



The Darwinization of Diabetes

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INTRODUCTION

Diabetes is a dynamic disease, an ever-evolving entity. In existence for centuries, the prevalence of diabetes has increased manifold over the past few decades.¹ This evolution is associated with a change in classification, clinical features, comorbidities, complications, and clinical management strategies. These changes are what we describe as the Darwinization of diabetes. Charles Darwin was one of the most important scientists in human history. His research forms the basis of evolutionary biology. His hypothesis on natural selection, created along with Alfred Wallace, is accepted as the most important mechanism of evolution.² A similar situation occurs with diabetes.

THE GLUCOCENE ERA

From a geological perspective, mankind has entered the Anthropocene Era, in which the world's environment is being modified by human activity. The term Barocene Era highlights the bidirectional impact of obesity and the environment on each other.³ Similarly, the term Glucocene Era may describe the changes related to the exploding diabetes epidemic. The Glucocene Era is marked by diabetogenic changes in the environment, e.g., lack of open spaces for exercise, as well as by environmental changes due to the "endemic" nature of diabetes, e.g., production of sugar-free foods and beverages, provision of diabetes-friendly services, and the environmental impact of plastic used in insulin and its ancillaries.

TYPES AND TAXONOMY

The Darwinization of diabetes, however, goes beyond this. As the human phenotype shifts toward heavier body weight and the immunotype toward enhanced autoimmunity, the "type" of diabetes is also changing. There is more diabetes and a greater incidence of type 1 diabetes than before. The incidence of malnutrition-modulated diabetes mellitus has declined so much so that the World Health Organization discontinued this terminology in its 1995 classification.⁴ Darwin's laws of natural selection will govern recent efforts at "creating" a type 5 diabetes: only the fittest will survive.

TARGETS AND TERMINI

The Darwinization of diabetes is evident in our understanding as well. We are now better evolved in terms of strategies, style, science, and substance while managing diabetes. The earlier glucocentric approach has been supplanted by comprehensive care, aimed at achieving pan-metabolic as well as psychosocial well-being. This is a perfect example of natural selection: only the fittest theories and tools survive; the most appropriate targets and termini are aimed for.⁵

BURDEN OR BUOYANCY?

There is a paradox here, however. Better care has helped increase survival rates in diabetes. This is especially true for persons with type 1 diabetes. This has led to an exponential increase in the number of persons living with diabetes. This creates an enigmatic situation: while the challenge of diabetes on society and the individual is higher, society and individuals can shoulder this burden better and live longer. Should we view the increasing number of persons living with diabetes as a failure of the preventive health care system or a success of the curative services? This question is open to debate.

MALTHUSIAN MALADAPTATION

Will the unchecked rise in our dysglycemic population lead to a Malthusian situation? Thomas Malthus argued that population growth, which occurs exponentially or logarithmically, will one day outstrip food supply, which grows arithmetically.² He felt that this would lead to a survival crisis, characterized by autocorrective man-made or natural disasters, which would drastically reduce the population.

Such pessimistic predictions have also been made earlier in the context of diabetes. There was a fear that bovine and porcine insulins would go out of stock because we did not have sufficient animals to produce insulin. The production of recombinant insulin resolved this Cassandra concept, and then came analog insulins.⁶ Today, newer challenges of diabetes, such as renal and cardiac disease, are met by novel drugs, which have been proven to enhance complication-free survival.

DIAGNOSTICS AND THERAPEUTICS

The Darwinization of diabetes extends to diagnostics as well. Newer methods such as HbA1c are available to diagnose diabetes. The World Health Organization has also accepted using glucometers for diagnosis, albeit with slightly higher capillary glucose levels.⁷ Diabetes monitoring now includes time in range, and complication screening can easily be done by point-of-care devices.⁸ All these are examples of evolution through natural selection, of affirmative action against adversity.

The same holds for treatment systems. Not only medication but the method of delivering health care is changing. Diabetes is increasingly being managed at the primary care level, using drugs that do not need dose adjustment or frequent monitoring. Modern medications developed for glucose control also help in weight management and metabolic protection, thus offering survival benefits and evolutionary advantage.⁹ The lack of side effects, such as hypoglycemia, is an added strength.

LINEARITY AND CYCLICITY

The Darwinian theory of evolution is a linear one. This contrasts with the Indian philosophy of cosmic evolution, which is cyclic. Hindu philosophy views the cosmos as undergoing continuous cycles, or kalpas and yugas, of creation, preservation, and destruction. Will diabetes care limit itself

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to linear growth and evolution? Or will it follow a cyclic path?

We do see signs of both. Linear and short-term secular trends are visible to all stakeholders in the diabetes care ecosystem. Long-time observers can discern examples of cyclic Darwinization, as we revisit older drugs and ancient wisdom in our effort to tame diabetes. Examples include a resurgence in interest in malnutrition-related diabetes mellitus, the use of hydroxychloroquine for diabetes, a return to vials and syringes in many parts of the world, and efforts to use ketosis as a treatment for obesity.

DYNAMICITY OF DARWINIZATION

Darwinization is dynamic, just as evolution is eternal. Despite progress in physiology and pharmacology, we continue to struggle with poor control of diabetes. This means that we still need to improve further. Better diagnostics, therapeutics, and enhanced

motivational and behavioral change skills are required. These will be effective only if we focus on awareness and advocacy about diabetes, the ill effects of poor control, and the advantages of good control.

This represents another paradox: awareness and education are seemingly the simplest of therapies to impart but the most arduous to achieve. This is what we try to do, along with our readers, at our journal. Let us evolve together, toward a Euglucocene Era.

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