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**Mechanical Stimulation of Smooth Muscle Cells by Arterial Pulsations.
An Important Stimulus for the Formation of Elastic Laminae
in Arterial Tissue.**

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It has been suggested that mechanical stimulation of smooth muscle cells by arterial pulsations might be an important stimulus for the formation of elastic laminae in arterial tissue (1-4). Recently we found direct evidence for this stimulation.

We implanted compliant, microporous, biodegradable vascular grafts, prepared from mixtures of polyurethane (PU) and poly-L-lactic acid (PLLA) (5), in the abdominal aorta of rats. These PU/PLLA grafts function as a scaffold for the regeneration of arterial tissue (6,7). Six weeks after implantation, the grafts were still pulsating, and smooth muscle cells had developed on the luminal side of the grafts underneath an endothelial layer; in between the smooth muscle cells, there was elastin, which was arranged in laminae (Fig. 1A).

When we implanted the compliant PU/PLLA grafts surrounded by rigid polytetrafluoroethylene grafts, to prevent the grafts from pulsating, smooth muscle cells had also developed on the luminal side of the grafts, but there were no elastic laminae - only limited amounts of irregular elastin (Fig. 1B).

Our results give direct evidence that mechanical stimulation of smooth muscle cells by arterial pulsations is an important stimulus for the formation of elastic laminae in arterial tissue.

Fig 1. IM micrograph of vascular graft six weeks after implantation in rat abdominal aorta.

A: A compliant PU/PLLA graft (PU). Note the elastic laminae in between the smooth muscle cells.

B: A PU/PLLA graft (PU) surrounded by a rigid polytetrafluoroethylene graft (PT, just visible). Note the absence of elastic laminae, only irregular elastin (E) is present.

(Toluidine blue - basic fuchsin staining, X 210)

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