PublisherInfo		
PublisherName	:	BioMed Central
PublisherLocation	:	London
PublisherImprintName	:	BioMed Central

Shear stress

ArticleInfo		
ArticleID	:	4051
ArticleDOI	:	10.1186/gb-spotlight-20010417-01
ArticleCitationID	:	spotlight-20010417-01
ArticleSequenceNumber	:	122
ArticleCategory	:	Research news
ArticleFirstPage	:	1
ArticleLastPage	:	2
ArticleHistory	:	RegistrationDate : 2001–04–17 OnlineDate : 2001–04–17
ArticleCopyright	:	BioMed Central Ltd2001
ArticleGrants	:	
ArticleContext	:	130592211

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The vascular endothelium is remarkably versatile in its ability to respond to both soluble chemical stimuli and mechanical stimuli. In the April 10 Proceedings of the National Academy of Sciences, Garcia-Cardena *et al*. report the results of a high-throughput genome-wide analysis of gene modulation by biomechanical activation (*Proc Natl Acad Sci USA* 2001, **98:**4478-4485). They used cDNA arrays to examine the effects of biomechnical forces on gene expression in cultured monolayers of human umbilical vein endothelial cells (HUVECs). They compared the expression profiles of over 11,000 genes in cells under static conditions with those of cells exposed to two distinct fluid dynamic conditions - steady laminar shear stress or turbulent flow (both at 10 dyn/cm2 for 24 hours). Cluster analysis revealed global profile patterns related to distinct functional phenotypes. The different shear stress conditions regulated distinct sets of genes involved in rearrangement of the cytoskeleton and control of the cell cycle. Hence, endothelial cells can sense and transduce different biomechanical stimuli.

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