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Role of glycol calix on the mechanism of flow sensing by guinea pig carotid endothelial cells

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Background: Luminal facing endothelial G-protein coupled receptors (GPCRs) are affected by flow. In human blood vessels, bradykinin produces a relaxing effect whereas in guinea pigs its effect is vasoconstrictive and affected by flow.

Objective: To study the mechanism by which flow is sensed by endothelial cells.

Methods: We have used guinea pig carotid arteries to evaluate the effect of flow on the contractile response to bradykinin and cultured carotid endothelial cells to know the expression pattern of p-SRC and p-ERK in response to flow.

Results: We have found that the flow-dependent vasoconstrictive effect of bradykinin is augmented by 5 min luminal exposure to heparinase or alfa-chymotrypsin enzymes suggesting that the flow sensor of the bradykinin receptor (BR) is associated to a carbohydrate residue and/or a protein segment of the receptor present in the extracellular face of the plasma membrane. The molecular structure of the BR suggests that a segment of the N-terminus could act as the flow sensor. By using carotid cultured endothelial cells, we found that flow decreases the expression of p-SRC protein and does not change the p-ERK expression.

Conclusion: The mechanism by which flow is sensed by endothelial cells is still on debate. However, one mechanism for sensing the flow could be located at the extracellular segment of the protein receptor. The N-terminus segment of the BR could move depending on the flow velocity and, as a consequence, increasing or decreasing the availability of the BR to its ligand.

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