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## The Effects of Insulin Resistance on Obesity

Obesity and insulin resistance have been issues of great concern and huge communal wellbeing impact. Various articles are published annually to focus on the possible mechanisms that underline the connection between obesity and the resistance of insulin. There is, therefore, the need to highlight literature within the last seven years with emphasis on some of the emerging concepts in the field of healthcare. It is necessary to understand the concepts that connect visceral adiposity with the build-up of lipids in the liver. The understanding of the mechanisms is essential for the learning of how ectopic fat accretion can lead to the resistance of insulin

Body fatness can be described as the excessive enlargement of adipose tissue more than the required amount by the body due to too much consumption of calories in excessive levels. Insulin resistance can be referred to as the reduction in the rate at which glucose is disposed in animals in reaction to the given insulin concentrations in the body. Regular resistance of insulin may be as a result of the failure of insulin to act normally in organisms and tissues that undergo normal metabolism. The resistance of insulin in the skeletal muscle is evident as a decline in the transport of glucose and glycogen production in reaction to the insulin that is circulating. In the liver, the resistance to insulin is discerning but goes on to stimulate the synthesis of fatty acids. Insulin resistance is manifested in the adipose tissue as a failed transport of glucose that is stimulated by insulin.

Medical information has it that the resistance of insulin is a necessary sign for the development of two types of diabetes mellitus. It is necessary to understand that obesity is not exclusively the cause of insulin failure in the body. The resistance is often associated with hypertension and other health concerns. Weight gain is also connected to the resistance of insulin as indicated in classical studies about insulin resistance and obesity. The necessary information about insulin resistance is useful in reinforcing the significance of learning the concept of the battle of insulin in body fatness.

### Results

A Review Article that Summarizes a Research Done in the Field of Healthcare Prior to Its Publication

In a review article that provides a summary of the research done in the field prior to its publication, information about a research on the relations between urbanization and two types

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of diabetes mellitus is provided. The research takes advantage that no studies have evaluated the harmful effects of air pollution and their success in the development of the two types of diabetes mellitus. In the information prior to the research, a hypothesis is made that the exposure to ambient fine particle matter overstresses insulin resistance that is diet-based, the swelling of the adipose and the adiposity of the visceral (Sun et al., 2009).

In the article, the methods that are summarized to have been used in the research are recorded alongside the results of the research. Under the methods, male mice were given high-fat chow to consume for approximately 10 weeks. The mice were randomly assigned to filtered air for a period of 24 weeks. Records from the article have it that the exposed mice indicated signs that there insulin was resisting, an augment in visceral adiposity, and a systematic swelling. It is noted that the exposure to concentrated ambient induced abnormal characteristics of insulin resistance such as an increase in protein Kinase C expression. The abnormalities from the experiment are highlighted to be associated with rare occurrences in the relaxation of the vascular tissue. Information from the article published prior to the publication of the research indicates that the contact with polluted air overstresses the resistance of insulin and visceral adiposity. The article, therefore, is an indication of a connection between air pollution and the two types of diabetes mellitus (Sun et al., 2009).

Experimentations Done Since the Publication of the Initial Review Article Prior to the Research

## **1. Experiment Done to Evaluate the Outcome of Particulate Air Contamination Experience on Body Fatness in Rodents**

A different research carries out an experiment to find out the impact of the contact with contaminated air on metabolic limits. The experiment is also aimed at investigating the participation of oxidative pressure pathways in the growth of metabolic variation. In the research, PM2.5 inhalation exposure was carried out to 6 mice with wild orientation. The experiment was done to the 6 mice from 6 weeks and the test done for the next 10 weeks. During the research, it was a routine to feed the different groups of mice simultaneously with varying diets for the same period of 10 weeks. The mice were given normal and high-fat diets and the mice that were exposed to the polluted air exhibited anomalous metabolic reactions such as visceral fat contents and enlarged subcutaneous layer. Again, the exposed mice reacted with a rise in the activities in the adipose. The different category of mice that were not exposed to the polluted air showed a development in limits of the resistance of insulin. Moreover, they did not experience vascular dysfunction. Vascular function and visceral inflammation were the responses the mice exhibited after the experimentation (Xu et al., 2010).

The experimentation outlines that contact with polluted air at the early stages in life is risky for

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the succeeding progress of insulin resistance. The exposure is also a risk factor of adiposity and inflammation. Evidence from the research indicates that the contamination of air is critical in the maturity of serious wellbeing consequences in both developed and developing countries. Similar to the information from the research are data on population cohorts that provide compelling connections between the contact with contaminated air and increased mortality. The experiment on the impact of air contamination on the well-being of the 6 mice is an illustration of the mechanistic connections between inhaled contaminated air and the habit of consuming meals with high-fat levels (Xu et al., 2010).

The animal samples used in the experimentation were permitted by the authorities to make the entire activity legal. The blood glucose levels in the mice were also measured using modern equipment and insulin levels determined as well. Additionally, abdominal fat evaluation was performed through the procedure of magnetic resonance imaging. Intravital microscopy was performed as well in the mice sample that was used. The health tests were done to determine the health status of the mice before and after the completion of the experiment (Xu et al., 2010).

The experiment begins when the mice are three weeks old to evaluate the propensity to insulin resistance from childhood to adulthood. The experiment also elaborates that childhood is the appropriate time to find out the effects of exposure to pollutants on insulin resistance. However, experiments that are aimed at evaluating the two types of diabetes mellitus and insulin resistance, with its relation to environmental factors may be helpful in clarifying the links between insulin resistance, obesity and the progress of cardiovascular risk. Various investigations also highlight the role played by swelling and oxidative pressure pathways in the procedure of insulin resistance in relation to body fatness.

The study conducted reveals that there are potential mechanisms by which polluted air may induce insulin resistance and obesity in living things. Previous studies revealed the impact of polluted air on body organs, more so the heart and the variability of heart rates. The mice being held under the same conditions at the early stages of their life suggest that the exposure to air pollution plays a critical role in the insulin resistance development.

## **2. Air Contamination as a Possibility Aspect for Type 2 Diabetes**

Recent researches reveal that the contamination of air is a significant aspect for the development of diabetes mellitus; type 2 specifically. Despite the studies on human and animal insulin resistance, there is no clear knowledge of the means by which atmospheric pollution causes diabetes. Research data from WHO indicates that approximately 347 million people globally suffer from diabetes, with a majority of those suffering from the disease coming from the low and middle-income countries. Some researchers have successfully evaluated the affirmative links between air contamination and diabetes while some researchers have not been

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victorious on the same (Rao, Patel, Puett & Rajagopalan, 2015).

Research information has it that the majority of the diabetes cases worldwide are minor to the known type 2. It has been realized that the medical system is not enough to address the challenges that come with diabetes as to most nations. Even with the appropriate financial investments, medical systems have to be supplemented with certain parameters to curb the issue of diabetes. Obesity has often been declared the major cause of diabetes while recent studies reveal that environmental factors are also responsible for the rising cases of diabetes. Air pollution, specifically, is demonstrated to be associated with the most spread type of diabetes (Rao, Patel, Puett & Rajagopalan, 2015).

On the same note, studies reveal an epidemiological connection between air contamination, and diabetes. Studies indicate an affirmative relationship between long-term exposure to atmospheric contamination and the high risk of developing type two diabetes mellitus. For instance, a study carried out by an organization in Canada about the connection between diabetes and contaminated air suggested that the contact with the traffic related pollution could lead to increased risks of developing type 2 diabetes mellitus.

Another recent study investigated the relationship between exposure to a particular matter and abnormal glucose tolerance in a number of expectant women from Boston, USA. In the study, traffic in the residential areas was used to investigate the likelihood of people developing diabetes due to the exposure to the polluted air. The experiment showed results of the occurrence of weakened glucose tolerance being prominent. In spite of the use of Nitrogen dioxide to indicate air pollution that is caused by traffic, it is most likely that the precise impact was as a result of other components of air pollution due to traffic (Rao, Patel, Puett & Rajagopalan, 2015)

Other studies have as well evaluated the connection between the exposure to atmospheric contamination and diabetes by analyzing data obtained from previous studies. The research results indicate that the association is prominent in people who are considered to be physically energetic and not smoking cigarettes; a suggestion that reductions in the exposure to polluted air may be beneficial to individuals who live healthily (Rao, Patel, Puett & Rajagopalan, 2015).

Other studies have not found out significant evidence to prove the connection between air contamination and diabetes. The differences in such studies that seem to have highlighted the differences with those that have not may be compared to the different methods, air pollutant used, and the differences in susceptibility. There is also experimental evidence that link air toxic waste coverage and the resistance of insulin. Evidence from animal studies state that atmospheric contamination and mechanisms of air toxic waste could provoke deviations in insulin resistance. Exposure to air pollutants may induce insulin resistance whereas

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inflammation plays a pathogenic duty in the growth of insulin resistance that is linked to body fatness and type 2 diabetes mellitus. It is highly suggested that inhaled elements could lead to the establishment of resistance methods by coming into contact with different types of receptors. A series of research investigates the significance of inborn resistance responses with the exposure to atmospheric contamination. Various researchers, therefore, come to agreement that air pollution activates the immune system by either direct recognition (Rao, Patel, Puett & Rajagopalan, 2015).

### **3. The Causes of Insulin Resistance Underlying Obesity**

Studies carried out recently reveal that there is a correlation between the resistance of insulin and the accumulation of visceral adipose tissue. The accumulation of excess fats in liver is said to be majorly due to visceral adiposity. The adipose tissue is also fragile to severe swelling that could contribute to the impairment of insulin signaling. Additionally, recent findings reveal that the enlargement of visceral adipose tissue and accumulation of excess fats in the sensitive body organs could be due to the restricted expansion of the skin. There are no features of extracellular matrix in the adipose tissue that would promote the growth of capillaries (Hardy, Czech & Corvera, 2012).

Latest researches in the field of healthcare call attention to the significance of understanding of the methods that connect visceral adiposity with the concentration of fats in the liver. The research has also noticed the need to understand the means by which ectopic accumulation of lipids leads to the failure of insulin and the methods used to determine the depot in the adipose tissue. Again, recent studies have revealed that not all types of obesity could cause insulin resistance. The expandability of the adipose tissue is noted to be significant in the protection against insulin resistance. Despite the research that goes on in the healthcare sector up to date, there is uncertainty on the system that verifies the expansion of the adipose tissue. It is, however, stressed that the capacity to alter the extracellular medium and to amplify the vascularization of vessels for efficient oxygen and nutrient supply are necessary (Hardy, Czech & Corvera, 2012).

Evidence-based experiments have demonstrated the reality of the hypoxia in adipose from those who suffer from obesity to be connected with blood flow in the lower adipose tissue. Again, there is no evidence of hypoxia in the study. Capillary expansion may, therefore, be essential in the prevention of hypoxia, inflammation, and fibrosis in the enlarging adipose tissue (Hardy, Czech & Corvera, 2012).

### **Discussion**

Based on strong evidence from the study carried out on the adipose tissue inflammation and

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insulin resistance, it is clear that exposure to pollutants in the air induces adipose inflammation and visceral adiposity as well. The study carried out relied on preliminary studies; hence there is the need to carry out new experiments to find out the effects about the same. Factors such as urbanization are a basis for future studies in the field of healthcare.

The experiment that was aimed at evaluating the impact of the exposure to air pollutants at the early stages of an animal's life concludes that the contact with pollutants in the air is of great risk for the consequent adoption of if insulin resistance, organ swelling, and adiposity. From the study, it is outlined that factors such as inappropriate diet and lack of exercise are fundamental in the propensity for type 2 diabetes mellitus. The study provides useful insights on the potential mechanisms by which the inhalation of polluted air may induce obesity and insulin resistance; thus, it may be unnecessary to conduct a further study of the same. The study goes ahead to address some findings from different researchers as a way of making clear all the facts that are controversial. Data from the study suggests a significant impact of the contact with exposure unsafe air on the acquisition of diabetes. Apparently, the research was perfect since it went ahead to examine ecological factors such as air contamination. The findings were of use to the public health on the understanding of the substances' impact on both the children's and adults' health.

The research on air contamination as a risk issue for diabetes relied on evidence to evaluate air contamination as an imperative determinant of severe metabolic illness. The research does not completely agree with the recent research on the impact of air contamination on insulin resistance. Current epidemiological data reveal that atmospheric contamination plays a slight responsibility in the health of animals than other prevailing concerns such as way of life of people. There is, therefore, the need to conduct further research on the experiment for purposes of clarity on the effect of atmospheric contamination and human health. Future research need to examine various pathways to assist in the identification of atmospheric contamination impacts and to group the risks.

The final research on the causes of insulin resistance underlying obesity has it that dietary changes are a major approach in the journey to weight loss. The research advises patients to comply with the dietary requirements. The study goes hand in hand with other recent studies; hence, there is no need for further research to elaborate on the issue of obesity and insulin resistance. Information from the study gives insight into ways of improving insulin resistance in association with the resistance of insulin. The research has played a critical role in the understanding of the impact of diet on insulin resistance and diabetes; thus, it would be essential for reference purposes in future studies that might be done due to the rapid changes in technology.

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