
# CORRELAZIONE TRA STATO NUTRIZIONALE ED IMBALANCE SIMPATO-VAGALE NEL PAZIENTE ANZIANO

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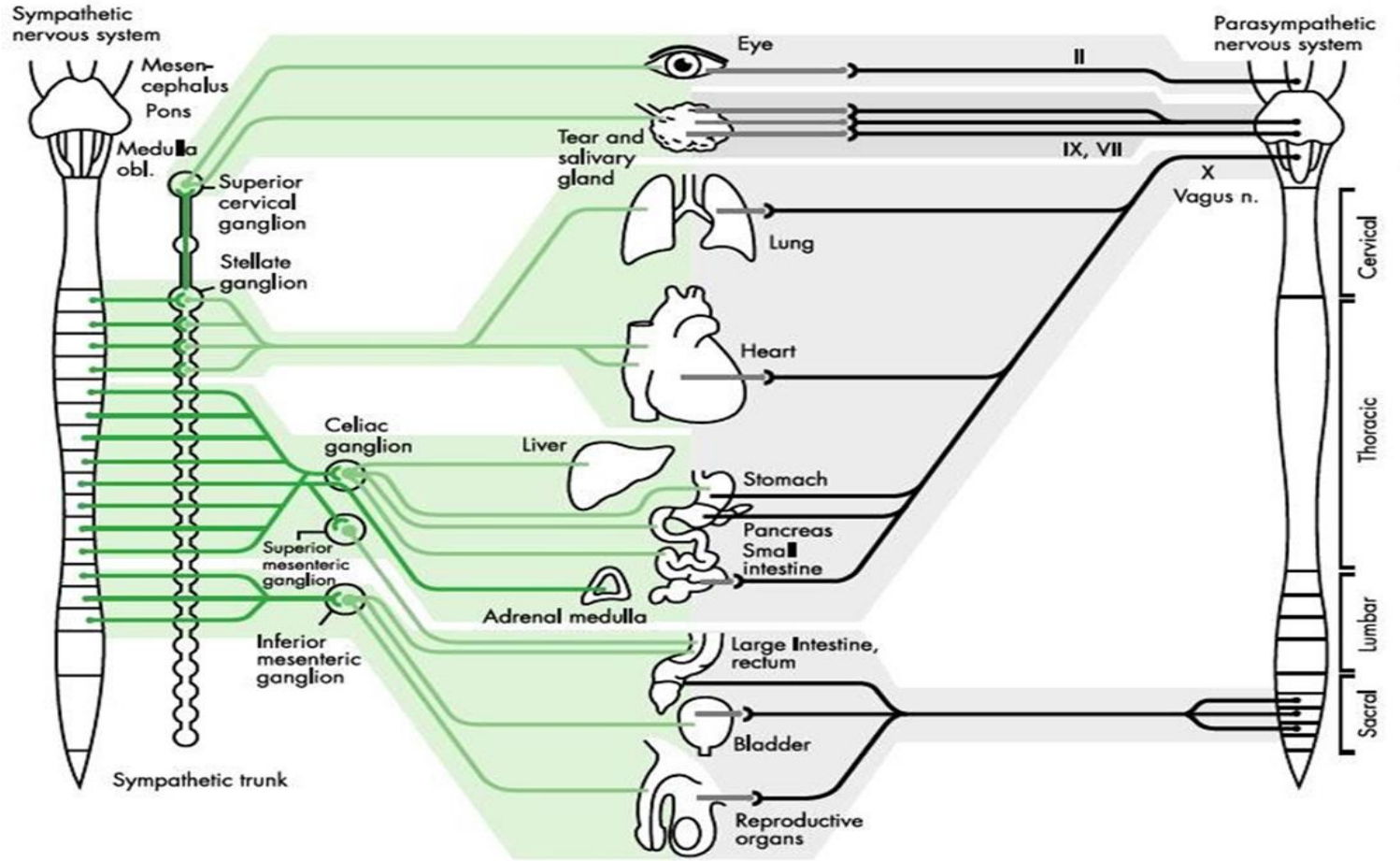
## Lo studio

**Correlare le variazioni dello stato nutrizionale nel paziente anziano, rilevate mediante la somministrazione del *Mini Nutritional Assessment* (MNA), con il balance simpato-vagale, registrato attraverso ECG Holter delle 24 h, in pazienti anziani**




Mathias CJ. N Engl J Mec

# Disautonomia ed Heart Rate Variability

## Signs and Symptoms Suggestive of Dysautonomia[1]

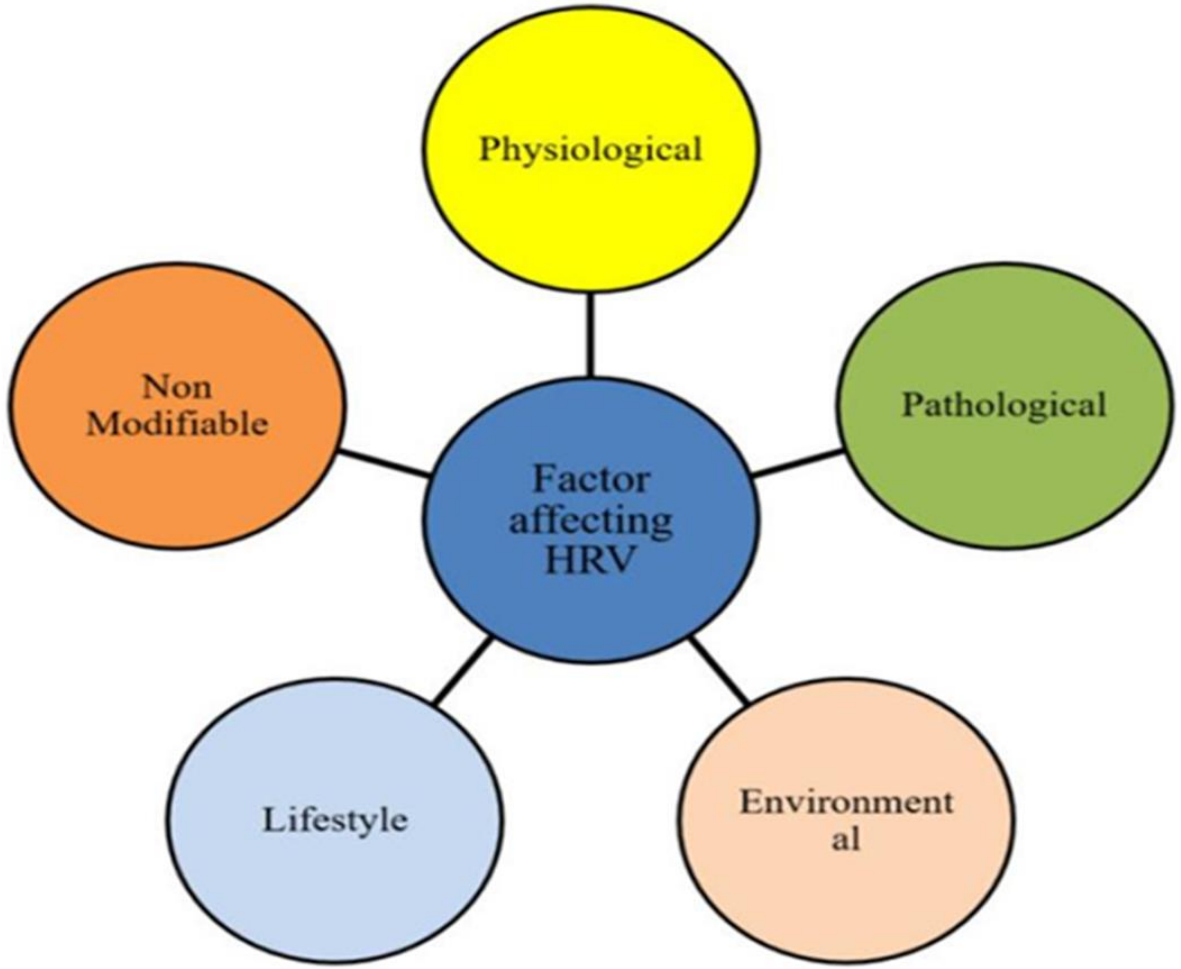
| Specific signs and symptoms | Symptoms in various organs |
|---|---|
| Postural dizziness, pre-syncope, syncope, fatigue, falls, exercise intolerance, inappropriate tachycardia, chronotropic incompetence, blood pressure lability. | Constipation, bundling, abnormal sweating, urinary urgency, erectile dysfunction, menstrual abnormalities, pupillary dysfunction, hypoglycemia and poor glycemic control in diabetics. |
| Pain and paresthesia in extremities<br>Orthostatic intolerance | Joint stiffness and tremor of the extremities |

## Dysautonomia evaluation flowchart

| | |
|---|---|
| Dysautonomia tests[7]<br>1- Blood pressure measurement in orthostasis with 1, 3 and 5 minutes<br>2- Valsalva, respiratory and orthostasis maneuvers 30:15<br>3- RR variability in the frequency and time domain | Electrocardiogram[2]<br>Tilt test<br>24-h ABPM<br>Other tests according to clinical condition[3]<br>Laboratory tests[4] |

## Investigation of pathologies that cause CAN[1] and follow-up

| | |
|---|---|
| Evaluation and follow-up with specialists (cardiologist, arrhythmologist, neurologist, endocrinologist) | Permanent follow-up and treatment with general measures and drugs, according to clinical manifestations |
| Follow-up with a multidisciplinary team (physiotherapist, nutritionist, occupational therapist) | Repetition of annual dysautonomia tests[5] and according to signs and symptoms |
| Constant evaluation of drugs that aggravate the condition. | Investigation and treatment of cardiovascular pathologies due to higher risk of cardiovascular mortality. |
| Treatment of underlying diseases | Consider antiplatelet drugs, statins and SGLT2[6] in diabetics |
| Consider that orthostatic hypotension (OH) may be associated with supine hypertension | |



Poon et al. BMC Cardiovascular Disorders (2020) 20:217
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BMC Cardiovascular Disorders

RESEARCH ARTICLE Open Access

# Insulin resistance and reduced cardiac autonomic function in older adults: the Atherosclerosis Risk in Communities study

Anna K. Poon[1], Eric A. Whitsel[1,2], Gerardo Heiss[1], Elsayed Z. Soliman[3], Lynne E. Wagenknecht[4], Takeki Suzuki[5] and Laura Loehr[2*]



Published in final edited form as:
*Obesity (Silver Spring)*. 2010 February ; 18(2): 414–416. doi:10.1038/oby.2009.408.

# Impact of Six-Month Caloric Restriction on Autonomic Nervous System Activity in Healthy, Overweight, Individuals

**Lillian de Jonge**, **Emilia AM Moreira**, **Corby K Martin**, **Eric Ravussin**, and **for the Pennington CALERIE Team**
Pennington Biomedical Research Center, Louisiana State University System, Baton Rouge, LA, 70808

Current Nutrition Reports (2021) 10:324–333
https://doi.org/10.1007/s13668-021-00373-1

GASTROENTEROLOGY, CRITICAL CARE, AND LIFESTYLE MEDICINE (SA MCCLAVE AND M EISA, SECTION EDITORS)

# Nutritional Implications of Patients with Dyseconomia and Hypermobility Syndromes

**Toan C1 · Sarah Diamond2 · Caitlin Green3 · Malissa Warren4**

Accepted: 17 August 2021 / Published online: 12 September 2021


GeroScience (2019) 41:13–24
https://doi.org/10.1007/s11357-018-0048-5

REVIEW ARTICLE

# Sympathetic nervous system as a target for aging and obesity-related cardiovascular diseases

**Priya Balasubramanian · Delton Hall · Madhan Subramanian**

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# Disautonomia e Nutrizione

Review > Geroscience. 2019 Feb;41(1):13-24. doi: 10.1007/s11357-018-0048-5. Epub 2018 Dec 5.

## Sympathetic nervous system as a target for aging and obesity-related cardiovascular diseases

Priya Balasubramanian [1], Delton Hall [2], Madhan Subramanian [3]

Affiliations + expand

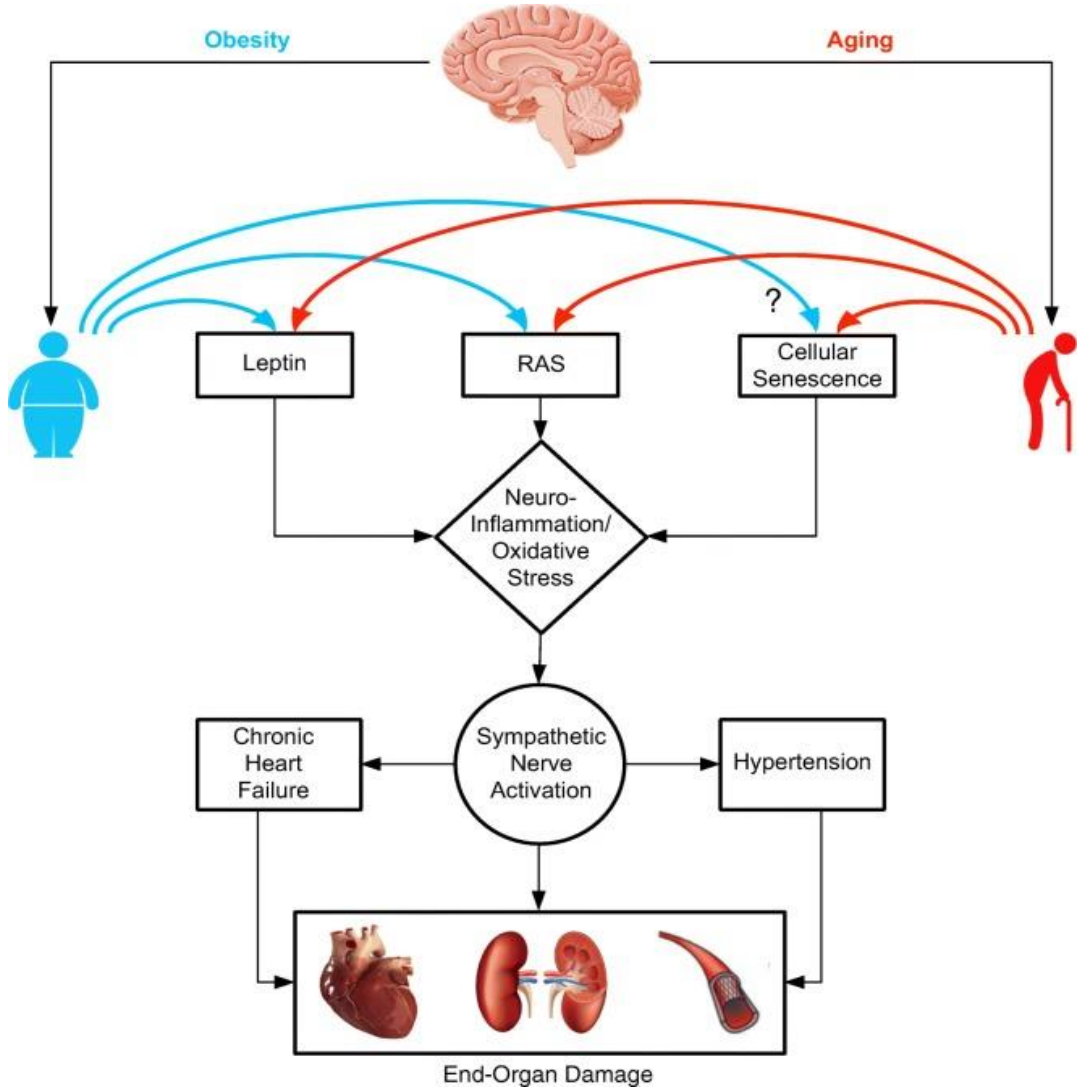
PMID: 30519806 PMCID: PMC6423215 DOI: 10.1007/s11357-018-0048-5

Free PMC article

### Abstract

Chronic sympathetic nervous system overactivity is a hallmark of aging and obesity and contributes to the development of cardiovascular diseases including hypertension and heart failure. The cause of this chronic sympathoexcitation in aging and obesity is multifactorial and centrally mediated. In this mini-review, we have provided an overview of the key and emerging central mechanisms contributing to the pathogenesis of sympathoexcitation in obesity and healthy aging, specifically focusing on hypertension. A clear understanding of these mechanisms will pave way for targeting the sympathetic nervous system for the treatment of cardiovascular diseases in obesity and aging.

**Keywords:** Aging; Cellular senescence; Hypertension; Inflammation; Leptin; Obesity; Oxidative stress; Renin-angiotensin system; Sympathetic nerve activity.



# Disautonomia e Nutrizione

Hindawi
Journal of Obesity
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https://doi.org/10.1155/2020/7185249

*Research Article*

## Risk Factors Associated with Cardiac Autonomic Modulation in Obese Individuals

**Camila Oliveira,[1] Erika Aparecida Silveira,[2] Lorena Rosa,[1] Annelisa Santos,[1] Ana Paula Rodrigues,[3] Carolina Mendonça,[1] Lucas Silva,[1] Paulo Gentil,[3] and Ana Cristina Rebelo[4]**

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Obesity leads to an imbalance in the autonomic nervous system, especially in increased sympathetic modulation and decreased vagal tone, and some anthropometric, metabolic, and lifestyle variables may increase the risk of developing cardiovascular disease. *Objective.* To analyze the association between cardiovascular autonomic modulation and biochemical and anthropometric markers, food intake, and physical activity level in severely obese individuals. *Methodology.* The present study is a cutout of a randomized clinical trial "Effect of nutritional intervention and olive oil in severe obesity" (DieTBra Trial), where the baseline data were analyzed. Anthroponetric data, biochemical exams, heart rate variability (HRV), accelerometry, and 24 h recall (R24H) of obese patients (body mass index BMI ≥35 kg/m$^2$) were collected. *Results.* 64 obese patients were analyzed, with a mean age of 39.10 ± 7.74 years (27 to 58 years). By HRV analysis, in the frequency domain, the obese had a higher predominance of sympathetic autonomic modulation (low frequency (LF) 56.44 ± 20.31 nu) and lower parasympathetic modulation (high frequency (HF) 42.52 ± 19.18 nu). A negative association was observed between the variables Homeostasis Evaluation Model (HOMA-IR) and HF ($p = 0.049$). In the physical activity analysis, there was a negative association between moderate to vigorous physical activity and the sympathetic component ($p = 0.043$), and for sedentary time (ST), there was a negative association with HF ($p = 0.049$) and LF/HF ($p = 0.036$) and a positive association with LF ($p = 0.014$). For multiple linear regression, waist circumference (WC) and HOMA-IR values were negatively associated with HF ($\beta = -0.685$, $p = 0.010$; $\beta = -14.989$, $p = 0.010$; respectively). HOMA-IR ($\beta = 0.141$, $p = 0.003$) and the percentage of lipids ingested ($\beta = -0.030$, $p = 0.043$) were negatively associated with LF/HF. *Conclusion.* Among the cardiovascular risk variables studied, insulin resistance and central adiposity showed the greatest influence on cardiac autonomic modulation of obese, increasing the risk for cardiovascular disease.

### 1. Introduction

Studies show that obesity leads to the development of noncommunicable diseases such as hypertension, hypercholesterolemia, insulin resistance, and type 2 diabetes [1–3], and also several previous studies have found changes in cardiac autonomic modulation in overweight and obese individuals [4–6], which may be more affected in obese individuals (body mass index (BMI) ≥35.0 kg/m$^2$) [9]. This impairment occurs through an imbalance in the autonomic nervous system (ANS), especially in increased sympathetic modulation and decreased vagal tone leading to decreased heart rate variability (HRV) [5, 7, 10].

The measurement of these patterns can provide a sensitive and early indicator of serious health impairment in obese individuals with a higher risk of multimorbidity and

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## Insulin resistance and reduced cardiac autonomic function in older adults: the Atherosclerosis Risk in Communities study

Anna K. Poon[1], Eric A. Whitsel[1,2], Gerardo Heiss[1], Elsayed Z. Soliman[3], Lynne E. Wagenknecht[4], Takeki Suzuki[5] and Laura Loehr[2*]

**Abstract**

**Background:** Prior studies have shown insulin resistance is associated with reduced cardiac autonomic function measured at rest, but few studies have determined whether insulin resistance is associated with reduced cardiac autonomic function measured during daily activities.

**Methods:** We examined older adults without diabetes with 48-h ambulatory electrocardiography (n = 759) in an ancillary study of the Atherosclerosis Risk in Communities Study. Insulin resistance, the exposure, was defined by quartiles for three indexes: 1) the homeostatic model assessment of insulin resistance (HOMA-IR), 2) the triglyceride and glucose index (TyG), and 3) the triglyceride to high-density lipoprotein cholesterol ratio (TG/HDL-C). Low heart rate variability, the outcome, was defined by <25th percentile for four measures: 1) standard deviation of normal-to-normal R-R intervals (SDNN), a measure of total variability; 2) root mean square of successive differences in normal-to-normal R-R intervals (RMSSD), a measure of vagal activity; 3) low frequency spectral component (LF), a measure of sympathetic and vagal activity; and 4) high frequency spectral component (HF), a measure of vagal activity. Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals weighted for sampling/non-response, adjusted for age at ancillary visit, sex, and race/study-site. Insulin resistance quartiles 4, 3, and 2 were compared to quartile 1; high indexes refer to quartile 4 versus quartile 1.

**Results:** The average age was 78 years, 66% (n = 497) were women, and 58% (n = 438) were African American. Estimates of association were not robust at all levels of HOMA-IR, TyG, and TG/HDL-C, but suggest that high indexes were associated consistently with indicators of vagal activity: High HOMA-IR, high TyG, and high TG/HDL-C were consistently associated with low RMSSD (OR: 1.68 (1.00, 2.81), OR: 2.03 (1.21, 3.39), and OR: 1.73 (1.01, 2.91), respectively). High HOMA-IR, high TyG, and high TG/HDL-C were consistently associated with low HF (OR: 1.90 (1.14, 3.18), OR: 1.98 (1.21, 3.25), and OR: 1.76 (1.07, 2.90), respectively).

**Conclusions:** In older adults without diabetes, insulin resistance was associated with reduced cardiac autonomic function – specifically and consistently for indicators of vagal activity – measured during daily activities. Primary prevention of insulin resistance may reduce the related risk of cardiac autonomic dysfunction.

**Keywords:** Insulin resistance, Homeostatic model assessment of insulin resistance, Cardiac autonomic function, Ambulatory electrocardiograms, Heart rate variability

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# Stato nutrizionale del paziente anziano

ELSEVIER

Nutrition

Volume 15, Issue 2, February 1999, Pages 116-122

Applied Nutritional Investigations

## The mini nutritional assessment (MNA) and its use in grading the nutritional state of elderly patients

Bruno Vellas MD *, Yves Guigoz PHD † ||, Philip J Garry PHD ‡, Fati Nourhashemi MD *, David Bennahum MD §, Sylvie Lauque (RD) * ||, Jean-Louis Albarede MD *

## Mini Nutritional Assessment MNA®

Nestlé NutritionInstitute

Cognome: Nome:

Sesso: Età: Peso, kg: Altezza, cm: Data:

Risponda alla prima parte del questionario indicando, per ogni domanda, il punteggio appropriato. Sommi il punteggio della valutazione di screening e, se il risultato è uguale o inferiore a 11, completi il questionario per ottenere una valutazione dello stato nutrizionale.

### Screening

**A** Presenta una perdita dell' appetito? Ha mangiato meno negli ultimi 3 mesi? (perdita d'appetito, problemi digestivi, difficoltà di masticazione o deglutizione)
0 = grave riduzione dell'assunzione di cibo
1 = moderata riduzione dell'assunzione di cibo
2 = nessuna riduzione dell'assunzione di cibo ☐

**B** Perdita di peso recente (<3 mesi)
0 = perdita di peso > 3 kg
1 = non sa
2 = perdita di peso tra 1 e 3 kg
3 = nessuna perdita di peso ☐

**C** Motricità
0 = dal letto alla poltrona
1 = autonomo a domicilio
2 = esce di casa ☐

**D** Nell' arco degli ultimi 3 mesi: malattie acuteo stress psicologici?
0 = sì 2 = no ☐

**E** Problemi neuropsicologici
0 = demenza o depressione grave
1 = demenza moderata
2 = nessun problema psicologico ☐

**F** Indice di massa corporea IMC = peso in kg / (altezza in m)²
0 = IMC <19
1 = 19 ≤ IMC < 21
2 = 21 ≤ IMC < 23
3 = IMC ≥ 23 ☐

Valutazione di screening ☐☐
(totale parziale max.14 punti)

12-14 punti: stato nutrizionale normale
8-11 punti: a rischio di malnutrizione
0-7 punti: malnutrito

Per una valutazione più approfondita, continuare con le domande G-R

### Valutazione globale

**G** Il paziente vive autonomamente a domicilio?
1 = sì 0 = no ☐

**H** Prende più di 3 medicinali al giorno?
0 = sì 1 = no ☐

**I** Presenza di decubiti, ulcere cutanee?
0 = sì 1 = no ☐

**J** Quanti pasti completi prende al giorno?
0 = 1 pasto
1 = 2 pasti
2 = 3 pasti ☐

**K** Consuma?
- Almeno una volta al giorno dei prodotti lattiero-caseari? sì ☐ no ☐
- Una o due volte la settimana uova o legumi? sì ☐ no ☐
- Ogni giorno della carne, del pesce o del pollame? sì ☐ no ☐

0.0 = se 0 o 1 sì
0.5 = se 2 sì
1.0 = se 3 sì ☐☐

**L** Consuma almeno due volte al giorno frutta o verdura?
0 = no 1 = sì ☐

**M** Quanti bicchieri beve al giorno? (acqua, succhi, caffé, té, latte...)
0.0 = meno di 3 bicchieri
0.5 = da 3 a 5 bicchieri
1.0 = più di 5 bicchieri ☐☐

**N** Come si nutre?
0 = necessita di assistenza
1 = autonomamente con difficoltà
2 = autonomamente senza difficoltà ☐

**O** Il paziente si considera ben nutrito? (ha dei problemi nutrizionali)
0 = malnutrizione grave
1 = malnutrizione moderata o non sa
2 = nessun problema nutrizionale ☐

**P** Il paziente considera il suo stato di salute migliore o peggiore di altre persone della sua età?
0.0 = meno buono
0.5 = non sa
1.0 = uguale
2.0 = migliore ☐☐

**Q** Circonferenza brachiale (CB, cm)
0.0 = CB < 21
0.5 = CB ≤ 21 CB ≤ 22
1.0 = CB > 22 ☐☐

**R** Circonferenza del polpaccio (CP in cm)
0 = CP < 31
1 = CP ≥ 31 ☐

Valutazione globale (max. 16 punti) ☐☐.☐
Screening ☐☐.☐
Valutazione totale (max. 30 punti) ☐☐.☐

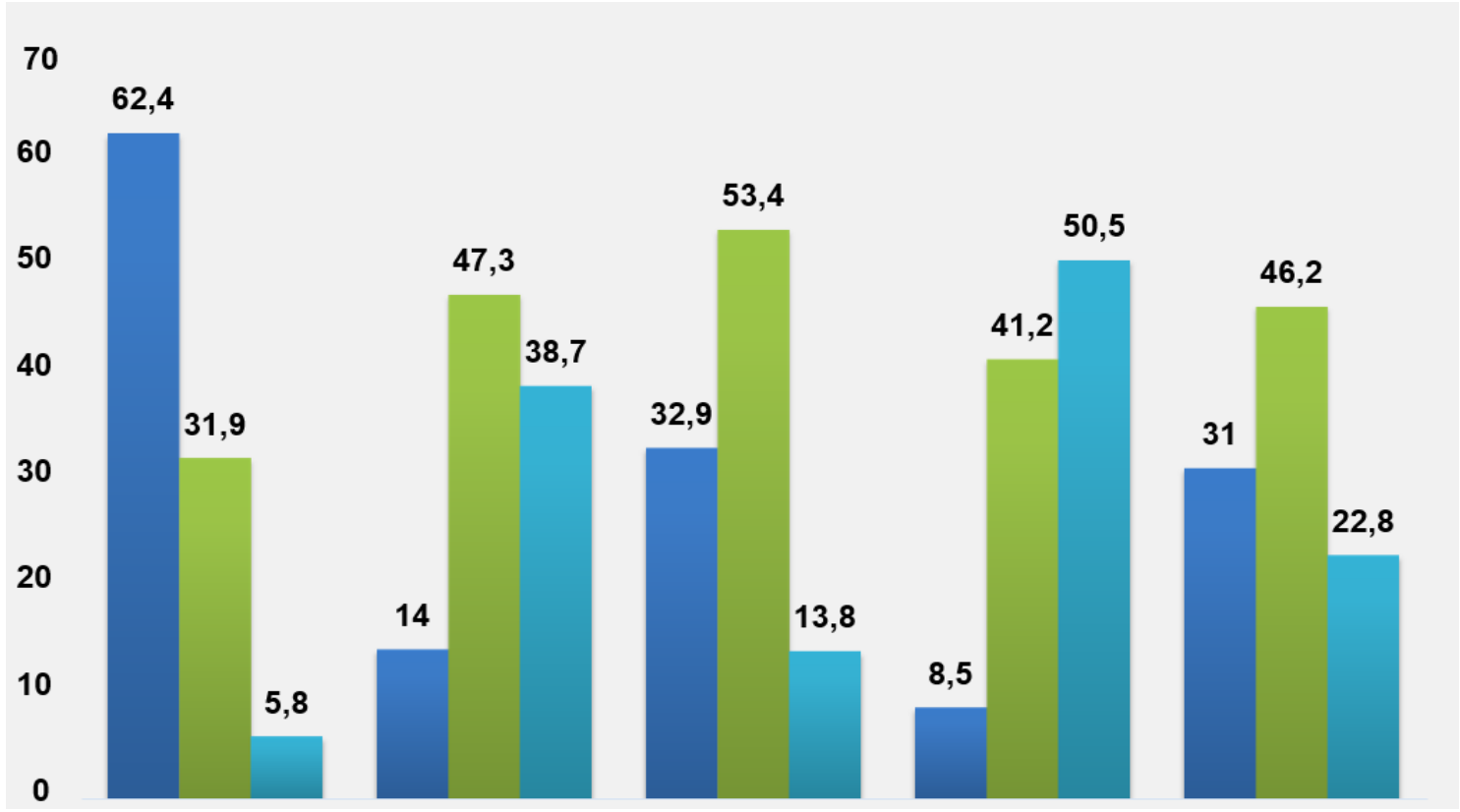
### Valutazione dello stato nutrizionale

24-30 da 24 a 30 punti — stato nutrizionale normale
17-23.5 da 17 a 23,5 punti — rischio di malnutrizione
meno 17 punti — cattivo stato nutrizionale

Ref. Vellas B, Villars H, Abellan G, et al. *Overview of MNA® - Its History and Challenges.* J Nut Health Aging 2006; 10: 456-465.
Rubenstein LZ, Harker JO, Salva A, Guigoz Y, Vellas B. Screening for Undernutrition in Geriatric Practice: *Developing the Short-Form Mini Nutritional Assessment (MNA-SF).* J. Geront 2001; 56A: M366-377.
Guigoz Y. *The Mini-Nutritional Assessment (MNA®) Review of the Literature – What does it tell us?* J Nut Health Aging 2006; 10: 466-487.

Per maggiori informazioni : www.mna-elderly.com

# Stato nutrizionale del paziente anziano




- Ben nutriti (MNA >23.5)
- Rischio malnutrizione (MNA 17-23.5)
- Malnutriti (MNA <17)

Kai Wei et al, MD,et al, JNO 2018

# Popolazione

Azienda Ospedaliera Universitaria Federico II
Integrata con il Servizio Sanitario Regionale

Questo studio è stato condotto presso gli ambulatori di Geriatria dell'AOU Federico II

dal 01/05/2023 al 30/10/2023.

Popolazione:
N = 53 pazienti ≥ 65 anni

♂ N = 38

♀ N = 15

Criteri di esclusione:

- Cachessia
- Degenerazione multiorgano in stadio terminale
- Malattie avanzate di SNP ed SNC
- Demenza di grado moderato-severo
- Stato di agitazione psicomotorio
- Depressione maggiore
- Registrazione Holter della durata < 20h

# Materiali e Metodi

**Azienda Ospedaliera Universitaria Federico II**

**Dipartimento assistenziale ad attività integrata di**

**MEDICINA INTERNA E PATOLOGIA CLINICA**

**MINI NUTRITIONAL ASSESSMENT (MNA)**

| |
|---|
| **ASSESSMENT ANTROPOMETRICO** |
| • BMI (peso/altezza² ,in Kg/m²) |
| 0 = BMI < 19 |
| 1 = 19 ≤ BMI < 21 |
| 2 = 21 ≤ BMI < 23 |
| 3 = BMI ≥ 23 |
| • Circonferenza media del braccio (MAC, in cm) |
| 0.0 = MAC < 21 |
| 0.5 = 21 ≤ MAC < 22 |
| 1.0 = MAC > 22 |
| • Circonferenza del polpaccio (CC, i |
| 0 = CC < 31 1 = CC ≥ 31 |
| • Perdita di peso negli ultimi 3 mesi |
| 0 = perdita di peso > 3 Kg. |
| 1 = non sa |
| 2 = perdita di peso tra 1 e 3 Kg. |
| 3 = non perdita di peso |
| |
| **ASSESSMENT GLOBALE** |
| • **Il paziente dipende dai servizi di** |
| 1 = no 0 = si |
| • **Assume più di 3 farmaci al giorn** |
| 0 = si 1 = no |
| • **Negli ultimi 3 mesi ha sofferto di** |
| 0 = si 2 = no |
| • **Mobilità** |
| 0 = costretto a letto o su una sedia |
| 1 = si alza dal letto/sedia ma non esce |
| 2 = esce di casa |
| • **Problemi neuropsicologici** |
| 0 = demenza grave o depressione |
| 1 = demenza lieve |
| 2 = non problemi psicologici |
| • **Ulcere da decubito** |
| 0 = si 1 = no |
| |
| **ASSESSMENT DIETETICO** |
| • Numeri di pasti al giorno |
| 0 = 1 pasto 1 = 2 pasti 2 = 3 pasti |
| • Consuma: |
| - almeno una volta al giorno prodotti c |
| - 2 o più volte la settimana legumi o u |

**Azienda Ospedaliera Universitaria Federico II**

**Dipartimento assistenziale ad attività integrata di**

**MEDICINA INTERNA E PATOLOGIA CLINICA**

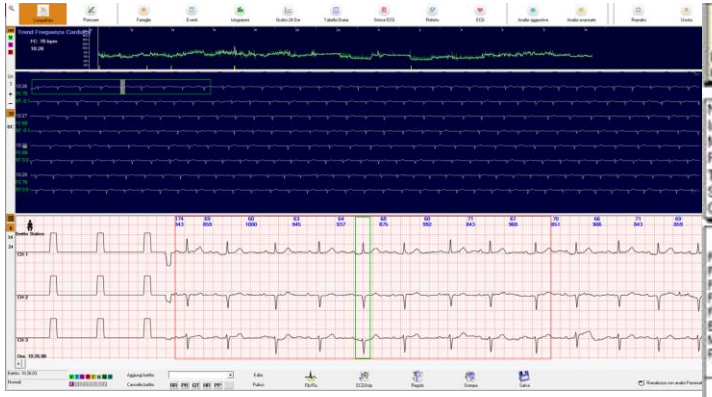
| |
|---|
| - Carne, pesce o pollo ogni giorno? |
| 0.0 = se 0 o un si |
| 0.5 = se 2 si |
| 1.0 = se 3 si |
| • Consuma 2 o più volte al giorno frutta o verdura? |
| 0 = no 1 = si |
| • Negli ultimi 3 mesi ha assunto meno cibo per perdita di appetito, difficoltà di digestione, masticazione o deglutizione? |
| **0 = perdita marcata di appetito** |
| 1 = perdita moderata di appetito |
| 2 = non perdita di appetito |
| • **Quanti bicchieri/tazze di bevande assume al giorno (acqua, succo di frutta, caffè, tè, latte, vino, birra,…)?** |
| 0.0 = meno di 3 bicchieri |
| 0.5 = da 3 a 5 bicchieri |
| 1.0 = più di 5 bicchieri |
| • Modo di mangiare |
| 0 = ha bisogno di assistenza |
| 1 = mangia da solo con qualche difficoltà |
| 2 = mangia da solo senza problemi |
| |
| **ASSESSMENT SOGGETTIVO** |
| • **Pensa di avere problemi di nutrizione** |
| 0 = malnutrizione grave |
| 1 = non sa o moderata malnutrizione |
| 2 = non problemi di nutrizione |
| • **Rispetto ad altre persone della stessa età, come considera il suo stato di salute?** |
| **0.0 = peggiore 1.0 = uguale** |
| 0.5 = non sa 2.0 = migliore |

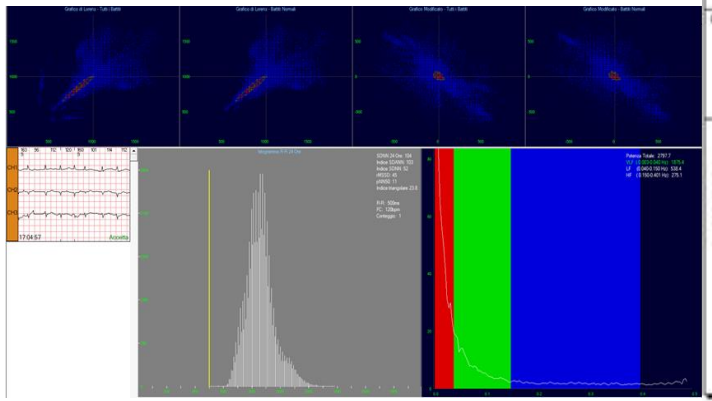
**Punteggio totale: /30**

Classificazione: ≥ 24 punti: normonutrito

da 17 a 23.5 punti: paziente con indici di rischio di malnutrizione

< 17 punti: paziente con indici evidenti di malnutrizione





A.O.U. FEDERICO II
U.O.C. Geriatria e Fibrosi Cistica dell Adulto
Tel.: Fax:

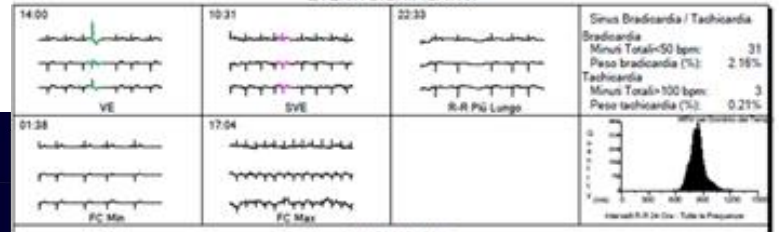
Data Inizio Registrazione 06/06/2023 — REFERTO HOLTER ECG — Ora Inizio registraz. 10:24

Nome: ID Paziente: ID Card:
Indirizzo: Età 74 anni DDN: Sex: M
Med. Rif.: Pacemaker: Nessuno Peso: 69 kg Altezza: 170 cm
Paziente da: Ordine MD: Editato da: Il Medico Interpetato da: Il Medico
Tel paz.: 3496104471 Tel Med: e-mail Med:
Sintomi/Indicazioni:
Commenti:

| FREQUENZA CARDIACA | | ECTOPIA VENTRICOLARE | | H R V | |
|---|---|---|---|---|---|
| Freq. Minima, 4 Intervalli: | 39 bpm at 1:38 | VE Totali: | 21 | SDNN 24 Ore: | 104 |
| Freq. Massima, 4 Intervalli: | 111 bpm at 17:04 | Coppie VE Totali: | 0 | Indice SDANN: | 103 |
| Freq. Media 24 Ore: | 67 bpm | Run VE Totali: | 0 | Indice SDNN: | 52 |
| Freq. Minima Oraria: | 51 bpm at 2:00 | Run VE pi Lungo: | Nessuno | rMSSD: | 45 |
| Freq. Massima Oraria: | 79 bpm at 16:00 | F.C. Max in Run VE: | Nessuno | pNN50: | 11 |
| Battiti Analizzati: | 98087 | F.c. Min in Run VE: | Nessuno | Potenza Spettrale - 24 Ore: | 2797.7 |
| Minuti Analizzati: | 1440 | VE per 1000/per Ora: | 0.21/0.88 | Potenza Spettrale Minima: | 539.3 |
| Periodo Monitoraggio ECG: | 24 ore 22 minuti | Peso VE (%): | 0.02% | Potenza spettrale Massima: | 5447.9 |
| | | R su T Ventricolare: | Nessuno | | |

| ANALISI SEGMENTO ST | | ECTOPIA SOPRAVENTRICOLARE | | BRADICARDIA | |
|---|---|---|---|---|---|
| Minuti Totali ST CH1: | 0 | SVE Totali: | 311 | Pause superiori a 2.5 s: | 0 |
| Minuti Totali ST CH2: | 0 | Coppie totali SVE: | 4 | Pausa Massima: | Nessuno |
| Minuti Totali ST CH3: | 0 | Run SV Totali: | 0 | R-R più lunghi | 1.93s(22:33:13) |
| Depressione MaX Delta ST: | Nessuno | Run SV più Lungo: | Nessuno | | |
| Elevazione MaX Delta ST: | Nessuno | F.c. Max in Run SV: | Nessuno | QT | |
| Episodio di Massimo ST: | Nessuno | SVE per 1000/per ora: | 3.17/12.98 | QT Max: | 429 ms (Ca. 1) |
| FC Max in Episodio ST: | 0 | Peso SVE (%): | 0.32% | QTc Max: | 429 ms |
| | | Totale Battiti Aberranti/Runs: | 9/0 | Ora di Max QT: | alle 03:37, FC 60 bpm |
| | | Peso AF: | 0 | BBB | Nessuno |

EVENTI SIGNIFICATIVI



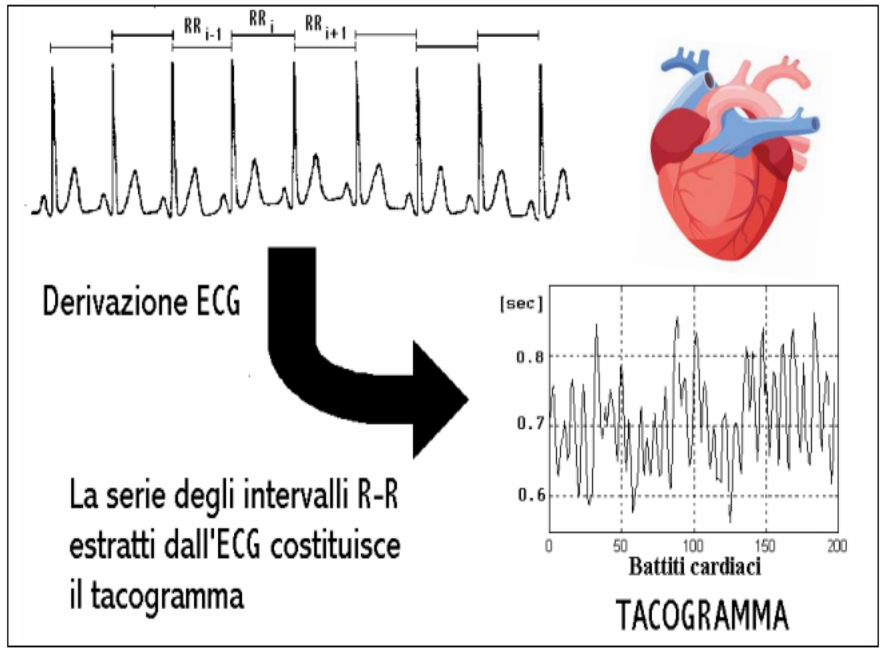

CONCLUSIONI

Registrazione holter ECG condotta per la durata di circa 24h.
Ritmo sinusale. FC Media: 67 bpm. FC minima: 39 bpm alle 01:38. FC massima: 111 bpm alle 17:04.
Conduzione AV in limiti alla.
Ectopie Ventricolari 21, tutte isolate. Episodi di aberranza 9.
Ectopie Sopraventricolari 311, di cui 303 isolate, 4 Coppie .Episodi di trigeminismo SVE 11.
Assenza di pause significative.
RRR più lungo è stato di 1.929 alle 22:33:13.
HRV SDNN 142, SDANN Indice:122.

Editato da: Il Medico

# Heart Rate Variability

- La variabilità della frequenza cardiaca (HRV) è la variazione temporale battito per battito in successivi intervalli RR su una registrazione elettrocardiografica (ECG)
- Riflette la regolazione della frequenza cardiaca da parte del sistema nervoso autonomo
- I metodi per quantificare l'HRV sono classificati come: dominio del tempo, dominio spettrale o della frequenza, geometrico e non lineare




R.E. Kleiger Ann, Noninvasive Electrocardiol.2005

# Heart Rate Variability

## An Overview of Heart Rate Variability Metrics and Norms

Fred Shaffer[1,*] and J. P. Ginsberg[2]

| Parameter | Unit | Description |
|---|---|---|
| ULF power | $ms^2$ | Absolute power of the ultra-low-frequency band (≤0.003 Hz) |
| VLF power | $ms^2$ | Absolute power of the very-low-frequency band (0.0033–0.04 Hz) |
| LF peak | Hz | Peak frequency of the low-frequency band (0.04–0.15 Hz) |
| LF power | $ms^2$ | Absolute power of the low-frequency band (0.04–0.15 Hz) |
| LF power | nu | Relative power of the low-frequency band (0.04–0.15 Hz) in normal units |
| LF power | % | Relative power of the low-frequency band (0.04–0.15 Hz) |
| HF peak | Hz | Peak frequency of the high-frequency band (0.15–0.4 Hz) |
| HF power | $ms^2$ | Absolute power of the high-frequency band (0.15–0.4 Hz) |
| HF power | nu | Relative power of the high-frequency band (0.15–0.4 Hz) in normal units |
| HF power | % | Relative power of the high-frequency band (0.15–0.4 Hz) |
| LF/HF | % | Ratio of LF-to-HF power |

| Parameter | Unit | Description |
|---|---|---|
| SDNN | ms | Standard deviation of NN intervals |
| SDRR | ms | Standard deviation of RR intervals |
| SDANN | ms | Standard deviation of the average NN intervals for each 5 min segment of a 24 h HRV recording |
| SDNN index (SDNNI) | ms | Mean of the standard deviations of all the NN intervals for each 5 min segment of a 24 h HRV recording |
| pNN50 | % | Percentage of successive RR intervals that differ by more than 50 ms |
| HR Max – HR Min | bpm | Average difference between the highest and lowest heart rates during each respiratory cycle |
| RMSSD | ms | Root mean square of successive RR interval differences |
| HRV triangular index | | Integral of the density of the RR interval histogram divided by its height |
| TINN | ms | Baseline width of the RR interval histogram |

*Interbeat interval, time interval between successive heartbeats; NN intervals, interbeat intervals from which artifacts have been removed; RR intervals, interbeat intervals between all successive heartbeats.*

Fred Shaffer, Frontiers in Public Healt, 2017

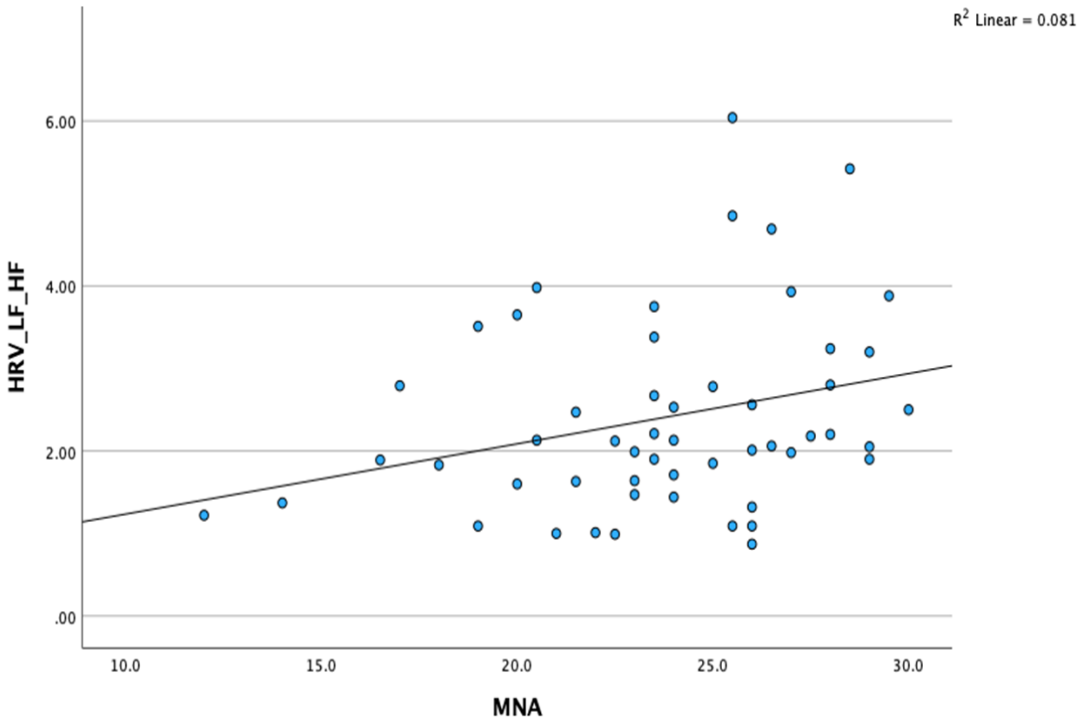
# Risultati

| | Minimum | Maximum | Mean |
|---|---|---|---|
| ETA' | 65 | 90 | 76±6,43 |
| HRV_SDNN24H | 52 | 333 | 140,43±64,24 |
| HRV_LF | 50,7 | 6709,0 | 1142,60±1526,35 |
| HRV_HF | 21,2 | 5754,8 | 661,33±1205,96 |
| HRV_LF_HF | 0,87 | 6,04 | 2,40±1,17 |
| MNA | 12,0 | 30,0 | 23,77±3,93 |
| HANDGRIP | 16,1 | 39,2 | 22,80±9,99 |
| BMI | 0,9 | 42,1 | 25,83±6,20 |
| CIRC BRACCIO | 21,0 | 34,0 | 26,25±3,59 |
| CIRC POLPACCIO | 20 | 42 | 32,64±5,91 |
| MMSE | 12,1 | 231,0 | 42,18±60,17 |
| GDS | 1 | 14 | 4,36±3,21 |
| ADL PERSE | 0 | 3 | 0,43±0,69 |
| IADL PERSE | 0 | 5 | 0,79±1,34 |
| CIRS C | 1 | 8 | 3,71±1,76 |

# Risultati

| | | MNA | HRV_SDNN24H | HRV_LF | HRV_HF | HRV_LF_HF |
|---|---|---|---|---|---|---|
| MNA | Pearson Correlation | -- | | | | |
| | N | 53 | | | | |
| HRV_SDNN24H | Pearson Correlation | 0,169 | -- | | | |
| | Sig. (2-tailed) | 0,225 | | | | |
| | N | 53 | 53 | | | |
| HRV_LF | Pearson Correlation | -0,252 | .460** | -- | | |
| | Sig. (2-tailed) | 0,069 | 0,001 | | | |
| | N | 53 | 53 | 53 | | |
| HRV_HF | Pearson Correlation | -.310* | .398** | .922** | -- | |
| | Sig. (2-tailed) | 0,024 | 0,003 | 0,000 | | |
| | N | 53 | 53 | 53 | 53 | |
| HRV_LF_HF | Pearson Correlation | .285* | -0,014 | -0,180 | -.327* | -- |
| | Sig. (2-tailed) | 0,039 | 0,921 | 0,198 | 0,017 | |
| | N | 53 | 53 | 53 | 53 | 53 |

* p<0.05 level (2-tailed)
**p<0.01 level (2-tailed).



# Risultati

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PMID: 19406882

## A new answer to an old question: does ageing modify baroreflex control of vascular sympathetic outflow in humans?

Kevin D Monahan

# Conclusioni

- Un buono stato nutrizionale nel paziente anziano correla con una riduzione dell'attività del sistema parasimpatico.
- L' HRV fornisce uno strumento aggiuntivo per analizzare l'effetto della nutrizione e del peso corporeo sull'omeostasi autonomica.
- Ulteriori studi saranno necessari per confermare questa associazione al fine di rafforzare l'importanza della valutazione dello stato nutrizionale nel paziente anziano.