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Review Article

Diabetes Medication and Metabolism

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Abstract

From a biological view, most of the processes involved in insulin resistance, which drives the pathobiology of type 2 diabetes, are reversible. This theoretically makes the disease reversible and curable by changing dietary habits and physical activity, particularly when adopted early in the disease process. Yet, this is not fully implemented and exploited in health care due to numerous obstacles. This article reviews the state of the art in all areas involved in a diabetes cure-focused therapy and discusses the scientific and technological advancements that need to be integrated into a systems approach sustainable lifestyle-based healthcare system and economy. The implementation of lifestyle as cure necessitates personalized and sustained lifestyle adaptations, which can only be established by a systems approach, including all relevant aspects. Introduction of such a systems approach in type 2 diabetes therapy not only requires a concerted action of many stakeholders but also a change in healthcare economy, with new winners and losers. A “call for action” is put forward to actually initiate this transition. The solution provided for type 2 diabetes is translatable to other lifestyle-related disorders. Metabolism is a term that refers to the complex biochemical processes that occur within an organism in order to sustain life. These processes include the conversion of food into energy, the synthesis of complex molecules, and the breakdown of waste products. Metabolism is an essential part of all living organisms, from single-celled bacteria to complex multicellular animals. The concept of metabolism dates back to the ancient Greeks, who believed that the body's metabolic processes were controlled by a balance of four bodily fluids, or "humors": blood, phlegm, yellow bile, and black bile. It wasn't until the 19th century that scientists began to study metabolism in a more systematic way, and it wasn't until the 20th century that the underlying biochemical mechanisms were fully understood.

Keywords: Diabetes, Metabolism, Medication, Biochemical, Scientist

INTRODUCTION

Current health care in the area of lifestyle-related diseases does not focus on reversal of the cause of the disease, but rather on controlling disease corollaries by manipulating biochemical pathways (gluconeogenesis by metformin, hepatic cholesterol synthesis by statins, insulin secretion by sulfonylureas, fatty acid housekeeping by PPAR agonists, etc.). A large repertoire of tools, technologies, and medicinal treatments has been developed for this purpose. Chronic disease care and (cardiovascular) risk management have been vastly improved thanks to these possibilities. However, we are running into the situation that disease care soon becomes too costly, with a number of stakeholders that either financially profit from the status quo or find the effort to change it too complicated. Also, unbeneficial drivers in our healthcare economy maintain this situation, as only reductionist solutions can be patented. In the context of our current healthcare system, citizens become patients in the literal sense of the word: patiently undergoing treatments instead of playing an active role in their own health care (Albert Mathieu et al., 2007) (Anspach Renee R et al., 1988).

In the end, this is an inefficient approach for treatment of the so-called “lifestyle related diseases,” including metabolic syndrome, obesity, type 2 diabetes, and cardiovascular disease. Moreover, we now know that our lifestyle partakes in the pathogenesis of many other diseases inflammatory diseases like rheumatoid arthritis, COPD, gastro oesophageal reflux disease, osteoarthritis, neurological diseases like Alzheimer and multiple sclerosis, and specific cancers. Over the past 10 years, an integrated view on health and health care was developed, embracing health as a system (including systems biology concepts and technologies), the development of disease from health as a continuum and exploiting these assets toward "P4-medicine" (Predictive, Personalized, Preventive, and Participatory). The personalized aspect emerged from the possibilities to quantify the causal mechanisms involved disease predisposition (genetics) and development (environment), while the participatory aspect related both to the health and medical data ownership and the need for patient citizens to take optimal control of all aspects of their own health, spanning all bio psychosocial aspects (Bassett Andrew Mark et al., 2018) (Beagan Brenda L et al., 2000).

In this article, we will focus and elaborate on type 2 diabetes as an exemplary prototype of a lifestyle-related disease, but very similar concepts and approaches are valid for many other diseases. The theoretical framework of P4 medicine and P4 health is now solid, but yet difficult to translate into daily practice of health care for a number of reasons, mostly related to conflicting stakeholder interest and cost of implementation. Some examples are emerging, but mostly in an experimental and costly setting. Type 2 diabetes is also interesting as the disease is not only part of a continuum from health to comorbidities and preventable but also to a large extends reversible and curable with relatively simple means, once P4 or P6 health is implemented, as will be demonstrated below (Beagan Brenda et al., 2003) (Bell Ann V et al., 2014).

DISCUSSION

Metabolism can be divided into two main categories: catabolism and anabolism. Catabolic processes involve the breakdown of complex molecules into simpler ones, releasing energy in the process. This energy can then be used by the cell or organism to perform various functions. Anabolic processes, on the other hand, involve the synthesis of complex molecules from simpler ones, requiring energy in the process. One of the most important catabolic processes in metabolism is cellular respiration. This process involves the breakdown of glucose, a simple sugar, into carbon dioxide and water, releasing energy in the process. This energy is then used by the cell to perform various functions, such as muscle contraction or the synthesis of new molecules. Other catabolic processes include the breakdown of fats and proteins. Anabolic processes, on the other hand, involve the synthesis of complex molecules from simpler ones. This requires energy, which is often provided by the breakdown of ATP, a molecule that stores energy in cells. Examples of anabolic processes include the synthesis of proteins, carbohydrates, and lipids. Metabolism is regulated by a variety of factors, including hormones, enzymes, and the availability of nutrients. Hormones, such as insulin and glucagon, play a key role in regulating metabolism by controlling the release of glucose into the bloodstream and the uptake of glucose by cells. Enzymes, which are proteins that catalyze biochemical reactions, also play a key role in regulating metabolism by controlling the rate at which reactions occur (Betancourt Joseph R et al., 2006) (Bleakley Alan et al., 2008).

Role of Medication

The current pharmaceutical approach to diabetes care is to assist the patient in maintaining glucose, lipid, and blood pressure control. Metformin primarily decreases hepatic glucose production. Thiazolidine diones assist in fatty acid storage in adipose tissue, thereby increasing the use of glucose as energy source and reducing ectopic fat storage. Sulfonylureas stimulate insulin secretion, DPP4 inhibitors prolong the half-life of insulin-stimulating hormones, and exogenous insulin facilitates organ glucose uptake. Medication is prescribed depending on the stage and severity of the disease. Yet, none of these medications addresses the root cause of T2D and will thus not cure the patient. The extent to which insulin sensitivity and/or action are compromised in each of these tissues may differ between patients. Therefore, the treatment strategy should be tailored to personal disease characteristics. For example, hepatic insulin resistance due to hepatosteatosis in a relatively lean subject may be due to impaired fatty acid uptake by subcutaneous fat or by excessive consumption of refined carbohydrates. Combining PPAR agonists with restriction of sugar (and alcohol) intake could be a beneficial "food-pharma" couple. Metabolism is regulated by a variety of factors, including hormones, enzymes, and the availability of nutrients. Hormones, such as insulin and glucagon, play a key role in regulating metabolism by controlling the release of glucose into the bloodstream and the uptake of glucose by cells. Enzymes, which are proteins that catalyze biochemical reactions, also play a key role in regulating metabolism by controlling the rate at which reactions occur. The rate of metabolism can also be influenced by a variety of external factors, including diet, exercise, and sleep. A healthy diet that is rich in nutrients and low in processed foods can help to support healthy metabolism, while regular exercise can help to increase metabolic rate and improve overall health. Adequate sleep is also important for maintaining healthy metabolism, as sleep deprivation has been shown to disrupt metabolic processes (Bochatay Naïke et al., 2020).

CONCLUSION

In this article, we provide evidence for the reversibility of insulin resistance and the remission of type 2 diabetes, specifically by diet and lifestyle. Complete cure may be achieved if beta-cell function is still appropriate and complications have not yet occurred. We demonstrate that T2D is a "systems disease" with multiple organs and processes involved and consequently deserve to be treated in a personalized manner, if necessary in a "personalized lifestyle-personalized medicine combination." Compliance to lifestyle change has been a major obstacle for implementation in health care, but the advancements in behavioural change technologies, health, health literacy, and personal health data valorization now may allow for a switch from a research setting to real-life socioeconomic implementation. Enough arguments and instruments are currently available to implement a lifestyle-based therapy for type 2 diabetes and other food-related lifestyle diseases and to extend this to a prevention and optimal health focused health care. Also, we argue that in doing so, an enormous economic gain will be achieved, which is well able to finance a lifestyle-based prevention and optimal health focused health care and economy. Since stakeholders, losses, and profits in this new economy will substantially differ from the current situation, the current healthcare industry will only slowly transit toward this new situation. Creative ways of implementation thus need to be explored. Ultimately, health data cooperatives may become the basis and drivers for this change, but this will take some time to develop into an economic reality. In the meantime, creative new "ecosystems" need to be explored that combine all necessary instruments for specific type 2 diabetes populations to be really effective. The goal would not only be to demonstrate its therapeutic efficacy but also and possibly more important to demonstrate that a new health economy that provides the services (coaching, ITC, foods, diagnostics, medication, all of these personalized and integrated) can become profitable while significantly reducing the net healthcare costs. Such ecosystems should preferably be regional, facilitating the simultaneous change of all relevant components if the "change system" to interact. This will allow community building, involvement of local healthcare centers, the local health and lifestyle-related economy, etc.

Metabolism is a complex process that is essential for the survival of all living organisms. It involves the conversion of food into energy, the synthesis of complex molecules, and the breakdown of waste products. Understanding how metabolism works can help us to better understand how our bodies function, and how we can support healthy metabolism through diet, exercise, and other lifestyle factors (Braun Lundy et al., 2017).

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CONFLICT OF INTEREST

None

REFERENCES

1. Albert Mathieu, Hodges Brian, Regehr Glenn (2007). Research in Medical Education: Balancing Service and Science. Adv Health Sci Educ. 12103-15.
2. Anspach Renee R (1988). Notes on the Sociology of Medical Discourse: The Language of Case Presentation. J Health Soc Behav. 29: 357-75.
3. Bassett Andrew Mark, Brosnan Caragh, Southgate Erica, Lempp Heidi (2018). Transitional Journeys into, and through Medical Education for First-in-Family (FiF) Students: A Qualitative Interview Study. BMC Medical Education. 18: 102.
4. Beagan Brenda L (2000). Neutralizing Differences: Producing Neutral Doctors for (Almost) Neutral Patients. Soc Sci Med. 51: 1253-65.
5. Beagan Brenda (2003). Teaching Social and Cultural Awareness to Medical Students: 'It's All Very Nice to Talk about It in Theory, but Ultimately It Makes No Difference. Academic Medicine. 78: 605-14.
6. Bell Ann V, Michalec Barret, Arenson Christine (2014). The (Stalled) Progress of Interprofessional Collaboration: The Role of Gender. J Interprof Care. 28: 98-102.
7. Betancourt Joseph R (2006). Cultural Competence and Medical Education: Many Names, Many Perspectives, One Goal. Academic Medicine. 81: 499-501.
8. Bleakley Alan, Brice Julie, Bligh John (2008). Thinking the Post-colonial in Medical Education. Medical Education. 42: 266-70.
9. Bochatay Naïke, Bajwa Nadia M (2020). Learning to Manage Uncertainty: Supervision, Trust and Autonomy in Residency Training. Sociol Health Illn. 42: 145-59.
10. Braun Lundy, Saunders Barry (2017). Avoiding Racial Essentialism in Medical Science Curricula. AMA Journal of Ethics. 19: 518-27.