresis: reduction in strength and / or function.

Paresthesia: abnormal perception as burning, tingling, pricking, stitching.

Parkinson: disease characterized by tremor, rigidity and slow movement.

Pericarditis: inflammation of the pericardium. It may be autoimmune, viral or bacterial, traumatic, neoplastic.

Ph: the pH of a solution is the base-10 logarithm of the reciprocal of the concentration of H +, that is the negative logarithm of the concentration of hydrogen ions. The pH of the water at 25 ° C, where there are H + and OH-in equal quantities, is 7. From this value, for each decrease of pH by one unit, there is an increase of 10 times the concentration of H +, while for each increase of pH by one unit, there is a reduction of 10 times the concentration of H +.

Phenotype: all physical, biochemical and physiological characteristics of an individual that is genetically determined as well as by the environment, as opposed to genotype.

Phlebitis: inflammation of a vein.

Phospholipid (phosphatide): compound containing one or two molecules of fatty acid, a molecule of alcohol and a basic nitrogen in nature.

Piastronopenia: lack of circulating blood platelets.

Pituitary: gland at the base of the skull**.** (contraction and misalignment).

Platelets: increase in the number of circulating platelets in the blood.

Pleiotropy: quality of a gene to express itself in more than one way, namely to produce more than one phenotypic expression.

Pneumonectomy: removal (or excision) lung surger

Pneumothorax: accumulation of air or gas in the pleural space.

Point prevalence: defines the events (eg disease) present in a given time and referred to a defined population

Polygon of Willis: polygonal shape characteristic of the arteries of the cranial base.

Polyuria: Increased production of urine.

Portal vein: a vein that carries blood from the intestines to the liver, spleen and stomach.

Positive predictive value: it expresses the probability that the person with positive test has to be sick. The higher it is, the greater the sensitivity of the test is.

Posture: it is the ratio of joints and muscles and tendons that our body creates from its center of gravity and the base plate, according to the positions they assume, in order to maintain stability and counter the force of gravity .

Pot: a synonym for artery, vein or lymphatic

Pre-load: it means the load borne by the muscle when it is in idle state; it relaxes the muscle that is at rest, and it directly depends on the increase in diastolic volume of the RV.

Prevalence period case: defining events (eg disease) present in the population over a given period of time.

Prinzmetal : angina pectoris con manifestazioni e caratteristiche particolari; si può ritrovare anche in pazienti con coronarie indenni.

Prostacyclin: derivatives of arachidonic acid via intermediates, they are potent vasodilators and inhibitors of platelet aggregation.

Proteinuria: protein loss through the urine, often in the course of renal disease in the glomeruli

Proteoglycans: substances found mainly in the matrix of connective tissues in which many glycosaminoglycan chains are attached covalently to a core protein as the bristles of a brush for bottles

Proteolysis: lysis, dissolution, separation of proteins by hydrolysis of peptide bonds.

Protidogramma: analysis of various blood protein fractions (albumin and globulin).

Psychosis: mental disorder characterized by delusions, hallucinations, abnormal speech and behavior that the person has no awareness.

Ptosis: Prolapse of an organ or part.

Ptyalism: excessive secretion of saliva.

Pulmonary heart disease (acute or chronic)**:** Right ventricular failure due to pulmonary disease conditions (eg, embolism, pulmonary hypertension, COPD).

Pyrogens: substances released by the body (endogenous pyrogens) or external agents that may be, for example bacterial or viral (exogenous pyrogen); they can cause fever (or pyrexia).

Q-

QRS (complex)**:** it corresponds to the depolarization (contraction) of the inter-ventricular septum and both ventricles.

R-

Rabdiomiolisi: destruction of skeletal muscle due to infection or intoxication.

Raynaud (disorder, syndrome, phenomenon)**:** ischemia followed by cyanosis and asphyxia with local loss of sensitivity

Rbbb: right bundle branch block; total, permanent or intermittent interruption of trasmission in the trunk of the right branch of His bundle before the first division in the two emibranche.

Rolling friction: the force that opposes the rolling of a round or roundish body over another similar body or a different surface.

Receptive: structure belonging to the nervous system that is used to transfer a message.

Rectocele**:** rectal wall prolapse.

Relative risk: ratio between the frequency of the incidence of a disease among individuals exposed to a particular risk factor and the frequency of the non-exposed ones.

Release Height: the height above the ground level(reference system) or the height above the point of landing, to which a body is thrown or otherwise undergoes a push that causes its movement.

Rheumatoid factor (RF): this term indicates antibodies directed against antigenic determinants of the Fc portion of IgG ; it is found in 80% of rheumatoid arthritis (in 20% of juveniles).

Rickets: it is a disorder caused by a deficiency of vitamin D, most commonly in children and teenagers, with abnormal ossification.

Riflex: fast and simple movement, at the base of automatic movements in response to noxious, proprioceptive, exteroceptive or enteroceptive stimuli

Rigidity: increase of the muscle tone of the agonist and antagonist muscles with resistance to the passive movement.

Rom: range of motion. It is used to measure joint mobility.

S-

Saccule: the smallest of the two divisions of the membranous labyrinth of the vestibule, the part that communicates with the cochlear duct by the ductus reuniens.

Sarcoidosis: systemic chronic disease, characterized by the presence of granulomas in many organs of the body, especially lungs, lymph nodes and liver

Sarcoma: malignant tumor that arises from connective structures.

Sarcopenia: a reduction in the number of muscle fibers.

Sarcoplasm: interfibrillare matter of a striated muscle.

Saturnism: lead poisoning

Schizophrenia: mental illness characterized by the alteration of the process of thinking, of the contact with the reality and the emotional reactivity

Scintigraphy: reproduction of bidimensional structures and organs through the recording of radiation emitted by tissues after the introduction of various radionuclides in the body.

Sclera: the white of the eye, visible externally

Scleroderma: skin disorders characterized by thickening and hardening of the skin with subcutaneous tissue, and sometimes deep tissue

Scoliosis: lateral deviation, relative to the central spine.

Scotoma: black spot that affects a part of the visual field

Secretin: peptide hormone secreted by the duodenum and fasting. It stimulates the pancreas to release bicarbonate and water which change the pH in the duodenum

Sedimentation rate (ESR): it measures the time required for the corpuscular part of a sample of blood plasma in the sediments.

Sensitivity: it is given by the proportion of patients who test positive to a test (true positives), and those who come out negative are false negatives.

Serotonin: a vasoconstrictor substance synthesized in the nervous system or the intestinal chromaffin cells.

Shunt muscle: muscle that functionally overrides the axial component of movement. It rather than producing observable motion, contracts to resist dislocating forces occurring at joints, the coracobrachialis, short head of biceps, and long head of triceps all contract to resist downward dislocating forces at the shoulder joint, as when toting luggage.

Shunt: passage or anastomosis between two natural channels, especially between blood vessels.

Sickling and sickle cell anemia: hereditary hemolytic anemia due to a genetic alteration of hemoglobin

Sign: evidence indicating the presence of something. The sign, opposite to the symptom (which is manifested by the patient), can be objectively found by the observer.

SLE (systemic lupus erythematosus)**:** multisystem inflammatory disorder of connective tissue involving the skin, joints, serous membranes and some organs.

Sna: autonomic nervous system.

Somatostatin: peptide produced mainly by the hypothalamus and the delta cells of the pancreas. It inhibits the release of growth hormone, of the thyrotropin and of corticotropin by the pituitary, insulin and glucagon, gastrin, secretin, and renin.

Spasm: involuntary contraction, sudden and violent of a muscle or muscle group.

Spasticity: increased tone (hypertonia) of agonist muscles with accentuation of tendon reflexes.

Specificity: it is given by the proportion of animals which are negative to a test (true negatives), the healthy who are positive are false positives.

Spherocytosis: hereditary hemolytic anemia. It is often associated to jaundice and splenomegaly.

Spina bifida: a developmental abnormality characterized by defective closure of the scaffold with possible bony protrusion of the spinal cord and spinal meninges.

Splenomegaly: increase in size of the spleen.

Sprue: malabsorption syndrome, chronic.

Starling (Law): the energy of cardiac contraction is proportional to the initial length of myocardial fibers (the degree of preload) in direct relation to the diastolic volume.

Steatosis: fatty degeneration, commonly the liver.

Stent: garrison consists of a small tube that is inserted through the catheter after angioplasty in stenosed artery to ensure patency.

Stiffness (rigidity): degree of resistance or tension of the muscle fibers as a result of their elongation.

Stretching: literally means stretching, tension. It more precisely identifies a particular technique that aids the improvement of quality muscle and joint of the subject through the stretch and the tension of muscle fibers and tendons.

Stroke: acute onset of focal brain lesion.

Subclavian steal phenomenon (SSP)**:** refers to subclavian artery steno-occlusive disease proximal to the origin of the vertebral artery and is associated with flow reversal in the vertebral artery. It produces a "brain steal" to ensure the blood supply to the ipsilateral upper limb. In these cases, the intense upper limb muscle activity may aggravate the condition of "steal" and can produce symptoms of cerebral hypoperfusion, most of which are dramatical.

Substance p.: 11 amonoacidi peptide present in nerve cells and endocrine cells of the intestine. It increases smooth and gastrontestinal muscle contraction and causes

vasodilation, it is attributed to a possible role as mediator of pain (the transmission of pain impulses.).

Superoxide dismutase: Enzino class of oxidoreductases. It has a protective function on the cell by the action of superoxide.

Surfactant: surfactant mainly consisting of phospholipids and produced by type II alveolar epithelial cells that cover the alveoli and reduces surface tension.

Sympathetic effect: see sympathetic.

Sympathetic: set of changes induced by adrenaline, such as mydriasis, tachycardia, vasoconstriction (alpha receptors), vasodilation (beta receptors).

Syncope: transient loss of postural tone and consciousness.

Syndrome: the complex of coexisting signs and symptoms

Synovitis: inflammation of the membrane covering the joints

T-

Tachycardia: increased heart rate.

Tea: tromboendoarteriectomia, surgical technique often used in internal carotid artery stenosis.

Tenesmus: constant need to urinate or defecate

Tetanus: sustained muscular contraction without periods of relax for the presence of rapidly repeated stimulation of activation of the contractile always before the release occurs.

Tetany: neuromuscular hyperexcitability due to a decline in the concentration of extracellular ionized calcium, it may be secondary to hyperventilation.

Tetraplegia: paralysis of four limbs

Thalassemia: hereditary hemolytic anemia since. Thalassemia or sickle cell anemia characterized by small red blood cells.

the speed and degree of stretching.

Threshold: greater (low threshold) or less (high threshold) capacity of excitability of a muscle fiber to nerve stimulation.

Thrombocytes: the other name of the platelets.

Thrombolysis: natural phenomenon or drug-induced, so the pre-formed thrombi are lysed

Thrombophilia: tendency to recurrence of thrombosis.

Thrombophlebitis: Inflammation of a vein associated with thrombosis of one or more segments.

Thromboxane (TX): an intermediate product of arachidonic acid metabolism. the tx a2 is a potent vasoconstrictor and inducer of platelet aggregation.

Thrombus: aggregation of blood factors in vivo, primarily platelets and fibrin that include cellular elements

Thyme: lymphoid organ consisting of two lobes located in the anterior and in the higher mediastinum.

TIA: transient ischemic attack. transient ischemic attack.

Time of flight: duration in which a body remains in the air without contact with other physical means (air or water). It depends on the angle of release, height of release, the force exerted on the body before release (vertical speed) than that the acceleration of gravity and air friction.

Tinnitus: is the perception of sound within the human ear not originated from the environment

Training: repetition of an exercise that requires physical effort, done with some intensity and aimed to improve performance.

Trigeminy: regular repetition of a premature beat (heartbeat) after two complexes of the basic rhythm.

Trypsin: enzyme that catalyzes the cleavage of peptide bonds. It is secreted by the pancreas as trypsinogen, later transformed into the small intestine.

U-

Utricle: the largest of the two parts of the membranous labyrinth, located in the posterosuperior region of the vestibule.

V-

Valgus: pathological condition in which the axis of a limb segment deviates outside from its normal position.

Valsalva (maneuver): forced expiration with closed glottis.

Valve insufficiency: situation created by the incontinence a valve (eg, cardiac or venous), causing regurgitation.

Valve stenosis: the situation characterized by a stenosis of a heart valve that reduces the outflow of blood.

Varus deformity: pathological condition in which the axis of a limb segment deviates within from its normal position

Vascular resistance: the force that opposes the flow of blood in the vessels. It is measured in dyn x sec x cm-5and it affects post-load.

Vasculitis: inflammation of a vessel, angiitis.

Vasopressin: the posterior lobe of the pituitary hormone with antidiuretic and vasoconstrictor hypertension

Vc: current volume

Ventricular fibrillation: the activation mechanism is similar to that of the atrial fibrillation. While in the AF , in spite of the atrial asystole, blood leeks by gravity from the atrium to the ventricle, the VF asystole is incompatible with life.

Ventricular pre-excitation: intracardiac conduction disorder characterized by the early activation of the ventricles due to the presence of additional nodal fiber bundles

Vertebral index (Delmas)**:** ratio between the height of the spine x 100 and its length measured in the sagittal plane. This ratio is considered normal with results between 94 and 96.

Vertigo: illusion of movement; it can be objective (which revolves around the space surrounding the subject) or subjective (the person who goes around to the surrounding space).

VIP: vasoactive intestinal polypeptide: vasoactive intestinal peptide.

Viscosity: it is characteristic of the muscle, it shows a dissipation of energy; this excess of energy expenditure is due, above all, to the increasing speed of the muscle's work.

Viscous friction or resistance of the medium: dependent force by a fluid (liquid or gas) which opposes the motion of a body immersed in it.

vitamin b12: cyanocobalamin.

W-

Whipple's disease: disease characterized by diarrhea with fatty stools, arthritis,emaciation and decreased strength secondary to deposits of fat in the gut.

Wrist: lifting perceived by palpating fingers artery surface wave associated with the shift from the blood.

X-

Xanthelasma: skin condition characterized by the appearance of yellowish spots, often symmetrical, to the internal angles of the upper eyelids.

Xanthoma: accumulation of cells rich in lipids (especially cholesterol) deposits that form skin or tendon

Xanthopsia: visual disturbance, to which all objects are yellow.

Xeroderma: Skin diseases with various skin lesions in congenital nature sensitive to ultraviolet radiation

Xeroderma: Skin that becomes dry, tough, especially for vitamin A deficiency

Xerophthalmia: dry eye.

Xerostomia: dry mouth mucosa.

Y-

Ymca: young man Catholic Association

Z-

Zoonoses: disease transmitted from animals to humans.