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# The analysis of the dermal collagen matrix in the absence of α11β1-integrins suggests a potential role for integrins α11β1 in the regulation of skin biomechanics

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Integrins $\alpha 11\beta 1$ are major collagen receptors and are thought to play a central role in fibrillar collagen arrangement [1;2], but this has not been demonstrated in vivo. In order to answer this question, here, we analysed the overall organisation of the dermal collagen network fibril diameter in samples of back skin of $\alpha 11\beta 1$-integrin-deficient mice (KO). Dermal collagen organisation was assessed for its complexity and its heterogeneity on paraffin sections after Sirius red staining (4 KO and 4 controls), by quantifying fractal dimension and lacunarity respectively. The results showed that fractal dimension was increased in KO mice (1,40±0,06 in $\alpha 11\beta 1$ KO mice vs 1,24±0,05 of control mice, p=0,009), whereas Lacunarity was reduced (0,78±0,06 in $\alpha 11\beta 1$ KO mice 0,97±0,02 of control mice p=0,002), indicating a re-organisation of the dermal collagen network in absence of integrins $\alpha 11\beta 1$. Fibril diameter was studied in images taken at the Transmission Electron Microscope (5 KO and 5 controls). The total number of fibrils examined was 22,212 (for the 5 controls) and 28,446 (for the 5 KO). The analysis showed a proportional increase in smaller fibrils with a proportional decrease in larger fibrils in $\alpha 11\beta 1$ KO mice, being these differences were most evident in fibrils with smallest (<40nm) and largest (>120nm) diameter. Chi squared test confirmed statistical significance of these changes (equivalent to p=0,001). Given the fundamental role of dermal collagen in skin stability, these changes in collagen organisation and fibril size also suggest a potential implication of $\alpha 11\beta 1$ integrins in the control of skin biomechanics.

## References

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Keywords

Transmission electron microscopy; stereological/morphometric analysis; a11b1 integrins; dermal collagen.