Stepped changes of monovalent ligand-binding force during ligand-induced clustering of integrin alpha IIbbeta 3

白其卉
Hsieh CF;Chang BJ;Bai CH;Chen HY;Tsai JW;Yi YH;Chiang YT;Wang DW;Chi S;Hsu L;Lin CH

Abstract

Recent evidence demonstrated that conformational changes of the integrin during receptor activation affected its binding to extracellular matrix; however, experimental assessment of ligand-receptor binding following the initial molecular interaction has rarely been carried out at a single-molecule resolution. In the present study, laser tweezers were used to measure the binding force exerted by a live Chinese hamster ovary cell that expressed integrin αIIbβ3 (CHO αIIbβ3), to the bead carrier coated with the snake venom rhodostomin that served as an activated ligand for integrin αIIbβ3. A progressive increase of total binding force over time was noticed when the bead interacted with the CHO αIIbβ3 cell; such an increase was due mainly to the recruitment of more integrin molecules to the bead-cell interface. When the binding strength exerted by a single ligand-receptor pair was derived from the "polyvalent" measurements, surprisingly, a stepped decrease of the "monovalent binding force" was noted (from 4.15 to 2.54 piconewtons (pN)); such decrease appeared to occur during the ligand-induced integrin clustering process. On the other hand, the mutant rhodostomin defective in clustering integrins exhibited only one (1.81 pN) unit binding strength.