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测出 ANP，实验组取体外培养的 HUVEC，48 h 换液后于第 5 天取全部上清液，测得 8 例平均含 ANP 的量为 25.2 ng/10^5 个细胞。

3 讨论

作者采用 PAP 法，观察到体外培养的 HUVEC 呈 ANP 样免疫阳性反应，但并不是所有阳性细胞的免疫反应强度均一致，密集区较稀疏区免疫反应强度弱，细胞形态也有差异，可能说明不同的细胞所处的功能状态不同。HUVEC 中免疫反应阳性的 ANP，其可能的来源有两个：①从血液中摄取；②细胞自身合成。蔡文琴等[2]利用原位杂交免疫细胞化学技术已证明在 HUVEC 中含有 ANP mRNA，换而言之，HUVEC 具有合成 ANP 这一生物活性多肽的能力已被确认。但 ANP 的分子量比较大，HUVEC 是否能合成 ANP 并将 ANP 释放入血，尚有待研究。Milner 等[9]曾证明培养的 HUVEC 内含有的 ATP、物质 P 和乙酰胆碱在增加流体速度等特殊情况下可以由 EC 释放入血。利用放射免疫测定技术测定培养上清液中的 ANP 含量，证明在空白对照组未培养细胞的 RPMI-1640 细胞培养液中不含 ANP，而在有 HUVEC 生长的培养上清液中，ANP 含量可达到 25.2±2.9 ng/10^5 个细胞。ICC 染色结果表明体外培养的 HUVEC 呈 ANP 样免疫阳性反应，证明培养上清液中测出的 ANP 来源于培养的 HUVEC。说明 HUVEC 不仅能合成 ANP，并能将之释放到细胞外。

目前已知的多种生物活性肽大都具有调节心血管功能的作用，ANP 是一种具有强烈利钠、利尿、舒张血管作用的生物活性肽。据文献报道[4]，ANP 还具有促进胚胎心脏发育的作用，表明 HUVEC 合成并向细胞外分泌的 ANP 在胚胎心血管的发育和功能的调节中可能起到一定的作用，确切的证据尚有待进一步研究。

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Study of synthesis and secretion of atrial natriuretic polypeptide in the endothelial cells of human fetal umbilical vein in vitro

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Abstract The endothelial cells of human fetal umbilical vein were cultured and immunocytochemical staining showed positive atrial natriuretic polypeptide (ANP)-like immuno reaction after 5 days of culture. Meanwhile 25.2±2.9 ng of ANP/10^5 endothelial cells of fetal umbilical vein was found in the supernatant with radioimmunoassay but it was zero in the control. It is postulated that ANP in the supernatant of endothelial cell culture originates from the secretion of endothelial cells.

Key words umbilical vein; human; endothelial cell; culture; atrial natriuretic polypeptide (ANP)

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