

Obesity Has Legs

Dauerbrenner Adipositas

The July issue of the German Journal of Sports Medicine is dedicated to the topic Adiposity. Since the 1980s, there has been an obvious increase in overweight and adiposity, which has reached the status of a global epidemic. Now 2.1 billion people are overweight; there are more overweight and adipose than people with malnutrition on the planet – this could be viewed as a success of modern agriculture. Apparently, the food supply is sufficient for so many people, and even further increase in the world population (presently by 156 people per minute) can be dealt with, if the foods were better distributed.

The increased prevalence of overweight and adiposity, however, also mean a change in morbidity and mortality. Since the 1980s, childhood adiposity in particular has increased dramatically. This increases the risk of subsequent Type 2 Diabetes, stroke and coronary heart disease and cancer, as well as early retirement or premature death (44, 46). This development is considered one of the greatest challenges for the next 30 years (17). This trend affects all parts of the world and, in accordance with the “America first” doctrine, is led by the USA (see Fig. 1) (35) The development in Germany is only a few years behind the USA (ca. 25% of adults are adipose (30)), and if we are not successful in bringing about the necessary changes in time, we will not avoid catching up. But we know the risk constellation of the metabolic syndrome, the importance of diet (29) and of physical activity (22) and thus have possibilities to ward off the threatening menace by lifestyle interventions before the debilitating consequential damage occurs (8, 20).

In the same period, we have also achieved a marked increase of knowledge in this area. We now know that adipocytes are not purely fat stores, but have decisive influence on the metabolism - the article by Krüger describes the sequelae of a “sterile inflammation” with all their consequences (21). We have come to better understand the regulation of appetite, and there have been successful trials to influence this by means of drugs – unfortunately no preparations low in side effects or risks have been developed. Likewise, we have recognized that the composition of a diet has relatively little influence on the weight loss accomplished; the essential decisive parameter is compliance with dietary modification (6, 11, 45). This simplifies the matter enormously: instead of making the adipose individual swear to maintain one of the innumerable praised dietary regimens, the best diet

is that which one can maintain over the long term. In order to achieve weight loss, either the caloric intake must be limited, or the caloric consumption cranked up – ideally both. Unfortunately, nearly all programs fail in the majority of patients with respect to effective, long-lasting weight reduction. And this despite the fact that the importance of calory reduction is apparently known among the population. More than half the US population say at any time that they are dieting, but apparently this is unsuccessful for nearly all of them over the long term (19). Only bariatric surgery can present with results of significant weight reduction in a majority of the patients, whereby we have to wait for evaluation of the long-term results.

Why do our efforts fail like this? The prevalence of overweight and adiposity has not decreased in any country over the past 30 years (18, 38). And what new impulses could bring improvement here? Since this is a worldwide problem, we can observe which measures have been successfully performed in other countries around the globe.

State measures could have a targeted influence on the dietary of the population (1, 10, 25, 36, 43). In Denmark, taxation resulted in a decrease in the consumption of saturated fatty acids by 10-15% (14). In Hungary, targeted taxation achieved a reduction in the consumption of “unhealthy products” by 25-35% (28). Mexico taxed sweetened drinks, which account for ca. 15% of the caloric intake (2), and also had a positive influence on the consumption (5). Such changes in sales figures can put pressure on the food producing companies. Thus, some manufacturers in Hungary altered the ingredients in food products in order to avoid the taxation. Likewise, the obligation of declaring the trans-fatty acid contents in products led in the USA, Canada and South Korea to a reformulation of the food product (23, 33, 47). A profit-oriented food industry has the goal of increasing sales with products in cost-optimized products. For this reason, ingredients like sugar, fats and salt, along with taste enhancers, additives and caffeine, or their combination are changed to optimize sales and market value (12). Many of the ultraprocessed foods contain only little roughage or protein, although it is known that these ingredients increase saturation and may delay the resorption of other ingredients, such as sugar. Modern foods, by contrast, have often been altered so that it is difficult for the human organism to control appetite and thus weight. Animal experiments show that ultraprocessed foods, which contain a lot of sugar, fat and salt, lead to changes in behavior and in neurobiochemical reactions, >



Prof. Dr. Peter Deibert

*Institute for Exercise and Occupational Medicine
University Medical Center
Freiburg, Germany*



Article incorporates the Creative Commons Attribution – Non Commercial License.
<https://creativecommons.org/licenses/by-nc-sa/4.0/>



QR-Code scannen
und Artikel online
lesen.

CORRESPONDING ADDRESS:

Prof. Dr. Peter Deibert
Ärztlicher Leiter
Institut für Bewegungs- und Arbeitsmedizin
Universitätsklinikum Freiburg
Hugstetter Str. 55, 79106 Freiburg
✉ : peter.deibert@uniklinik-freiburg.de

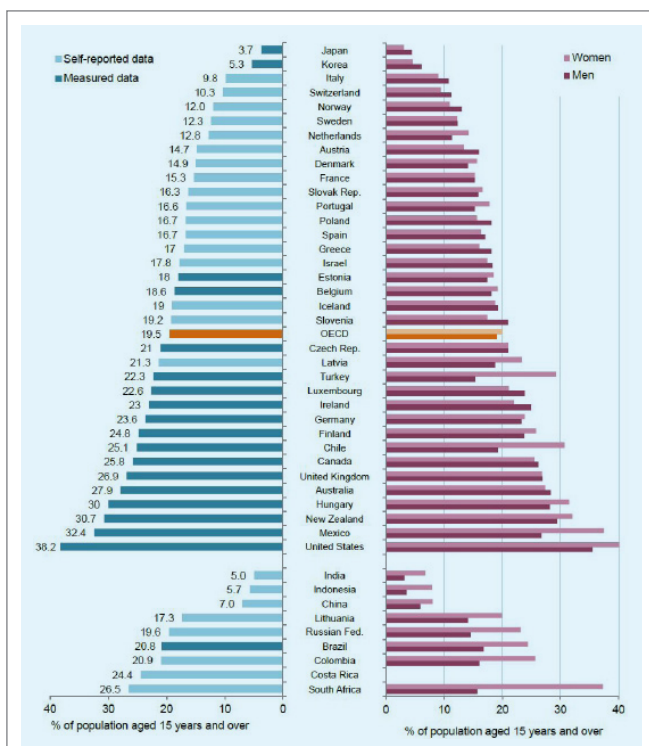


Figure 1 Prevalence of obesity in over 15-year-olds in 2015 or the nearest survey (from (35)).

similar to addictive behavior (15). This reminds one strongly of the cigarette industry, which continued to increase addiction to cigarettes by additives, despite knowing the injurious effects of smoking. This biological sensitivity to ultraprocessed foods is especially dangerous for children, since they react more than adults to sweet foods (7, 40).

It is enormously important to set the proper course for the youngest so they won't become tomorrow's patients. Even during pregnancy, the fetal phenotype is influenced by maternal diet. Postpartum, nursing is considered the optimum form of feeding and should provide infant food wherever possible. Additionally, we have to make efforts to create an environment in which healthy behavior patterns can be learned. The first 2 years are already formative (13). Especially parents and caregivers must be supported in learning the corresponding competencies to create optimized conditions (41). Disruptive factors, like advertising for unhealthy foods, should be minimized in addition (26). Only measures which are in tune with one another will lead to the desired success (24, 48). Likewise with respect to school meals, standards could achieve improved nutrition, as has been successful in Great Britain (42). It is decisive that all levels of society are reached, since there is a relationship between prevalence and the socioeconomic status. And especially cheap foods or prepared meals often don't meet the demands of a health-promoting diet. An appropriate diet often costs more and these higher costs must be recognized as meaningful (37). The knowledge, understanding and evaluation possibilities for foods and for a healthy lifestyle must also be improved at all levels. Most consumers are not able to interpret the simple listing of macronutrients and the proportion of saturated fatty acids on our food packaging anyway.

As described, behavioral prevention can be achieved only with inadequate success. Consequently, scientific societies (German Diabetes Society (DDG), German Society of Cardiology (DGK), German Alliance of Non-communicable Diseases (DANK) and DiabetesDE) demand as a means of behavioral prevention among other things, daily at least 1 hour of exercise or sports in schools and kindergartens, taxation of adipogenic foods and reduced taxation of healthy foods, binding quality standards for lunches in kindergartens and schools, as well as a ban on food advertising directed to children and adolescents (9).

Along with the reduction of caloric intake, the caloric expenditure must also be increased for effective combatting and prevention of adiposity. Only a small proportion of German adults achieve the targets recommended by the WHO for energy expenditure. But we know that even a much lower amount of exercise than that demanded by the WHO Guidelines produces a marked benefit compared to complete inactivity (49). Even without attendant weight loss, physical activity can relieve some of the metabolic dysbalances (39). Physical fitness is the decisive mortality parameter and modulates the influence of adiposity (34). In countries with low and middle income, physical activity is usually performed at work, in the household or in transport, while in rich countries it plays a role predominantly in leisure time (27). In the latter, the proportion of sitting jobs at the workplace has increased and thus contributed to a reduced caloric expenditure by ca. 100cal/d (4). In this respect it would be a logical solution to increase the caloric expenditure at work again. Employer-organized programs (such as "active breaks, sponsored memberships in fitness studios with regional providers near the workplace or national), running groups, or introductory courses at company health days could be offered. Likewise, activity programs during working hours have been evaluated positively (3, 16, 31, 32). The setting at the workplace makes it possible to reach possibly stimulate people with these measures who would never have participated in activity programs on their own. The Prevention Law of 2015 supports these measures, the number of programs and certified providers is growing. Professional cooperation among sports physicians, sports scientists and industrial physicians is needed to develop and implement good projects. If the parents or one parent is physically active, there is hope in rich countries for a positive influence on the next generation. And the children of today are the adults of tomorrow. ■

References

- (1) **CABRERA ESCOBAR MA, VEERMAN JL, TOLLMAN SM, BERTRAM MY, HOFMAN KJ.** Evidence that a tax on sugar sweetened beverages reduces the obesity rate: a meta-analysis. *BMC Public Health.* 2013; 13: 1072. doi:10.1186/1471-2458-13-1072
- (2) **CAPRIO S.** Calories from soft drinks--do they matter? *N Engl J Med.* 2012; 367: 1462-1463. doi:10.1056/NEJMe1209884
- (3) **CHRISTENSEN JR, OVERGAARD K, CARNEIRO IG, HOLTERMANN A, SOGAARD K.** Weight loss among female health care workers--a 1-year workplace based randomized controlled trial in the FINALE-health study. *BMC Public Health.* 2012; 12: 625. doi:10.1186/1471-2458-12-625
- (4) **CHURCH TS, THOMAS DM, TUDOR-LOCKE C, KATZMARZYK PT, EARNEST CP, RODARTE RQ, MARTIN CK, BLAIR SN, BOUCHARD C.** Trends over 5 decades in U.S. occupation-related physical activity and their associations with obesity. *PLoS ONE.* 2011; 6: e19657. doi:10.1371/journal.pone.0019657
- (5) **COLCHERO MA, POPKIN BM, RIVERA JA, NG SW.** Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: observational study. *BMJ.* 2016; 352: h6704. doi:10.1136/bmj.h6704
- (6) **DANSINGER ML, GLEASON JA, GRIFFITH JL, SELKER HP, SCHAEFER EJ.** Comparison of the Atkins, Ornish, Weight Watchers, and Zone Diets for Weight Loss and Heart Disease Risk Reduction: A Randomized Trial. *JAMA.* 2005; 293: 43-53. doi:10.1001/jama.293.1.43
- (7) **DESOR JA, BEAUCHAMP GK.** Longitudinal changes in sweet preferences in humans. *Physiol Behav.* 1987; 39: 639-641. doi:10.1016/0031-9384(87)90166-1
- (8) **DIABETES PREVENTION PROGRAM RESEARCH GROUP.** Long-term effects of lifestyle intervention or metformin on diabetes development and microvascular complications over 15-year follow-up: the Diabetes Prevention Program Outcomes Study. *Lancet Diabetes Endocrinol.* 2015; 3: 866-875. doi:10.1016/S2213-8587(15)00291-0
- (9) **DEUTSCHE DIABETES GESELLSCHAFT (DDG) AND DIABETESDE-DEUTSCHE-DIABETES-HILFE.** *Deutscher Gesundheitsbericht.* Kirchheim Verlag, 2017.
- (10) **EYLES H, NI MC, NGHIEM N, BLAKELY T.** Food pricing strategies, population diets, and non-communicable disease: a systematic review of simulation studies. *PLoS Med.* 2012; 9: e1001353. doi:10.1371/journal.pmed.1001353
- (11) **GARDNER CD, KIAZAND A, ALHASSAN S, KIM S, STAFFORD RS, BALISE RR, KRAEMER HC, KING AC.** Comparison of the Atkins, Zone, Ornish, and LEARN diets for change in weight and related risk factors among overweight premenopausal women: the A TO Z Weight Loss Study: a randomized trial. *JAMA.* 2007; 297: 969-977. doi:10.1001/jama.297.9.969
- (12) **GEARHARDT AN, BRAGG MA, PEARL RL, SCHVEY NA, ROBERTO CA, BROWNELL KD.** Obesity and public policy. *Annu Rev Clin Psychol.* 2012; 8: 405-430. doi:10.1146/annurev-clinpsy-032511-143129
- (13) **INSTITUTE OF MEDICINE.** *Early childhood obesity prevention policies.* Washington D.C.: National Academies of Science Press, 2011.
- (14) **JENSEN JD, SMED S.** The Danish tax on saturated fat : short run effects on consumption, substitution patterns and consumer prices of fats. *Food Policy.* 2013;42:18-31. doi:10.1016/j.foodpol.2013.06.004
- (15) **JOHNSON PM, KENNY PJ.** Dopamine D2 receptors in addiction-like reward dysfunction and compulsive eating in obese rats. *Nat Neurosci.* 2010; 13: 635-641. doi:10.1038/nn.2519
- (16) **KAEDING TS, KARCH A, SCHWARZ R, FLOR T, WITTKO TC, KÜCK M, BÖSELT G, TEGTBUR U, STEIN L.** Whole-body vibration training as a workplace-based sports activity for employees with chronic low-back pain. *Scand J Med Sci Sports.* 2017; 00: 1-13. doi:10.1111/sms.12852
- (17) **KATAN MB, BOEKSCHOTEN MV, CONNOR WE, MENSINK RP, SEIDELL J, VESSBY B, WILLETT W.** Which are the greatest recent discoveries and the greatest future challenges in nutrition? *Eur J Clin Nutr.* 2009; 63: 2-10. doi:10.1038/sj.ejcn.1602923
- (18) **KLEINERT S, HORTON R.** Rethinking and reframing obesity. *Lancet.* 2015; 385: 2326-2328. doi:10.1016/S0140-6736(15)60163-5
- (19) **KONES R.** Primary prevention of coronary heart disease: integration of new data, evolving views, revised goals, and role of rosuvastatin in management. A comprehensive survey. *Drug Design, Development and Therapy.* 2011; 5: 325-380. doi:10.2147/DDDT.S14934
- (20) **KÖNIG D, DEIBERT P, FREY I, LANDMANN U, BERG A.** Effect of meal replacement on metabolic risk factors in overweight and obese subjects. *Ann Nutr Metab.* 2008; 52: 74-78. doi:10.1159/000119416
- (21) **KRÜGER K.** Inflammation during Obesity – Pathophysiological Concepts and Effects of Physical Activity. *Dtsch Z Sportmed.* 2017; 68: 163-169. doi:10.5960/dzsm.2017.285
- (22) **LAAKSONEN DE, LAKKA HM, SALONEN JT, NISKANEN LK, RAURAMAA R, LAKKA TA.** Low levels of leisure-time physical activity and cardiorespiratory fitness predict development of the metabolic syndrome. *Diabetes Care.* 2002; 25: 1612-1618. doi:10.2337/diacare.25.9.1612
- (23) **LEE JH, ADHIKARI P, KIM SA, YOON T, KIM IH, LEE KT.** Trans fatty acids content and fatty acid profiles in the selected food products from Korea between 2005 and 2008. *J Food Sci.* 2010; 75: C647-C652. doi:10.1111/j.1750-3841.2010.01737.x
- (24) **LERNER-GEVA L, BAR-ZVI E, LEVITAN G, BOYKO V, REICHMAN B, PINHAS-HAMIEL O.** An intervention for improving the lifestyle habits of kindergarten children in Israel: a cluster-randomised controlled trial investigation. *Public Health Nutr.* 2015; 18: 1537-1544. doi:10.1017/S136898001400024X
- (25) **LLOYD-WILLIAMS F, BROMLEY H, ORTON L, HAWKES C, TAYLOR-ROBINSON D, O'FLAHERTY M, MCGILL R, ANWAR E, HYSENI L, MOONAN M, RAYNER M, CAPEWELL S.** Smorgasbord or symphony? Assessing public health nutrition policies across 30 European countries using a novel framework. *BMC Public Health.* 2014; 14: 1195. doi:10.1186/1471-2458-14-1195
- (26) **LOBSTEIN T, JACKSON-LEACH R, MOODIE ML, HALL KD, GORTMAKER SL, SWINBURN BA, JAMES WP, WANG Y, MCPHERSON K.** Child and adolescent obesity: part of a bigger picture. *Lancet.* 2015; 385: 2510-2520. doi:10.1016/S0140-6736(14)61746-3
- (27) **MACNIVEN R, BAUMAN A, ABOUZEID M.** A review of population-based prevalence studies of physical activity in adults in the Asia-Pacific region. *BMC Public Health.* 2012; 12: 41. doi:10.1186/1471-2458-12-41
- (28) **MARTOS É, BAKACS M, JOÓ T, KAPOSVÁRI C, NAGY B, SARKADI NAGY E, SCHREIBERNÉ MOLNÁR E.** Assessment of the impact of a public health product tax. Budapest: „WHO Regional Office for Europe”, 2015.
- (29) **MCKEOWN NM, MEIGS JB, LIU S, SALTZMAN E, WILSON PW, JACQUES PF.** Carbohydrate nutrition, insulin resistance, and the prevalence of the metabolic syndrome in the Framingham Offspring Cohort. *Diabetes Care.* 2004; 27: 538-546. doi:10.2337/diacare.27.2.538
- (30) **MENSINK GB, SCHIENKIEWITZ A, HAFTENBERGER M, LAMPERT T, ZIESE T, SCHEIDT-NAVE C.** Übergewicht und Adipositas in Deutschland. *Bundesgesundheitsbl.* 2013; 56: 786-794. doi:10.1007/s00103-012-1656-3
- (31) **MICHISHITA R, JIANG Y, ARIYOSHI D, YOSHIDA M, MORIYAMA H, YAMATO H.** The practice of active rest by workplace units improves personal relationships, mental health, and physical activity among workers. *J Occup Health.* 2017; 59: 122-130. doi:10.1539/joh.16-0182-OA
- (32) **MOREIRA-SILVA I, TEIXEIRA PM, SANTOS R, ABREU S, MOREIRA C, MOTA J.** The Effects of Workplace Physical Activity Programs on Musculoskeletal Pain: A Systematic Review and Meta-Analysis. *Workplace Health Safety.* 2016; 64: 210-222. doi:10.1177/2165079916629688
- (33) **MOZAFFARIAN D, AFSHIN A, BENOWITZ NL, BITTNER V, DANIELS SR, FRANCH HA, JACOBS DR JR, KRAUS WE, KRIS-ETHERTON PM, KRUMMEL DA, POPKIN BM, WHITSEL LP, ZAKAI NA.** Population approaches to improve diet, physical activity, and smoking habits: a scientific statement from the American Heart Association. *Circulation.* 2012; 126: 1514-1563. doi:10.1161/CIR.0b013e318260a20b

- (34) **MYERS J, PRAKASH M, FROELICHER V, DO D, PARTINGTON S, ATWOOD JE.** Exercise capacity and mortality among men referred for exercise testing. *N Engl J Med.* 2002; 346: 793-801. doi:10.1056/NEJMoa011858
- (35) **ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT (OECD).** 2017 Obesity Update 2017. <http://www.oecd.org/els/health-systems/Obesity-Update-2017.pdf> [15. Juni 2017].
- (36) **POWELL LM, CHRQUI JF, KHAN T, WADA R, CHALOUPKA FJ.** Assessing the potential effectiveness of food and beverage taxes and subsidies for improving public health: a systematic review of prices, demand and body weight outcomes. *Obes Rev.* 2013; 14: 110-128. doi:10.1111/obr.12002
- (37) **RAO M, AFSHIN A, SINGH G, MOZAFFARIAN D.** Do healthier foods and diet patterns cost more than less healthy options? A systematic review and meta-analysis. *BMJ Open.* 2013; 3: e004277. doi:10.1136/bmjopen-2013-004277
- (38) **ROBERTO CA, SWINBURN B, HAWKES C, HUANG TT, COSTA SA, ASHE M, ZWICKER L, CAWLEY JH, BROWNELL KD.** Patchy progress on obesity prevention: emerging examples, entrenched barriers, and new thinking. *Lancet.* 2015; 385: 2400-2409. doi:10.1016/S0140-6736(14)61744-X
- (39) **ROSS R, DAGNONE D, JONES PJH, SMITH H, PADDAGS A, HUDSON R, JANSSEN I.** Reduction in Obesity and Related Comorbid Conditions after Diet-Induced Weight Loss or Exercise-Induced Weight Loss in Men: A Randomized, Controlled Trial. *Ann Intern Med.* 2000; 133: 92-103. doi:10.7326/0003-4819-133-2-200007180-00008
- (40) **SCHWARTZ C, ISSANCHOU S, NICKLAUS S.** Developmental changes in the acceptance of the five basic tastes in the first year of life. *Br J Nutr.* 2009; 102: 1375-1385. doi:10.1017/S0007114509990286
- (41) **SKOUTERIS H, MCCABE M, SWINBURN B, NEWGREEN V, SACHER P, CHADWICK P.** Parental influence and obesity prevention in pre-schoolers: a systematic review of interventions. *Obes Rev.* 2011; 12: 315-328. doi:10.1111/j.1467-789X.2010.00751.x
- (42) **SPENCE S, DELVE J, STAMP E, MATTHEWS JN, WHITE M, ADAMSON AJ.** The impact of food and nutrient-based standards on primary school children's lunch and total dietary intake: a natural experimental evaluation of government policy in England. *PLoS ONE.* 2013; 8: e78298. doi:10.1371/journal.pone.0078298
- (43) **THOW AM, DOWNS S, JAN S.** A systematic review of the effectiveness of food taxes and subsidies to improve diets: understanding the recent evidence. *Nutr Rev.* 2014; 72: 551-565. doi:10.1111/nure.12123
- (44) **TIROSH A, SHAI I, AFEK A, GAL DUBNOV-RAZ MHA, AYALON N, GORDON B, DERAZNE E, TZUR D, SHAMIS A, VINKER S, ASSAF R.** Adolescent BMI trajectory and risk of diabetes versus coronary disease. *N Engl J Med.* 2011; 364: 1315-1325. doi:10.1056/NEJMoa1006992
- (45) **TOBIAS DK, CHEN M, MANSON JE, LUDWIG DS, WILLETT W, HU FB.** Effect of low-fat diet interventions versus other diet interventions on long-term weight change in adults: a systematic review and meta-analysis. *Lancet Diabetes Endocrinol.* 2015; 3: 968-979. doi:10.1016/S2213-8587(15)00367-8
- (46) **TWIG G, YANIV G, LEVINE H, LEIBA A, GOLDBERGER N, DERAZNE E, BEN-AMI SHOR D, TZUR D, AFEK A, SHAMISS A, HAKLAI Z, KARK JD.** Body-Mass Index in 2.3 Million Adolescents and Cardiovascular Death in Adulthood. *N Engl J Med.* 2016; 374: 2430-2440. doi:10.1056/NEJMoa1503840
- (47) **UNNEVEHR LJ, JAGMANAITE E.** Getting rid of trans fats in the US diet: Policies, incentives and progress. *Food Policy.* 2008; 33: 497-503. doi:10.1016/j.foodpol.2008.05.006
- (48) **WATERS E, DE SILVA-SANIGORSKI A, HALL BJ, BROWN T, CAMPBELL KJ, GAO Y, ARMSTRONG R, PROSSER L, SUMMERBELL CD.** Interventions for preventing obesity in children. *Cochrane Database Syst Rev.* 2011; CD001871. doi:10.1002/14651858.CD001871.pub3
- (49) **WEN CP, WAI JP, TSAI MK, YANG YC, CHENG TY, LEE MC, CHAN HT, TSAO CK, TSAI SP, WU X.** Minimum amount of physical activity for reduced mortality and extended life expectancy: a prospective cohort study. *Lancet.* 2011; 378: 1244-1253. doi:10.1016/S0140-6736(11)60749-6