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New dialysis technique for the continuous measurement of the concentration of vasoactive hormones

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A method has been developed to measure the plasma concentration of vasoactive hormones in the blood of man. So far experiments have been confined to the dog. Heparinized blood is pumped at 50 ml/min through the central channel (volume 75 ml) of a miniature Kiil dialysis machine, and is then returned intravenously to the animal. Krebs solution is passed at 5 ml/min in a counter-current direction through the outer channel (volume 20 ml) of the machine and is then allowed to cascade over a bank of isolated tissues (Vane, 1964, 1969). The two channels are separated by a dialysis membrane made of reconstituted cellulose (Cuprophan 150 P/M).

To estimate the passage of vasoactive hormones from blood to Krebs the substance under study was infused at a known concentration for 12–24 min into the blood as it entered the machine. The concentration of the substance diffusing into the Krebs solution was then estimated by biological assay. The degree of dialysis was then calculated as a percentage of the initial concentration in blood. For instance, for noradrenaline (three expts.) the concentration in the Krebs was 42% that in the blood, for oxytocin (four expts.) it was 35%, for adenosine 50% (two expts.), for 5-hydroxytryptamine 20% (one expt.), for prostaglandin E_2 43% (eighteen expts.) and for prostaglandin $F_{2\alpha}$ 35% (four expts.). Maximum dialysis was usually achieved by the 10th min of infusion. When the concentration of substance in blood was altered there was a proportional change in tissue response. Bradykinin (directly infused or produced by an infusion of kallikrein) and angiotensin were bound to the dialysis membrane and the method was therefore unsuitable for their detection, although it can be used as a method of their elimination.

The system has also been used to investigate the binding of drugs to plasma proteins. For this dialysis with Krebs solution on both sides of the membrane was compared with dialysis from blood to Krebs solution. By this method it was not possible to detect binding of PGE_2, $PGF_{2\alpha}$, or oxytocin.

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