

Functional expression of an olfactory receptor on the surface of HEK-293 cells

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Construction of artificial olfactory biosensor using a heterologous cell system is useful to study the signal transduction of olfactory cells and will provide the stepping stone for the development of cell-based biosensor. In this study, an olfactory receptor of rat, I7, was functionally expressed on the surface of HEK-293 cells. The stable cell lines regulated by an inducer were obtained. The expression on the cell surface and binding of specific odorant molecules to the olfactory receptor were confirmed by RT-PCR, immunocytochemical, western blotting method and QCM (quartz crystal microbalance)¹⁾. The QCM results demonstrate that the 3D structure and orientation of olfactory receptor may be important to their function. The functional activity was analyzed by Ca²⁺-assay²⁾. The result of Ca²⁺-assay shows that HEK-293 cells have an endogenous analogue of CNG-channels or the CNG-channels, and signal transduction by cAMP pathway is triggered by the binding of odorant molecules (octanal, also named as octyl aldehyde) to the olfactory receptor I7. The result also shows that the increase in intracellular concentration of Ca²⁺ ions occurs through the predicted CNG (cyclic nucleotide gated)-channels and the internal Ca²⁺ stores of HEK-293 cells.

References

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