

Integrins, receptors for the extracellular matrix

Integrins, function and structure

Integrins are a family of transmembrane receptor proteins, connecting the cytoskeleton with the extracellular matrix (ECM). Integrins bind to ECM glycoproteins including collagens, fibronectins, laminins, and a number of cellular receptors.

In addition, integrins function as signal transducers. Importantly, different integrins activate differential intracellular signaling pathways that control biological and cellular functions including cell adhesion, migration, proliferation, cell differentiation, and apoptosis¹.

Integrins are formed by two noncovalently bound alpha and beta subunits. There are 18 alpha and 8 beta subunits, forming at least 24 distinct integrin heterodimers.

Each heterodimer consists of

- a large extracellular domain,
- binding proteins in the extracellular environment,
- a single-membrane-spanning transmembrane domain,
- a generally small intracellular cytoplasmic tail domain, which forms links with the cytoskeletal elements².

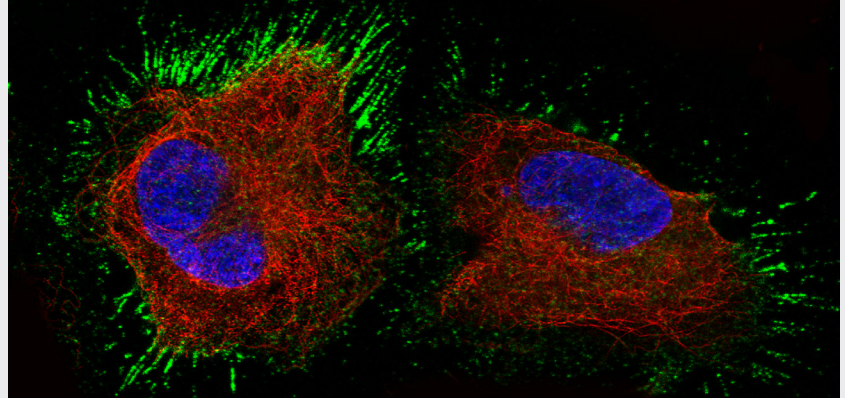


Figure 1. Immunocytochemical staining using the monoclonal Anti-ITGB8 (AMAb91467) on WM-115 cells shows specific staining in the plasma membrane in green.

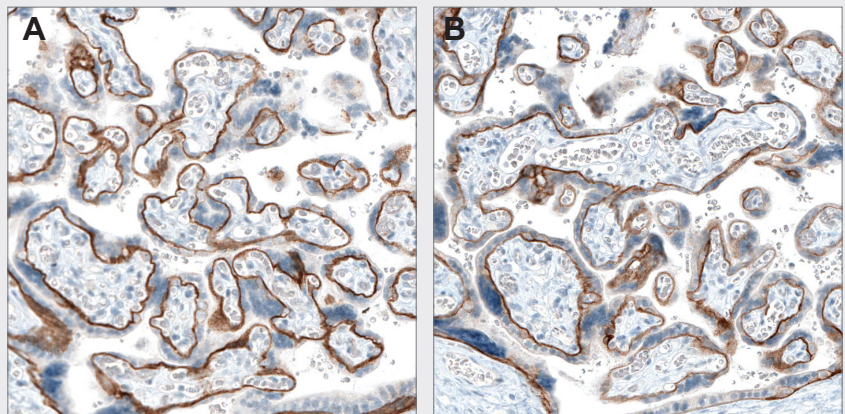


Figure 2. Immunohistochemical stainings using (A) monoclonal Anti-ITGA6 (AMAb91450) and (B) monoclonal Anti-ITGB4 (AMAb91453) show identical pattern in placenta. The two integrins interact to form a laminin-binding Alpha6 Beta4 complex involved in cell migration and invasion.

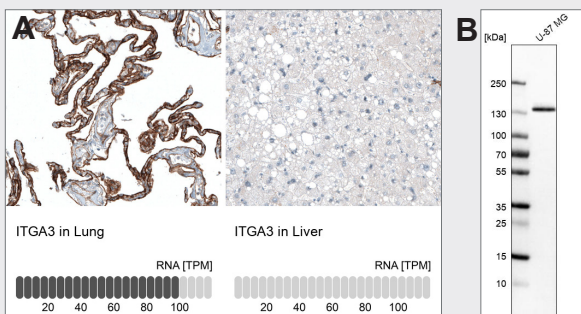


Figure 3. Orthogonal Antibody Validation. Immunohistochemical staining using the monoclonal Anti-ITGA3 (AMAb91446) antibody showing (A) strong immunoreactivity in human lung and absence of positivity in liver, with corresponding RNA values indicated below and (B) Western blot analysis in U-87 MG cells.

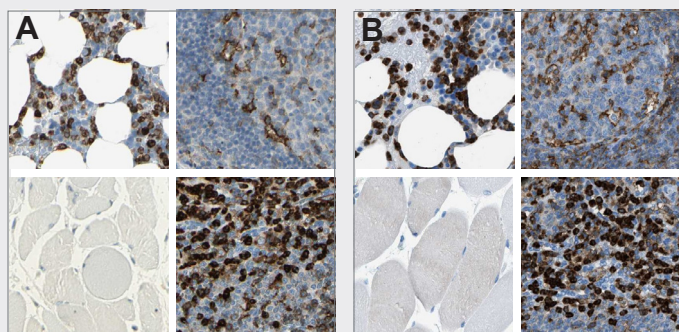


Figure 4. Independent Antibody Validation. Immunohistochemical staining of human bone marrow, lymph node, skeletal muscle and spleen using the Anti-ITGB2 antibodies (A) HPA008877 and (B) HPA016894 showing similar protein distribution across tissues.



Integrin specificity

The specificity of integrin binding to ECM components including laminins, collagens, and fibronectin depends on the extracellular domains of the alpha and beta integrin subunits.

Integrins $\alpha 1\beta 1$, $\alpha 2\beta 1$, $\alpha 10\beta 1$, and $\alpha 11\beta 1$ represent the primary collagen receptors².

Integrins $\alpha 5\beta 1$, $\alpha 8\beta 1$, $\alpha 11\beta 3$ and the $\alpha v\beta$ integrins are the major fibronectin receptors that bind in an RGD-dependent manner³.

Finally, integrins $\alpha 3\beta 1$, $\alpha 6\beta 1$, $\alpha 6\beta 4$ and $\alpha 7\beta 1$ are the major laminin receptors⁴.

The tables below summarize a selection of our Integrin alpha (**Table 1**) and beta (**Table 2**) subunits.

Visit atlasantibodies.com for the full antibodies catalog.

References

1. Schwartz MA et al. *Integrins: emerging paradigms of signal transduction*. Annu Rev Cell Dev Biol. 1995;11:549-99.
2. Hynes RO. *Integrins: bidirectional, allosteric signaling machines*. Cell. 2002;110(6):673-87.
3. Van der Flier A and Sonnenberg A. *Function and interactions of integrins*. Cell Tissue Res. 2001;305(3):285-98.
4. Belkin AM and Stepp MA. *Integrins as receptors for laminins*. Microsc Res Tech. 2000;51(3):280-301.

Table 1. Selected antibodies for Integrin alpha subunits.

Gene/Protein	Catalog No	Application	Selected Interaction Partners	Involved In
ITGA1/CD49a	AMAb91461	IHC*, WB*	ITGB1, LAMA1	Cell adhesion, inflammation, fibrosis
ITGA2/CD49b	AMAb91469	IHC*, WB	ITGB1, LAMA1	Cancer growth/invasion
ITGA3/CD49c	AMAb91446	IHC*, WB	ITGB1, ITGB4, ITGB5	Laminin-binding, Cancer growth/invasion
ITGA4/CD49d	HPA074961	ICC-IF	ITGB3, VCAM	Cancer
ITGA5/CD49e	AMAb91449	IHC*, WB	ITGB1, ITGB3, ITGB5, FN1	Cancer growth/invasion
ITGA6/CD49f	AMAb91450	IHC*	ITGB1, ITGB4	Laminin-binding. Cancer invasion/metastasis/stem cells.
ITGA7/ITGA7	HPA008427	IHC, ICC-IF	ITGB1	Laminin-binding. Cancer
ITGA8/ITGA8	AMAb91468	IHC*, WB	ITGB1	Epithelial-to-mesenchymal transition.
ITGAD/CD11D	HPA026786	IHC	ITGB2, ICAM3, VCAM1	Extracellular matrix organisation, cell-cell adhesion, immune response
ITGAE/CD103	HPA036313	IHC	ITGB7, CDH1	Cancer
ITGAM/CD11b	AMAb90911	IHC*, WB	ITGB2, ICAM1	Immune system, monocytes
ITGAV/CD51	HPA004856	IHC, ICC-IF	ITGB1, ITGB3, ITGB5, ITGB6, ITGB8	Cancer
ITGA2B/CD41	HPA031170	IHC*, WB	ITGB3	Different, including metastasis
ITGAX/CD11c	AMAb90915	IHC*, WB	ITGB2	Cancer, leukemia

Table 2. Selected antibodies for Integrin beta subunits.

Gene/Protein	Catalog No	Application	Selected Interaction Partners	Involved In
ITGB1/CD29	HPA059297	IHC*, WB	ITGA1, ITGA2, ITGA3, ITGA5, ITGA6, ITGA7, ITGA8, ITGA9, ITGA10, ITGA11, ITGAV	Laminin-binding, Cancer growth/invasion
ITGB2/CD18	HPA016894	IHC*,WB,ICC-IF	ITGAL, ITGAD, ITGAM, ITGAX	Immune system
ITGB3/CD61	AMAb91470	IHC*, WB	ITGA4, ITGA5, ITGA2B, ITGAV	Cancer
ITGB4/CD104	AMAb91454	IHC*, WB	ITGA3, ITGA6, SMAD2, SMAD3	Laminin-binding, Cancer growth/invasion
ITGB5/ITGB5	HPA001820	IHC	ITGA3, ITGA5, ITGAV	Cancer, cell adhesion, survival
ITGB6/ITGB6	HPA023626	IHC, ICC-IF	ITGAV, MAPK1, FN1	Different diseases, cancer.
ITGB8/ITGB8	AMAb91467	WB, ICC-IF	ITGAV, RHEB, FN1	Cancer

* Products with enhanced validation for indicated application

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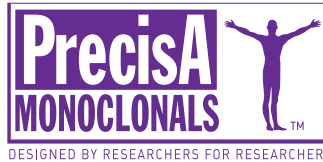
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029-210818

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