Rebecca F. Gottesman: “Telling someone their risk of dementia would drop if they treated their high blood pressure would impact them more than the possibility of a heart attack or stroke"

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Stroke Branch Chief at the National Institute of Neurological Disorders and Stroke (NINDS)

Dra. Rebecca Gottesman joined the National Institute of Neurological Disorders and Strokes as Stroke Branch Chief in May 2021. In addition to the Branch, she is also Chief of the Stroke, Cognition and Neuroepidemiology Section. Before joining NINDS, Dr. Gottesman was an investigator at the Johns Hopkins University, where she made significant research contributions to understanding the cognitive impacts of stroke and other vascular diseases, as well as short- and long-term associations between vascular risk factors, vascular disease, and dementias.

- **Your presentation is about new imaging technologies and their use in dementia and vascular problems. What is the future of these techniquese?**

I am a vascular neurologist but also an epidemiologist. I mainly work with population studies. For me, neuroimaging is the way to understand the mechanisms of diseases. If I am interested in understanding how vascular risk factors like high blood pressure, diabetes, high cholesterol, smoking and obesity could be related with dementia or even specifically with Alzheimer's, I can't do an experiment on humans and expose them to these factors to see what happens, because it would obviously be unethical and unreasonable to do so. But I can use images of the brain to understand what the connections could be, if it is through certain changes in the brain's structure or through functional changes.

The imaging technique isn't a very new one: we are using images that are quite accessible in a study based on a large population, using magnetic resonance and some positron emission tomography (PET).

We use imaging techniques on a wide population of people. That said, there is a lot of excitement surrounding the new ways of using imaging to study diseases and mechanisms. There are other types of PET that can evaluate different biomarkers of a disease. There have been great changes in the field leading to the use of biomarkers in blood, particularly for Alzheimer's biomarkers, which we now know can be detected in plasma much more easily than with imaging data. With magnetic resonance we can also analyse not only structure but function, such as cerebral blood flow (CBF), the health of blood vessels and the characteristics of the main arteries that go to the brain. All this information is useful to understand what is happening in the brain related to the risk factors and with the cognitive changes we observe.

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- **With all this information and the data collected with these techniques, can you understand what is really going on with the relationship between vascular factors, dementia and stroke?**

A large part of this conference has been about the mechanisms that lead to cognitive deterioration or stroke in certain people. But given that I work with large populations and epidemiological studies, my focus is on considering the risks of dementia that can be modified.

These risk factors are important because they are things we know how to treat and, therefore, are examples of how we can prevent dementia. An important observation we have made is that these risk factors, like high blood pressure and diabetes have a stronger connection with cognitive deterioration and dementia when they are anomalous in middle age. This is a crucial observation we have made from long-term follow-up epidemiological studies: if you have high blood pressure when you are young it is likely that you should control it from an early age to benefit your future cognitive health. From the perspective of prevention, it is important not to wait too long to start thinking about

these risk factors. For middle-aged, or even younger people, prevention will be the key to modifying the risk of disease.

Images tell us a little about what is happening and at what stages we can intervene. They do not tell us with any certainty, if we see certain findings in the images, it is too late to treat the high blood pressure, but because they show the potential mechanical connections between, say, high blood pressure and dementia, they can indicate at what point along the road we can change the trajectory. These studies are not conclusive, they do not show the causal relationships that a clinical trial or animal studies might, but they reveal strong associations, and, in some cases, we need these long-term longitudinal studies in humans because these associations take decades to develop.

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- **We also have an epidemic of obesity, diabetes and probably high blood pressure, since more than half of the people with high blood pressure don’t know they have it. The future is not looking bright.**

Absolutely not. If you look in terms of population, the rate of strokes has gone down, as have rates of dementia, which is encouraging, but it is mainly for old people. If you observe the younger population, we do not see the same reduction in rates of stroke, what worries me and other people is that when that sector of the population ages, the rates of dementia will increase again due to lifestyle factors, many of which would probably modify the risk of dementia. If we see an increase in these risk factors, even if they are more controlled, as you mentioned, if someone doesn’t know they have a risk factor, they are not taking treatment and are not being controlled. I 100% agree that there is concern about the futur

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- **Major advances have been made in the field with therapies that modify Alzheimer’s disease. We have some available treatments, but they are controversial, have many side effects and are expensive… .**

Very controversial. But the reality is that even if we are successful in the sphere of treatment, it is likely that we will also need to treat the vascular factors because most people, including the ones who clinically seem to have Alzheimer’s, show a mixed pathology with a vascular component in post-mortem studies. So, treating Alzheimer’s alone, even if we can do it really well, will not be enough. Anyway, we have to think of the vascular factors and risks that can be modified.

- **According to your research, is it possible to make recommendations to the public or governments to prevent the next pandemic?**

I think it is fundamental to make an effort in education and in carrying out tests to detect many of these risk factors, particularly high blood pressure. Smoking is another important factor. I am here in Spain, and I see many more people smoking here than in the USA, where this aspect has improved. This is an example of how you sometimes need to modify risk factors with large-scale public health initiatives in order to really make a change. In the USA you can’t smoke anywhere now, so people don’t smoke. I think that if we somehow manage to improve access to healthy communities, it would be a great advance, at least in the USA where the lack of resources is a major problem. Physical activity probably has a direct benefit on cognitive health, and indirect advantages in the reduction of high blood pressure, obesity and diabetes. We need a public health campaign on the subject.

People are scared of things like heart attacks and strokes, but they are a lot more scared of

dementia. Telling someone that if they treat their high blood pressure, their risk of dementia would drop, would have more impact on them than the possibility of a heart attack or a stroke, which are also terrifying. I think this is a convincing message.