Causes, diagnostics and integrative Treatment of environmentally induced diseases (CFS, MCS, fibromyalgia)

Univ.Doz.Dr. John Ionescu

Dr. Alexandru Tudor Constantinescu

Introduction

There are currently over 160 million chemical compounds changes are registered and a new substance is added almost every 2.5 minutes [1]. Of these, 500,000 chemical substances cover areas of public interest, including common and frequently regulated chemicals [2].

It has long been shown, both in animal experiments and in human medicine, that many heavy metals or synthetic chemical substances can negatively influence or even block cellular energy production and the immune system. These include environmental toxins such as wood preservatives, car exhaust fumes, pesticides, insecticides, fertilizers, chemical residues and

Heavy metal ions from drinking water or from Amalgam fillings as well as additives from food such as preservatives, colorings, binding agents, flavorings and flavor corrections. Therefore, the identification and corresponding breakdown and elimination of these environmental toxins is of crucial importance for the metabolic and immunological relief of chronic environmental diseases such as multiple chemical sensitivity (MCS), chronic fatigue syndrome (CFS) and fibromyalgia.

Unfortunately, due to a lack of diagnostic and therapeutic experience, these patients are often psychiatrized and spend years wandering from one treatment center to another.

In accordance with the Bavarian "Guide for Environmental Medicine" (1998) [3], a corresponding methodology is used in the diagnosis and treatment of well-known environmental diseases.
Here, the appropriate use of the diagnostic blocks is given special consideration.

Multiple Chemical Sensitivity (MCS)

MCS (English: Multiple Chemical Sensitivity, German: Multiple Chemical Sensitivity) is a chronic multisystem disease with sometimes severe intolerance to a variety of volatile chemicals, such as: E.g. fragrances, cigarette smoke, solvents or exhaust gases. What is characteristic of the clinical picture is that there are subthreshold concentrations that are rarely or not at all found in healthy people are perceived and do not show any irritating or toxic effects, are able to affect the patient to cause duck complaints.

The most important MCS classification criteria according to Cullen (1987) [4]

Symptoms were acquired in association with documented environmental exposure

- ÿ the symptoms affect more than one organ
- ÿ the clinical picture is chronic
- ÿ the symptoms appear and disappear in Connection with predictable stimuli
- ÿ The symptoms are caused by chemicals with different structures and mechanisms of action
- ÿ Exposure to very low doses leads to Triggering of symptoms
- ÿ No single common organ function test can explain the symptoms

Furthermore, among the most important are MCS trigger factors

- ÿ Cumulative effects of fat-soluble toxins (e.g. organochlorine compounds, aflatoxins, solvents, pesticides, protein decay products (secondary amines), etc. [5–7]) and heavy metals (Pb, Cd, Hg, Sn, Ni, Cr, Pd, Au, Pt from drinking water, food, or as a corrosion products made from dental alloys and implants [8] Fig. 1). This accumulation of pollutants leads to neurotoxic and immunotoxic xic side effects (concentration and memory disorders, polyneuropathy or Immunosuppression, susceptibility to infections, impaired release of inflammatory mediators [9, 10])
- ÿ In some cases, the binding of the above-mentioned toxins to the body's own proteins leads to the creation of new structures that trigger an immune response and thus trigger type IV sensitization reactions (detectable as LTT reactions against pollutants [11]). As a result, exposure to subtoxic concentrations of viral antigens or solvent mixtures leads to disproportionate secretions.

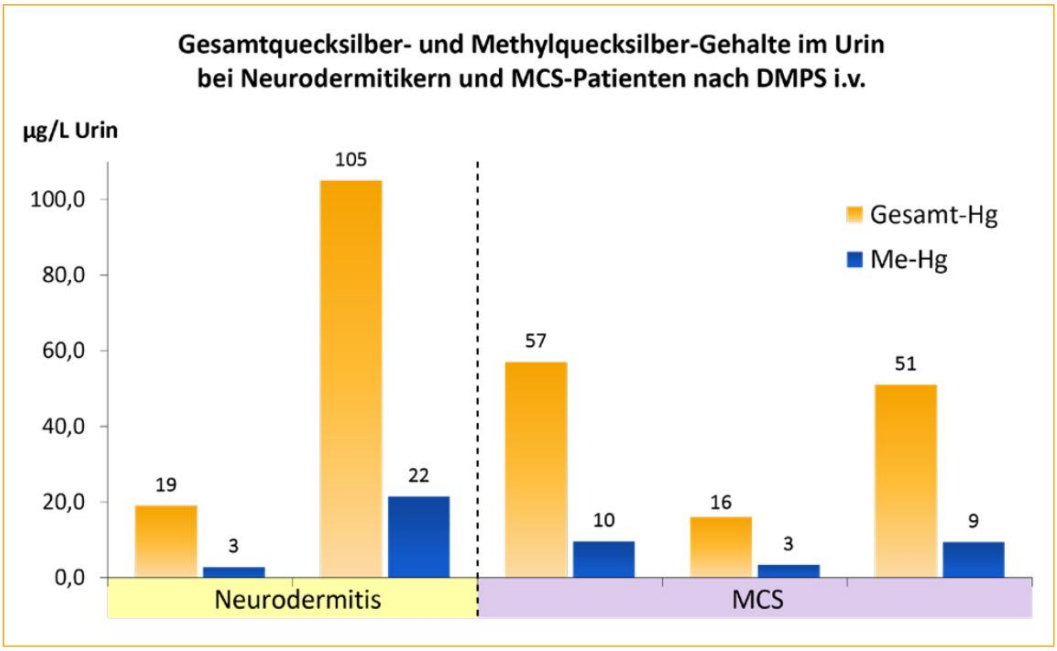

Fig. 1

cation of inflammatory messengers (ÿ-IFN, IL-2, IL-10 and NFÿB) and thus to strong inflammatory reactions [12, 13]

ÿ Genetic polymorphisms of important detox systems (CytP450 family, aryl hydrocarbon hydroxylase, monooxygenases or GST, NAT, UDP-glucuronidase, etc.) of phases I and II [14–16]

ÿ Genetic polymorphisms that lead to a reduction in the activity of the most important antioxidant enzyme systems. (SOD, GPx, GSH-Red.)

ÿ Chronic oxidative and nitrosative stress (ROS or RNS), through exogenous and endogenous factors, coupled with chemical exposure [17]

ÿ Reduced antioxidant capacity of the blood (GSH, coenzyme, Q10, ÿ-carotene, selenium, albumin reduced) with simultaneous strong production of free radicals [18, 19]

ÿ Reduced brain perfusion (SPECT) or glucose utilization in heavily exposed MCS patients patients

ÿ Inhibition of muscular metabolism excessive lactate production [20]

Laboratory analysis

The relevant diagnostic markers for MCS are:
Neukirchen Special Clinic carried out the following immunobiological and environmental medical analyzes:

ÿ If heavy metal accumulation is suspected:
Mobilization tests with DMSA, DMPS, EDTA under antioxidant protection with subsequent
AAS evaluation of the excreted heavy metals

ÿ cellular sensitization detection of T lymphocytes (LTT metals or LTT-MCS)

ÿ GC-MS measurement of pesticide, wood preservatives and solvent contamination (PCP, PCBs, lindane, DDT, pyrethroids, benzene, toluene, xylene and others) in the blood

ÿ Detox profile (GST, NAT2, sulfoxidases, Cyt P450, Metallothioneins) as gene expression analyses

ÿ Free radicals in the blood and antioxidant activity (AOA) in plasma [17]

ÿ ÿ-IFN and IL10 release after lymphocyte exposure to BTX [12]

ÿ Substance P as a neurotransmitter-like substance [21]

ÿ In the blood: Brain barrier protein S-100 after exposure to heavy metals, biocides or solvents [22]

ÿ Markers of porphyrin metabolism (Kryptopy-rol, PBG, UBG, ALA)

Chronic Fatigue Syndrome (CFS)

Chronic fatigue syndrome or chronic fatigue syndrome (English: Chronic Fatigue Syndrome, abbreviated CFS) is a chronic illness characterized by exceptionally severe fatigue, which is always accompanied by pronounced physical and cognitive symptoms In extreme cases, it can lead to extensive disability and need for care. The main characteristic is the so-called post-exertion fatigue or malaise: a deterioration in the patient's condition that usually occurs the day after an effort and can last for days or even weeks. CFS is also known as myalgic encephalomyelitis (ME) or ME/CFS.

In addition to pronounced fatigue and cognitive impairment, most patients suffer from pain and sleep disorders or unrefreshing sleep [23]. It is estimated that 300,000 – 400,000 patients or even more suffer from it in Germany alone [23].

After more than 3,000 research papers, there is sufficient scientific evidence that CFS is a real, organic disease. It is not a form of depression or hypochondria. A number of biological abnormalities have been found in CFS patients, but none are specific

Laboratory test. Therefore, CFS is based on a set of Diagnostic criteria established after excluding other illnesses that could explain the exhaustion, such as: B. endocrinopathies, neoplasms, heart failure).

According to the Center of Disease Control, USA, 1988 [24], the most important CFS classification criteria include:

ÿ Main criteria such as first occurrence of permanent or recurrent paralyzing
Fatigue and fatigability:
ÿ without similar symptoms in the past layer
ÿ without disappearing through bed rest
ÿ with a reduction in daily activity below 50% of the usual activity level for at least at least 6 months
ÿ Secondary criteria:
ÿ Symptom criteria: intermittent temperatures not exceeding 38.6° C; Sore throat, painful cervical or axillary lymph nodes swelling; unexplained generalized muscle weakness, long-lasting exhaustion after otherwise easily possible exertion, headaches, psychological disorders (forgetfulness, difficulty concentrating, irritability, but also photophobia and fleeting scotomas); Sleep disorders, anamnestic indication of the development of symptoms within a few hours to days.

ÿ Finding criteria: intermittent temperatures up to 38.6°C orally, non-exudative pharyngitis, painful cervical or axillary lymph node swelling up to 2 cm in diameter.

ser.

Other diagnostic criteria have also been proposed over time. The ones published in 1994 by Fukuda and CDC [25] are also very frequently used today. Here too it is listed under main and

A distinction is made between secondary criteria.

ÿ Main criteria: clinically assessed, persistent or recurrent chronic fatigue
ÿ cannot be explained in any other way, ÿ occurred recently or at a specific point in time (not already throughout life),

ÿ is not the result of sustained exertion, ÿ is not significantly alleviated by rest and
ÿ leads to a significant restriction of previous professional, school, social or personal activities; ÿ Secondary criteria: the simultaneous occurrence of four or more of the following symptoms, all during six or more consecutive periods

months of illness or must have occurred repeatedly but not before the fatigue: ÿ self-reported impairment of the

Short-term memory or concentration that is so severe that it results in significant impairment of previous professional, school, social or personal activities;

ÿ sore throat; ÿ painful lymph nodes in the neck or armpits; ÿ Muscle pain, pain in several

ren joints without joint swelling or redness;
ÿ Headache of a new type, pattern or severity; ÿ no restful sleep;

ÿ Post-exercise malaise that lasts longer than 24 hours.

One of the best-known provocation factors of CFS to count

ÿ Herpes viruses such as EBV, HHV-1/-2/-6, CMV and Varicella zoster is considered an important cause of CFS.

ÿ Enteroviruses such as Coxsackie B2 and B4, Retroviren such as HTLV2 and Spumaviridae as well as endogenous retroviruses
ÿ Chronic infections with intracellular bacteria teria, fungi and protozoa: mycoplasma, mycobacteria, chlamydia, Brucella sp., Lis-teria, Borrelia, salmonella, toxin-producing staphylococci; Fungi such as Aspergillus, Cryptococcus, Histoplasma and Candida sp.; Protozoa such as Leishmania, Toxoplasma and Trypanosoma.

The identification of the above-mentioned pathogens is relevant for the CFS diagnosis [26].
Functional disorders of the immune, neurohomone and antioxidant systems associated with

ÿ increased susceptibility to infections and reduced NK cells [27]
ÿ Allergen-induced T cell activation (positive LTT against foods, yeasts, heavy metals such as Ni, Pd, Hg) and increased TH2 cytokine secretion (Il4>y-IFN)

ÿ increased ANA, autoantibodies against thyroid oxidase and beta-adrenergic and muscarine acetylcholine receptors [28]
ÿ increased inflammatory parameters such as IL6 and sIL2 receptor
ÿ frequent hypoglycemic conditions as a result of carbohydrate-rich foods with a high glycemic index, cravings for sweets.
ÿ Hypothyroidism or hypocortisolism due to low ACTH

ÿ Upregulation of the antiviral 2–5A synthetase L-RNase in response to viral infections
ÿ Increased peroxynitrite levels as a result of chronic Infections associated with superoxide radical production and complex formation with nitrite oxide (NO*) [29]
ÿ Increased oxidative stress due to inadequate Antioxidant status (PUFAs, cysteine, glutamine reduced)

ÿ Excessive thrombocytic coagulation, associated with low cellular oxygen supply, leading to acidosis [30]

ÿ Muscle proteolysis with increased amino acid production excretion in urine

ÿ Increased serum lactate after muscular (ergometric) load [31]
ÿ Chronically reduced ATP synthesis through mitochondrial chondrial dysfunction [32]

The diagnostic markers of CFS are based on the above-mentioned pathogenetic factors.

Fibromyalgia

Fibromyalgia (FM) is a disease characterized by chronic, generalized pain, fatigue, unrefreshing sleep, cognitive symptoms, abdominal pain or cramps, and depression. Other symptoms include insomnia and general hypersensitivity.

The relevant classification criteria for fibromyalgia according to the American College of Rheumatology, 1990 [33], or the “2016 Revisions” are: [34]

ÿ Constant muscle and tendon pain (tendomyopathy) both at rest and during movement, substance P in the muscles and pathological changes in the muscle fibers detectable in biopsies.

ÿ Pressure pain in at least 11 of 18 so-called Tender points/pain pressure points with a colder skin surface than the surrounding skin.
ÿ Morning stiffness, headaches, migraines
ÿ chronic fatigue, sleep disorders, con- Poor concentration, dizziness
ÿ Hyperhidrosis, edema, tachycardia and arrhythmias

ÿ Reynaud's syndrome (sensitive to cold), paraesthesia, tremor, tinnitus
ÿ Dryness of the mucous membranes, subfebrile temperatures (37.5–38° C)
ÿ Susceptibility to infections, inflammation of the throat mucosa, respiratory diseases, Borrelia and Candida infections [35]
ÿ Dysmenorrhea or amenorrhea

As diagnostic markers for fibromyalgia come in Consider:

ÿ ANA profile for rheumatic complaints or suspected collagen vascular disease
ÿ Borrelia and Candida diagnostics
ÿ high antibody levels against serotonin, ganglioside, phospholipids
ÿ low serotonin levels
ÿ low phosphocreatine and ATP levels in the Muscles [36]
ÿ low calcitonin, prostaglandins 2, L-tryptophan, histidine, lysine and threonine in serum

- ÿ low HGH and IGF-1 levels
- ÿ increased prolactin in the blood
- ÿ increased substance P in cerebrospinal fluid and muscles
- ÿ S-100 brain barrier protein in the blood after exposure to heavy metals, biocides and solvents medium
- ÿ increased inorganic phosphate (Pi)-, H+- and H2 PO+ values in the muscles [37]
- ÿ Increased cortisol levels in evening stools and urine
- ÿ increased soluble IL2 receptor (sIL2R) antigens in plasma
- ÿ Free radicals in the blood and antioxidant activity (AOA) in plasma [17]

The environmental clinic diagnostic program Neukirchen

Knowing the above-mentioned diagnostic markers for the respective environmental disease, the main goal of the program is to evaluate the material, neurotoxic and immunotoxic loads of environmental patients.
First, take a detailed medical history
and targeted immunological tests rule out symptom causes such as Eppstein-Barr virus, a Borrelia infection or an autoimmune disease.
This is followed by a complex examination of various harmful environmental pollutants in the blood, breast milk or urine that are clinically relevant for Central Europe. This includes the identification of important organochlorine compounds (PCP, PCB's, HCH or lindane, DDT, hexachlorobenzene, etc.), pyrethroid derivatives, solvents, formaldehyde as well as fusel alcohols, methanol and organic mercury compounds using gas chromatography-mass spectrometry (GC-MS). .

In the clinical environmental laboratory, routine
10 relevant heavy metals, which are mostly found in dental and tableware alloys
(mercury, tin, palladium, gold, silver, copper,
lead, cadmium, nickel, chromium), in saliva, urine and
Breast milk after mobilization tests with chelating agents
fen using atomic absorption spectrometry (AAS)
examined.

The inability to neutralize and excrete the pollutants mentioned in environmental patients is often due to a so-called “genetic polymorphism”, which is also examined in the Neukirchen special clinic and is usually the case

a limited function of important detoxification enzymes in the first or second detox phase. The resulting accumulation of harmful substances in fatty and connective tissue, liver, kidneys and nervous system are responsible for the well-known neurotoxic, immunotoxic, sensitizing and inflammatory reactions

of environmental patients.
At the center of the diagnosis and therapy program

The problem of food intolerances, which these days can be responsible for many surprising symptoms such as headaches, migraines, skin rashes of all kinds and intestinal problems and even shortness of breath, is also part of the gram. You under-

distinguishes between typical allergic reactions
Foods that involve the immune system and false allergic reactions, mostly due to food additives

(sodium glutamate, biogenic amines from sausage, beer, Cheese, chocolate, red wine as well as colorings, preserves substances, thickeners, etc.).

Intolerance reactions against 60-90 food allergens and additives from food (preservatives, colors and flavorings, emulsifiers, flavor correctors, metals, biogenic amines, spices, etc.) are investigated alongside the most important physiological and pathogenic (disease-causing) representatives of the intestinal flora (Bacteria, fungi and parasites) also checked.

The identification of the provocation factors mentioned above is of great importance because the majority of those affected It has been proven that people suffer from combined damages substance influences that potentiate each other and thus explain the long-standing immunotoxic and neurotoxic side effects associated with energy blockages, redox shifts and the production of free radicals, which means that the

polymorbid conditions of fibromyalgia, MCS and CFS patients arise.

Individual therapeutic measures

Only after these findings have been evaluated can the necessary integrative treatment steps be taken
individual character.
As a rule, the strategy of the specialist clinic includes the following therapy guidelines:

1. The prescription of appropriate drainage and detox procedures (removal of dental alloys in the event of proven exposure, chelating agents, biological agents to increase the first and second detox phases in the liver, kidneys and the nervous system, hyperthermia application, colon hydro- therapy, toxin absorbers, enzyme preparations, etc.) [30, 38, 39]. In detail:

   a. The administration of toxin absorbers such as algae, zeolite, bentonite or activated carbon, which are able to bind the organotoxins in the enterohepatic circulation that are mobilized by hyperthermia (sauna) or sport
   became
   b. The removal of organotoxins from the blood by apheresis or hemoadsorption with appropriate filter columns

c. The complexation and removal of heavy metals with chelating agents such as
DMSA, DMPS and/or EDTA

d. The consumption of botanicals that activate detoxification phase I (green tea, rosemary, astaxanthin, etc.) or phase II (cruciferous vegetables, alliaceae, mustard, curcumin, rooibos tea)
fours

e. The administration of liver-protecting substances as well as substrates for the conjugation reactions of phase II in oral form or as infusion
sion (Essentiale, Equiderm Plus, Cell Energy Capsules)

2. Identification and treatment of viral and microbial infections (antiviral drugs, vitamin C, ozone, H. pylori eradication)

3. The reconstruction of a physiological intestinal flora through the targeted administration of antimicrobial substances (antibiotics, antimycotics, etc.) followed by long-term pre- and probiotic therapy.

4. An individual hypoallergenic and additive-free diet plan that takes intolerances into account and contributes to the development of physiological intestinal flora with the help of probiotics.

5. Compensation for the identified deficiencies in antioxidants, fatty acids, amino acids,
Trace elements and vitamins with co-enzyme function (in infusion or capsule form)

6. A complex psychological support program with individual and group discussions as well as relaxation techniques such as autogenic training, yoga, bio-feedback, etc

7. Recommendations for a remediation program at work and at home that depends on the results of the investigation and takes into account the removal of various sources of emissions: wood preservatives, chipboard, impregnated carpets and wallpaper, leather furniture or clothing, detergents and disinfectants, occupational allergens, metal dishes/cutlery et al

The positive long-term results of the Neukirchen Special Clinic for environmental diseases such as MCS, CFS and fibromyalgia [40, 41] and currently for Long-COVID syndrome have caused health insurance companies to cover the therapy costs for inpatient treatment of these patients since 1995 to take over.

Univ.Doz.Dr. John Ionescu
Dr. Alexandru Tudor Constantinescu
Hospital Street 9
93453 Neukirchen bei Heiligen Blut
T +49 (0)9947.280
info@spezialklinik-neukirchen.de
www.spezialklinik-neukirchen.de

literature

[1] *Everything You Need To Know About CAS Numbers* [Internet]. *Chemwatch. 2021* [last accessed: 2022 Jul 26]; *Available at: https:// www.chemwatch.net/ blog/ everything-you-need-to-know-about-cas-numbers/.*

[2] *CAS Registry. CAS.org: FAQs* [Internet]. *2022* [last accessed: 2022 Jul 26]; *Available at: https:// www.cas.org/ about/ faqs.*

[3] *Bavarian Medical Association / Health Department. Guide to environmental medicine. Munich: Bavarian Medical Association; 1999.*

[4] *Cullen MR. Workers with multiple chemical sensitivities. Occup Med State Art Rev. 1987; 2:655-661.*

[5] *Ashford NA, Miller CS. Low-level chemical exposures: A challenge for science and policy. 1998;*

[6] *Maschewsky W. MCS hypersensitivity or Overexposure. Occupational diseases currently 28/29, 25. 2000; 38.*

[7] *Baines CJ, McKeown-Eyssen GE, Riley N, Cole DEC, Marshall L, Loescher B, et al. Case–control study of multiple chemical sensitivity, comparing hematology, biochemistry, vitamins and serum volatile organic compound measures. Occupy. Med. (Chic. Ill). 2004; 54(6):408–418.*

[8] *Ionescu G. Dental alloys: electrochemical and biological material testing. Complement. Med. Res. 1996; 3(2):72–77.*

[9] *Rea WJ. Chemical Sensitivity: Clinical Manifestations. CRC Press; 1995.*

[10] *Caress SM, Steinemann AC, Waddick C. Symptomatology and etiology of multiple chemical sensitivities in the southeastern United States. Arch. Environ. Heal. To International J. 2002; 57(5):429–436.*

[11] *Meggs WJ. Multiple chemical sensitivities and the immune system. Toxicol. Ind. Health. 1992; 8(4):203–214.*

[12] *Bieger WP, Bartram F, Knabenschuh B, Penz M, Neuner-Kritikos A, Mayer W. The role of oxidative stress in the pathogenesis of MCS. Z Environmental Med. 2002; 10:198–205.*

[13] *Bartram F. Immune-induced inflammatory processes chronic chemical exposure. Environmental Medicine Society. 2005; 18(3):202–208.*

[14] *Seidegård J, Ekström G, Seidegard J, Ekstrom G. The role of human glutathione transferases and epoxide hydrolases in the metabolism of xenobiotics. Environ. Health Perspective. 1997; 105(suppl 4):791–799.*

[15] *Eggermann T, Zerres K, Dott W, Wiesmüller GA. Multiple chemical sensitivity (MCS): Strategies for elucidating genetic predispositions. Allergology. 2003; 26(7):268–280.*

[16] *Schnackenberger E, Fabig KR. Susceptibility: a uncalculated factor for those polluted by the environment. environmental medicine Society 18 (3), 209. 2005; 212.*

[17] *Ionescu JG, Weber D, Bradford R. Applications of redox and free radical assessment in the clinical practice. Int. J. Gerontol. 2000; 3:47–56.*

[18] *Ionescu G, Merk M, Bradford R, Ionescu JG, Merck M, Bradford R. Simple Chemiluminescence Assay for Free Radicals in Venous Blood and Serum Samples: Results in Atopic, Psoriasis, MCS and Cancer Patients. Research Complementarmed. 1999; 6(6):294–300.*

[19] *Ionescu JG. Free radical monitoring of integrative therapies by enhanced chemiluminescence assays in venous blood and plasma. J. Cap. University Integr. Med. 2001; 1:73-93.*

[20] *Binkley KE, Kutcher S. Panic response to sodium lactate infusion in patients with multiple chemical sensitivity syndrome. J Allergy Clin. Immunol. 1997; 99(4):570–574.*

[21] *Kuklinski B. Substance P, neurogenic inflammation and Xenobiotic susceptibility. Environment Medical Society 2003; 3:196–200.*

[22] *Kuklinski B, Scheifer R, Bleyer H. Brain barrier protein S-100 and xenobiotic susceptibility. Environmental Medicine Society. 2003; 16:112-120.*

[23] *Bleijenberg G, van der Meer JWM, Grabowski P, Disc arch C. Chronic fatigue syndrome. In: Suttorp N, Möckel M, Siegmund B, Dietel M, editors. Harrison's Internal Medicine. Berlin: ABW Wissenschaftsverlag; 2017. p. 464e.*

[24] *Holmes GP, Kaplan JE, Gantz NM, Komaroff AL, Schonberger LB, Straus SE, et al. Chronic fatigue syndrome: a working case definition. Ann. Internal. Med.* [Internet]. *1988; 108(3):387–9. doi:10.7326/0003–4819–108–3-387.*

[25] *Fukuda K, Straus SE, Hickie I, Sharpe MC, Dobbins JG, Komaroff A. The chronic fatigue syndrome: a comprehensive approach to its definition and study. International Chronic Fatigue Syndrome Study Group. Ann. Internal. Med.* [Internet]. *1994; 121(12):953–9. doi:10.7326/0003–4819–121–12–199412150–00009.*

[26] *Staines DR. Is chronic fatigue syndrome an autoimmune disorder of endogenous neuropeptides, exogenous infection and molecular mimicry? Medical hypotheses. 2004; 62(5):646–652.*

[27] *Ogawa M, Nishiura T, Yoshimura M, Horikawa Y, Yoshida H, Okajima Y, et al. Decreased nitric oxide-mediated natural killer cell activation in chronic fatigue syndrome. Eur. J. Clin. Invest. 1998; 28(11):937–943.*

[28] *Loebel M, Grabowski P, Heidecke H, Bauer S, Hanitsch LG, Wittke K, et al. Antibodies to ÿ adrenergic and muscarinic cholinergic receptors in patients with Chronic Fatigue Syndrome. Brain. Behavior Immune.* [Internet]. *2016; 52:32–39. doi:10.1016/j.bbi.2015.09.013.*

[29] *Pall ML, Satterlee JD. Elevated nitric oxide/peroxynitrite mechanism for the common etiology of multiple chemical sensitivity, chronic fatigue syndrome, and posttraumatic stress disorder. Ann. NY Acad. Sci. 2001; 933:323-329.*

[30] *Ali M. Darwin, fatigue, and fibromyalgia. J Integr. Med. 1999; 3:5-10.*

[31] *Arnold DL, Radda GK, Bore PJ, Styles P, Taylor DJ. Excessive intracellular acidosis of skeletal muscle on exercise in a patient with a post-viral exhaustion/fatigue syndrome: a 31P nuclear magnetic resonance study. Lancet. 1984; 323(8391):1367–1369.*

[32] *Norman E Booth, Sarah Myhill, John McLaren-Howard. Mitochondrial dysfunction and the pathophysiology of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome. Int. J. Clin. Exp. Med.* [Internet]. *2012; 5(3):208–220. doi:10.1016/j.pnpbp.2010.06.023.*

[33] *Wolfe F, Smythe HA, Yunus MB, Bennett RM, Bombardier C, Goldenberg DL, et al. The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. Arthritis rheum. 1990; 33(2):160–172. doi:10.1002/art.1780330203.*

[34] *Wolfe F, Clauw DJ, Fitzcharles MA, Goldenberg DL, Hauser W, Katz RL, et al. 2016 Revisions to the 2010/2011 fibromyalgia diagnostic criteria. Semin. Arthritis rheum.* [Internet]. *2016; 46(3):319–329. doi:10.1016/j.semarthrit.2016.08.012.*

[35] *Awad AB, Bradford PG. Nutrition and cancer prevention. CRC Press; 2005.*

[36] *Bengtsson A, Henriksson KG. The muscle in fibromyalgia--a review of Swedish studies. J. Rheumatol. Suppl. 1989; 19:144–149.*

[37] *St. Amand RP. A description of fibromyalgia and hypoglycemia. In: Proceedings of AAEM 33rd Annual Meeting. Baltimore: 1998.*

[38] *Ionescu G. Environmental diseases. Diagnosis and new ones Treatment options. In: 2nd International Congress on Skin and Environmental Diseases. Saarlouis: 2001.*

[39] *Ionescu JG. Integrative detox procedures. Co'med. 2004; 3.*

[40] *Kauppi M. Successful treatment of environmental diseases in Bavaria, Germany. Heavy Met. Bull.* 3,[2], *15. 1996; 17.*

[41] *Ionescu JG. MCS/CFS/Fibromyalgia - research into causes and new treatment options. Co'med. 2005; 2:18-20.*