

# **Synergistic effect of N-3 polyunsaturated fatty acids deprivation and early life maternal separation in rats placed in an uncontrollable adverse situation**

**Mathieu Géraldine<sup>1</sup>, Oualian Catherine<sup>2</sup>, Denis Isabelle<sup>1</sup>, Laviaille Monique<sup>1</sup>, Gisquet-Verrier Pascale<sup>2</sup> and Vancassel Sylvie<sup>1</sup>**

<sup>1</sup>*Unité de Nutrition et Régulation Lipidiques des Fonctions Cérébrales, NuRéLiCe, UR909, INRA, Domaine de Vilvert, 78352 Jouy-en-Josas cedex, France.*

<sup>2</sup>*CNRS, Centre de Neurosciences Paris-Sud, UMR 8195, Université Paris-Sud, 91405 Orsay, France.*

[sylvie.vancassel@jouy.inra.fr](mailto:sylvie.vancassel@jouy.inra.fr)

**Background:** Low concentrations of n-3 polyunsaturated fatty acid (PUFA) and chronic stress are implicated in susceptibility to mood disorders.

**Methods:** One group of rats was fed an n-3 PUFA-deficient and the other a balanced diet from conception and throughout their lives. Half of them suffered early chronic stress by separation from their mothers (MS) from day 6 to 21 (6 hrs/day) and the behavior of all rats was tested at three months. Anxiety was assessed with the cross-maze task, before and after behavioral tests involving two aversive tasks differing in the control that the rat could exert: (1) conditioned fear involving 5 paired tone-shock associations and (2) an avoidance brightness discrimination task in a Y maze.

**Results:** MS significantly increased basal anxiety. All rats were more anxious after the behavior tests, but the n-3 PUFA-deficient rats that had experienced MS were most anxious. An n-3 PUFA-deficit also increased their expression of fear in inescapable situation while the MS rats were the more fearful.

**Conclusion:** A lack of n-3 PUFA and MS both modulated the emotional status and acted in synergy when rats were placed in an uncontrollable stressful situation. The n-3 PUFA-deficiency exacerbated the effects of early stress in the adult rats, supporting the notion that PUFA-unbalanced diet is a risk factor in emotional disorders.