FROM MOLECULAR PATHOLOGY TO INFORMATIONAL PATHOLOGY

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INTRODUCTION. The great advances of genetics, biochemistry, immunology and other fundamental sciences, transferred all the human pathology from the organic level at the molecular level. So we know today very well the molecular substrate almost of all the diseases we face. Therefore diagnosis and treatment of these diseases is today based on molecular changes posed. However between molecular changes and their clinical manifestations there is not a linear relationship because they do not always produce the disease. Not always mutations of different genes, and molecular markers, will manifest clinically. Therefore, almost all molecular changes occurs probabilistic. The effect of molecular changes is defined by the risk that the changes to make different diseases. Often in order to manifest clinical, molecular changes require the presence of predisposing factors to act a very long time. Meanwhile asymptomatic chronic diseases can evolve and molecular changes may cause irreversible damage. The phenomena occur as though behind molecular changes would be some hidden parameters that control these changes. One of the hidden parameters has been found to be represented by epigenetic factors that can stimulate or block the activity of different genes depending on the environment conditions. But no epigenetic factors can explain the nonlinearity between the molecular changes and their clinical manifestations. So for example, no epigenetic factors can explain how come the selection of genes which are activated or inhibited, in various diseases, or why they need so long time to manifest clinically. Therefore, we have pointed out that in addition of the substantial aspect of molecular changes there is an informational aspect, represented by molecular information carried by different molecules. The information is actually that ensures control of many biological and pathological processes, and information may not be confused with the molecule that carries. Molecular information it can explain much better the nonlinearity relations between molecular changes and their clinical manifestations. Therefore we have shown that in addition of the molecular pathology there is an informational pathology too, that could open new ways for prevention and treatment in the very complicated diseases we are faced.

METHOD. To discover the causes of nonlinearity between molecular changes and their clinical manifestations, we studied the etiology and pathogeny of some diseases, very common and very serious, as atherosclerosis, diabetes, Alzheimer's disease, and cancer. We studied these diseases because they have a molecular substrate very well known, both in terms of genetic and epigenetic view. But also because in these diseases there is a nonlinearity between molecular changes and their clinical manifestations. Therefore the clinical manifestations of various molecular changes can be expressed only by means of probabilities. In this reason, in these diseases is more talk about some genetic predisposition and other risk factors not known precisely how probability works.

RESULTS. Studying these diseases, we found that the nonlinearity between molecular changes and their clinical manifestations is expressed by a great variability of clinical manifestations, which can go to the absence of any clinical manifestations. We also found that as the research evolves molecular substrate of these diseases is increasingly more and more complicated. So

for example, after 20 years ago it was discovered four genes, in recent years have discovered more than 10 genes that are involved in the onset of Alzheimer's disease. This situation is true in the case of atherosclerosis, diabetes and cancer, where it is discovered more and more candidate genes. And candidate genes require the presence of risk factors that occur sometimes and sometimes not produce disease. On the other hand, risk factors need a very long time to be clinically evident, which brings into question the role of regulatory mechanisms in the disease. Also the treatment action we use in these diseases is probabilistic nature. And the result of treatments varies from one individual to another. Therefore they speak of necessity personalization of treatment depending on the particularities of each patient. The phenomena occur as if between molecular changes and their clinical manifestations would intervene and other factors that can sometimes help and sometimes can stop, the action of molecular modifications.

CONCLUSIONS. After analyzing nonlinear relations between molecular changes and their clinical manifestations, we concluded that in addition to substantial aspect of molecular changes, it is involved also an informational aspects. As is known that in addition of the substance and energy, all the molecules have a molecular information, represented by the spatial structure of the molecule. And this information plays an important role in the recognizing process of different molecules and in the control process of many biological and pathological reactions. Therefore the body has become a very complicated communication system, which transmits over a lot of chemical messengers. Molecular information they transmit these molecules can better explain the nonlinearity of relations between molecular changes and their clinical manifestations, because in information systems acts an informational causality. This means that information not determine some effects, but only triggers some effects, which depend on the operating program of the recipient, such is the cells on they act. Molecular information and informational causality can explain better the relations between molecular changes and their clinical manifestations. But this means that behind of molecular pathology there is a hidden informational pathology, which could open new ways for prevention and treatment in very complicated diseases we are faced.

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