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Antidepressant-induced neurochemical alterations measured by in vivo microdialysis in rats: a meta-analysis

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There exists a large body of literature on the neurochemical alterations measured by in vivo microdialysis in rat brain following antidepressant administration. However, so far no efforts have been made to systematically survey and converge this knowledge. The main objective of this meta-analysis is to fill this gap and thereby create a universal reference database on the antidepressant-induced neurochemical processes at neurocircuitry level. In total, 1173 original research articles were screened and data from 456 studies (21,978 rats) were extracted and analyzed.

The relationship between levels of one particular neurotransmitter, serotonin, and duration of SSRI administration in long-term experiments was modeled. Here, an initial drop of serotonin was demonstrated, followed by an approximately linear time-dependent increase of serotonin levels in frontal cortex. As far as this brain region is concerned, the findings support the hypothesis of serotonin autoreceptor-mediated negative feedback loops. Yet, converging evidence of initially increased 5-HT levels in other brain regions (e.g. hippocampus and hypothalamus) suggests a limitation of this theory. In summary, a universal database on antidepressant-induced neurochemical alterations in rat brain is delivered which may represent the reference framework in this area and guide future research projects.