"Sleep has been proven to be a risk factor for cardiovascular disease”

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Dr. Filip Swirski is associate professor at Harvard Medical School and Massachusetts General Hospital (USA) and one of the leading experts on the relationship between sleep and heart disease

Dr. Filip Swirski is associate professor at Harvard Medical School and Hospital General de Massachusetts (USA). In 2004, he obtained his Ph.D. in immunology from McMaster University in Canada, and in 2007 he completed his post-doctoral studies in Vascular Biology at Brigham and

Women's Hospital and Massachusetts General Hospital, and joined the Center for Systems Biology at that same hospital. He has received awards from the C**anadian Institutes of Health Research and the American Heart Association**. His team studies innate immunity and leukocyte communication. Dr. Swirski is the lead author of a study published in Nature magazine that explained the relationship between sleep and heart disease.

- ***Cardiovascular disease is still the first cause of death in the world. Your team studies the relationship between heart disease and sleep. Could you explain to us what you have found out until now?***

What we have known for a long time is that sleeping well is very important. No one is going to find that out now; we all know the effects of poor or little sleep, or how jet lag affects us, for example. And we have also known, for years, that poor sleep, with many interruptions, is related to an increased cardiovascular risk. There are many studies in humans, carried out over the years, that show this. That is, we are aware that sleeping well is a protective factor against cardiovascular disease, but in reality, we ignore how sleep keeps us healthier. And that is what we are trying to determine in my laboratory. The question we ask ourselves is how? We know it is important, but how does it happen?

- **And what have you discovered?**

We have seen that there is some biological mechanism in sleep that makes us healthier. And that is what we must identify. In regards to the relationship with heart disease, the most honest answer would be to say that right now we are beginning to understand that such a relationship exists. We know it is important, but we ignore the 'how'. I think we are only beginning to scratch the surface of this knowledge.

- ***You say it's important to sleep well, but do you know why?***

We can actually say that we know a lot about this relationship, but also that there is a lot that we don't know. And it is quite fascinating because we spend 30% of our lives sleeping and we are only on the surface of knowing how sleep keeps us healthy or how irregular sleep or interruptions promote the appearance of all kinds of diseases, such as heart failure.

- ***In the last two years there has been a lot of research on how and how much we should sleep in order to improve our health. But, do we actually know what a good night's sleep is?***

For this question there are two types of answer: the simple one and the complex one. The simple one, regarding number of hours that it is advisable to sleep, is that it should be between 6 and 9 hours a day. But, in this sense it is necessary to recognize, and this is the complex answer, that we are still learning about it every day. We have to consider our genetic 'fingerprints' that are related to our need for sleep. Some people require more hours of sleep than others. This is what we call chronotypes. And to complicate it even more, not only are the number of hours that one sleeps important, but also, the moment in which one goes to sleep, or if one tends to get up early or not. These habits are, in some way, genetically determined.

And, furthermore, there are other factors to consider: do you usually take naps? During the weekends do you make up for lost sleep by binge sleeping? We know that we will never really make up for lost sleep. Therefore, the really important thing is to determine what our chronotype is and in this way find out what our individual sleep needs are and understand if we are doing it correctly or not.

- ***Can you say that sleep is as important a risk factor as tobacco or cholesterol?***

Should doctors include it as a risk factor?

Of course. Sleep has been proven to be a risk factor in cardiovascular disease and, as such, it should be considered by doctors. But not only the fact of little or poor sleep, but also excessive sleep, which too is unhealthy. We can compare it to tobacco or hypertension as a relevant risk factor.

Something that is also becoming increasingly believed among the medical community is the importance of the circadian rhythm to our health, this is our internal biological clock. All organisms have day / night fluctuations throughout the 24-hour cycle and it is not the same for all people. And this rhythm influences the effectiveness of treatments and, therefore, there are more and more voices that affirm that therapies should be synchronized with the circadian rhythm. For example, a study was recently published in the European Heart Journal that showed that the time of day to take a drug can be key in terms of optimizing the drug's effects in treating hypertension (*Bedtime hypertension treatment improves cardiovascular risk reduction: the Hygia Chronotherapy Trial*).

And in atherosclerosis it is also known that immune cells migrate at higher levels at certain times of the day. Therefore, the best way to follow a treatment is to adjust it to our biological clock.

- ***And what about aging? You sleep less and less as you get older.***

This is a very fascinating phenomenon. Babies sleep almost 23 hours and, as we grow older, we sleep less. There are animals that hibernate for months and others that only sleep a couple of hours. This is related to what we have talked about previously: we do not know the sleep mechanism in detail. It is possible that studies that analyze these animals that sleep for months or others that study and compare the sleep patterns of a baby with that of an 80-year-old person will help us understand this process a little better.

- ***Was sleep one of your priority research areas from the beginning?***

Yes, from the beginning we wanted to study this event in the laboratory. Our motivation was the following: What Causes Cardiovascular Disease? Genes, of course, but also a series of modifiable risk factors: hypertension, excess fat, sedentary lifestyle, obesity, diabetes, etc. And when you stop to think about what favors these risk factors, you come to the conclusion that they are all associated with lifestyle: the food we eat, the amount, whether you exercise, the type of stress, what our environment is like, etc. That is why we consider sleep a priority area of research in our laboratory.

- ***How important is it to combine basic and clinical research?***

Both are fundamental. In humans, many studies can be carried out: you can analyze blood samples, imaging tests and postmortem analysis ... But there are endless tests that are not possible to do. If you want to know something in depth at the molecular, tissue, cellular level, etc. then, there is no alternative but to use animal models. And this most basic information is essential to understand fundamental concepts. It is also true that what is true in a mouse may not be true in humans. The biology is very similar, almost 99% in many cases, but it is not the same. We must not forget this. They are great models, some better than others, but they are models. But it is essential that this data is verified in humans. Now we are at the moment of studying the mechanisms that we have identified in humans.

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Do you remember when you became interested in science?

I have always been interested in the natural world. I always thought I was going to be a physicist or a mathematician, but in the end, out of everything that interested me, I decided to focus on this field.

- ***Is there someone in particular that helped you during your research career?***

The truth is that I have had a lot of mentors throughout my career and I remember all of them. If you ask me who has been the most important, the answer is easy: **my wife**. The scientific career is not easy at all and, of course, you are not going to get rich. You have to be passionate and the motivation should be curiosity. Because the path is full of failures.

- ***It's not your first visit to the CNIC. What do you think about the center?***

The first time I visited the CNIC was three years ago and I still think that it is a magnificent center. Some of my researchers have done stays at the CNIC. I consider it to be a very diverse research center with great international prestige.

Dr. Filip Swirski participated in the CNIC Conference entitled 'New Concepts in Age-related Cardiovascular Disease'.