

Heart rate variability, breathing and body movements in hypoxic fetal lambs.

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Besides ultrasound biometrie, registration of fetal heart rate is today the most frequently applied technique for detection and monitoring the fetus at risk. It is assumed that hypoxia causes only relatively late alterations in the pattern of fetal heart rate. The question arose whether fetal breathing and body movements are possibly more sensitive to fetal hypoxia and changes of these parameters can thus be recognized earlier than alterations of fetal heart rate. Fetal breathing movements, arterial pressure, heart rate and electrocortical activity were recorded continuously in 8 chronically catheterized sheep, 120-140 days pregnant. Hypoxemia in the fetus was induced by clamping the common hypogastric artery for 2-18 hours by a inflatable vascular occluder. We subdivided the experiments into four groups on the basis of the pO_2 level.

A rapid and marked reduction of fetal breathing movements was observed with falling pO_2 , whereas fetal somatic activity only decreases slowly.

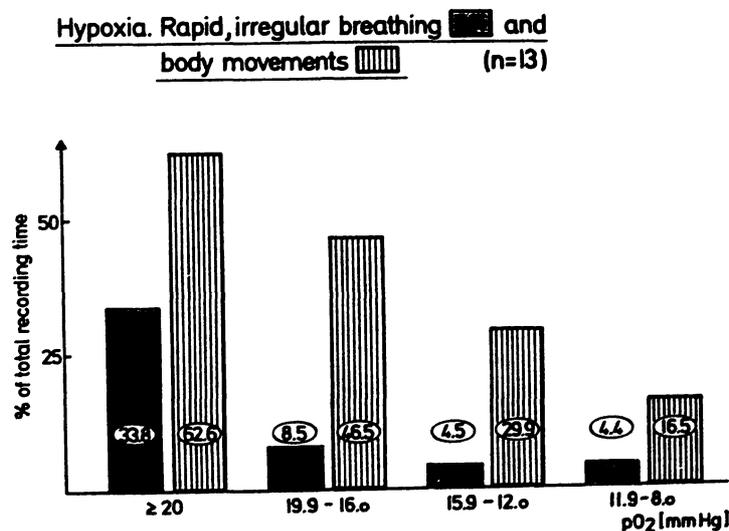
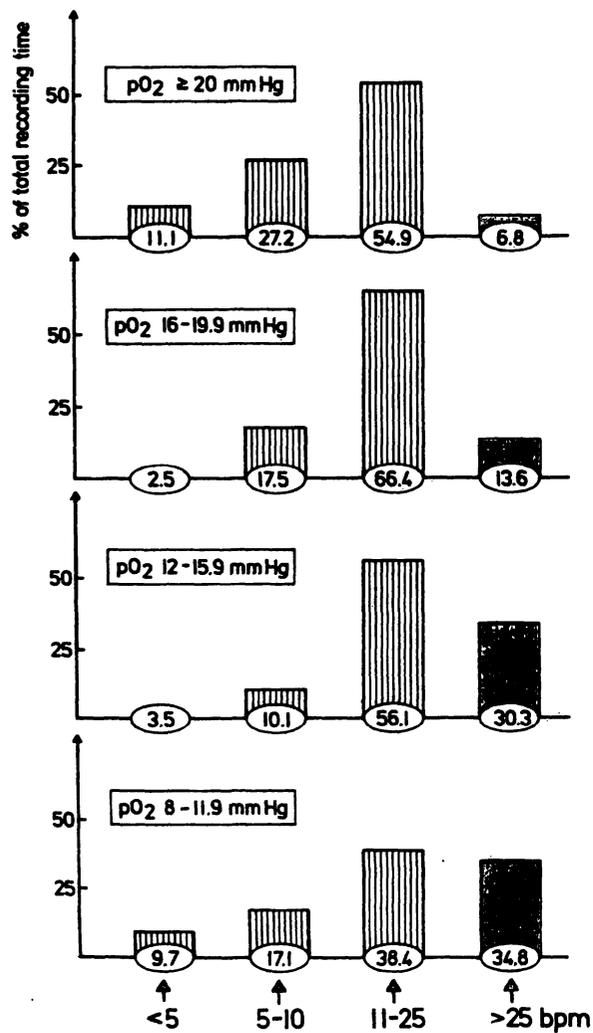


Fig. 1

there seems to be a linear correlation between pO_2 and body movements in the range from 8-25 mmHg.

The columns in Fig. 1 represent the percentage of time in which the fetus is breathing or moving. The initial rapid fall of breathing activity from 33.8 to 8.5% is followed by an only relatively small reduction to 4.4% with progressively severe hypoxia. The amount of body movements decreased from 62.6 to 16.5% of total recording time and

Hypoxia. Heart rate variability. (n=13)



With regard to the influence of fetal hypoxia¹ on heart rate variability an increase of heart rate variability was found during moderate severe and severe hypoxia (Fig.2). The percentage of saltatoric heart rate pattern increased from 6.8% to 34.8% with falling pO₂, whereas the percentage of silent heart rate pattern decreased from 11.1% to 2.5% and increased again to 9.7% of total recording time at pO₂ levels less than 12mmHg. This result is in contrast to the changes of heart rate variability during acute hypoxia in man.

Fig.2

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