

Regional changes in cerebral glucose utilization in kindled rats during convulsions

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Rats were kindled (Goddard, McIntyre & Leach, 1969) from the left amygdala by a daily one second pulse at 60 Hz with a current intensity of 300 μ A (Farjo & Blackwood, 1978).

To identify the brain regions in which glucose utilization and hence functional activity is altered in

protein⁻¹) for each brain region was expressed as a percentage of the value for the visual cortex in each animal.

In the brain areas shown in Table 1, glucose utilization was significantly increased in the kindled rats which had convulsed, when compared with the other three groups. Kindled rats which had not been convulsed did not differ significantly from the sham operated or unoperated groups. No significant difference between the groups was found in fronto-parietal cortex, caudate/putamen, thalamus, cerebellar hemispheres, dentate nucleus, brain stem reticular formation, inferior colliculus or olfactory bulb.

These results suggest that generalised seizures, associated with kindling of the amygdala selectively involves sub-cortical structures listed in Table 1.

Table 1

	Kindled (convulsed) <i>n</i> = 9 $\bar{x} \pm s.d.$	Kindled (not convulsed) <i>n</i> = 6 $\bar{x} \pm s.d.$	Sham operated <i>n</i> = 9 $\bar{x} \pm s.d.$	Unoperated <i>n</i> = 11 $\bar{x} \pm s.d.$	Analysis of Variance <i>F</i> ratio
R. Amygdala	82 \pm 5.1	74 \pm 5.5	71 \pm 5.3	69 \pm 4.7	6.9a
L. Amygdala	83 \pm 5.1	72 \pm 5.5	72 \pm 4.6	70 \pm 5.6	9.4a
R. Hippocampus	92 \pm 11	79 \pm 5.1	75 \pm 3.9	70 \pm 3.1	10.8a
L. Hippocampus	93 \pm 7.1	79 \pm 3.4	75 \pm 3.5	71 \pm 4.4	14.4a
R. Hypothalamus	83 \pm 5.6	77 \pm 3.6	73 \pm 5	66 \pm 6.6	11.8a
L. Hypothalamus	83 \pm 5.5	76 \pm 2.6	72 \pm 4.9	67 \pm 7.2	10.5a
R. Septal Region	85 \pm 5.3	77 \pm 4.7	72 \pm 5.5	65 \pm 6.7	11.9a
L. Septal Region	91 \pm 9.1	76 \pm 4.2	74 \pm 7.6	66 \pm 5.7	13a
R. Subst. Nigra	87 \pm 9.9	77 \pm 5.4	64 \pm 10.4	66 \pm 5.2	9.1a
L. Subst. Nigra	89 \pm 6.2	72 \pm 4.2	66 \pm 12.8	65 \pm 5.3	9.8a
R. Superior Colliculus	108 \pm 6.9	94 \pm 6.3	93 \pm 8.1	88 \pm 8.9	9.2a
L. Superior Colliculus	106 \pm 6.6	91 \pm 6.7	91 \pm 5.5	89 \pm 5.5	7.5b

The accumulation of tritium in each brain region was measured as (ct/min)/mg protein and then expressed as a percentage of the value for the visual cortex in each rat. The table gives the mean and standard deviation of this percentage. The analysis of variance showed a significant difference between groups in all these areas. a. $P < 0.0005$, b. $P < 0.001$.

kindling, a modification of the technique developed by Sokoloff *et al.* (1977) was used. Two minutes after the tail vein injection of 2-deoxy-D-[1-³H]-glucose (200 μ Ci/Kg) one group of kindled rats received a stimulus which provoked a generalised convulsion. A second group of kindled rats and groups of sham operated and unoperated controls received no stimulus. All animals were killed and decapitated at 45 min after injection, the brains rapidly removed and frozen at -20°C . One mm coronal slices were prepared and specific regions removed with the aid of a dissecting microscope. The degree of labelling (counts min⁻¹ mg

References

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