

# A research prize on the association between chronic pain and depression

Ipek Yalcin and Michel Barrot, researchers at the Institute of Cellular and Integrative Neuroscience (INCI – CNRS/University of Strasbourg) and members of the Graduate School of Pain (EURIDOL), have been awarded the 2024 Axel Kahn Prize of the French League against cancer (*Ligue contre le cancer*). This prize, worth 50 000 euros, honours 15 years' work on the connection between chronic pain and depression.

*"The fact that pain can lead to a state of depression may seem obvious, but the mechanisms are not clear. Does the pain itself provoke a depressive state, or does it precipitate a risk of depression that is already present? And how can physical pain bring on psychological troubles?"* wonders Michel Barrot, adding that very little research existed on the subject at the beginning of this century.

In order to bring to light the way in which molecular and cellular mechanisms function, Ipek Yalcin developed a model in rodents that presented chronic pain linked to pressure on a nerve. *"We are one of the first three teams at the international level to have succeeded in such a modelling of a connection between pain and depression."*



Michel Barrot and Ypek Yalcin at the Award ceremony on 17 December 2024.

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## Modification of the anterior cingulate cortex

The studies are performed over a long period of time. *"We followed the animals for five months. The history of this disease has a temporality, with a depressive and anxious state that develops over a space of time"*, emphasises Ipek Yalcin, mentioning the emergence of depressive behaviour in the model. *"That is to say a mouse that takes less care of itself, is less attracted to certain activities or rewards..."*

## Differences between male and female mice

In the brain, the scientists then identified hyperactivity and modifications of the anterior cingulate cortex, which cause the anxiety and depressive symptoms. This cortical zone is linked to emotional deregulation, but also to the aversive perception of pain. *"One of our hypotheses is that this unpleasant aspect of pain will, with time, tip the person towards a more negative state and change the way they interpret the world,"* adds Michel Barrot.

They also observe differences between male and female mice. *"With regard to the latter, the depressive state lasts longer. On the other hand, we didn't observe any anxiety in our model, but we still need to verify whether this is not linked to the fact that tests were designed for male subjects,"* Ipek Yalcin explains.

## Dissociation between intensity of pain and emotional consequences

These data are crossed with human data thanks to donor brain banks. *“This enabled us to look at modifications found in patients who had committed suicide. We saw that certain of these modifications resembled those in our animal model,”* said Ipek Yalcin, who also mentioned an MRI project analysis on mice, carried out with the Engineering science, computer science and imaging laboratory (ICube – CNRS/University of Strasbourg/Insa Strasbourg/Enges) and which will be compared with MRI human data.

## A project to consider post-treatments in a cancer-related context

More generally, the scientists point out that different types of pain could lead *“via different routes to the same brain dysfunction. There is also a dissociation between intensity of pain and emotional consequences. For example, for patients suffering from fibromyalgia, even if the pain is of average intensity, 80% of them present depressive disorders. And once the pain is relieved, the depressive state does not necessarily disappear”*, emphasises Ipek Yalcin, who indicates that for those cancers whose treatments can be very painful, few studies exist on the long-term consequences. A project on post-treatment in a cancer-related context has just been launched by her team.

**Marion Riegert**

The 2024 Axel Kahn Prize was awarded to [Michel Barrot](#), [Ipek Yalcin](#), Sophie Laurent and Serge Perrot in different categories. The work of these scientists illustrates the richness of the expertise necessary in order to grasp, understand and treat efficiently pain that is linked to cancer.

*This article was originally published in French : [Un prix pour des recherches sur les liens entre douleur chronique et dépression](#) (30/01/2025).*