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定点追踪技术评价携Sialyl Lewis^x和抗P-选择素单抗靶向微泡在高剪切应力下的黏附行为

Observation on adhesive behavior of dual-targeted microbubbles carrying both Sialyl Lewis^x and anti-P-selectin monoclonal antibody in high-shear flow by using set-point tracking technology

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中文摘要:

目的 构建携Sialyl Lewis^x和抗P-选择素单抗靶向微泡,用定点追踪技术在体外高剪切应力下评价其黏附行为。方法 构建携Sialyl Lewis^x靶向微泡(MB-S)、携抗P-选择素单抗靶向微泡(MB-P)、携Sialyl Lewis^x和抗P-选择素单抗双配体靶向微泡(MB-D)。利用平行板流动腔和Image-Pro-Plus软件绘制微泡滚动的时-速度折线图。微泡第1帧的速度为V1,第2帧至黏附前倒数的平均速度为V2,黏附前倒数第2帧的速度为V3。结果 MB-P高速滚动,速度骤降为0;MB-S从高速平缓过渡到低速,再渐降低至0;MB-D从高速过渡到低速,再骤降为0。3种微泡V1差异无统计学意义($P>0.05$);MB-P的V2明显高于MB-S和MB-D($P<0.01$);MB-S和MB-D间V2差异无统计学意义($P>0.05$)。V3在3种微泡中的顺序为MB-P>MB-D>MB-S($P<0.01$)。结论 Sialyl Lewis^x介导微泡的高效滚动,抗P-选择素单抗介导微泡速度的骤降,两者在微泡靶向黏附时可发挥互补作用。

英文摘要:

Objective To assess the adhesive behavior of dual-targeted microbubbles carrying both Sialyl Lewis^x and anti-P-selectin monoclonal antibody in high-shear flow in vitro by using set-point tracking technology. **Methods** Targeted microbubbles were prepared by attaching to phospholipid microbubbles with Sialyl Lewis^x (MB-S), anti-P-selectin monoclonal antibody (MB-P) or both of them (MB-D). A parallel plate flow chamber combined with Image-Pro-Plus software was used to draw the time-velocity diagram of the microbubbles. V1 was defined as the instantaneous velocity of the microbubble in the first frame, V2 was defined as the mean velocity in from the first frame to last third one, V3 was defined as the instantaneous velocity in the last second frame. **Results** MB-P rolled in a high velocity and then descended to 0 sharply. The velocity of MB-S decreased from a high level to a low level, then to 0 gradually. MB-D rolled in from a high velocity to a low one, and then descended to 0 sharp remarkable difference was found in V1 among MB-P, MB-S and MB-D ($P>0.05$). V2 of MB-P was significantly larger than that of MB-S and MB-D ($P<0.01$), and no remarkable difference in V2 was found between MB-S and MB-D ($P>0.05$). The value of V3 descended in the following order: MB-P>MB-D>MB-S ($P<0.01$). **Conclusion** Sialyl Lewis^x mediates high-efficiency rolling, while anti-selectin monoclonal antibody mediates the sharp decrease of the velocity. These two ligands may play complementary roles in the targeted adhesion of microbubbles.

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