

# 50 Hz弱磁场诱导离体表皮生长因子受体聚集

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利用原子力显微镜 (atomic force microscope, AFM) 观测到浓度为5  $\mu$ g/mL离体表皮因子受体 (epidermal growth factor receptor, EGFR) 蛋白在50 Hz磁场作用下发生聚集, 其颗粒呈现倍数变大和变高趋势; 利用透射电镜 (transmission electronic microscope, TEM) 也得到类似的蛋白变大趋势。结果表明, 在AFM和TEM下观察到, 磁场作用后蛋白聚集颗粒的平均半高宽 (平均直径) 由(21.7 $\pm$ 2.2) nm (12.5 nm) 增大到(33.0 $\pm$ 4.0) nm (23 nm), 最可几高度由(1.42 $\pm$ 0.18) nm增加到(3.08 $\pm$ 0.17) nm。这种由磁场引起的聚集效应呈时间依赖性。利用Alexa-488-EGF标记EGFR观察了磁场暴露对细胞上EGF受体表达的影响, 提示EGF受体的表达可能稍有上调。上述结果提示50 Hz磁场信号可能通过影响EGFR 的膜上聚集状态来影响下游信号通路。这种对信号通路的影响可能是电磁场生物性效应的一种机制。

## The clustering effect of purified Epidermal Growth Factor Receptor induced by 50 Hz magnetic field

By using atomic force microscope (AFM) and transmission electron microscope (TEM), the effects of 50 Hz magnetic field on the clustering of purified A431 EGFR were investigated. Results from AFM and TEM indicated that 30-min field exposure of 50 $\mu$ g/mL EGFR molecules at room temperature, resulted in obvious clusters for a basal size of the molecule particles: the height of apparent individual basal particles increased from (1.42 $\pm$ 0.18) nm to (3.08 $\pm$ 0.17) nm, and the mean of the half-width (the mean of the diameter) from (21.7 $\pm$ 2.2) nm (12.5 nm) to (33.0 $\pm$ 4.0) nm (23.0 nm), suggesting a nearly doubled size of EGFR particles. The magnetic field-induced clustering of EGFR was time-dependent. Further, the expression of EGFR on CHL cells was observed and it showed that EGFR was likely up-regulated by MF but no significant difference statistically.

关键词