Modification of the AV Loop Rat Model by Combination of the Intrinsic and Extrinsic Vascular Pathway
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**Introduction**
In this study we present a modification of the AV loop model, which combines extrinsic and intrinsic vascularisation modes in order to enhance vascularisation of matrices.

**Materials and Methods**
An arteriovenous loop was created in the medial thigh of 24 rats. The loop was placed in a newly developed three dimensional cellular titanium chamber, which was fabricated with an electron beam melting facility, and was embedded in a HA/βTCP matrix, filled with fibrin. At the explantation time points (2, 4, 6 and 8 weeks) constructs were perfused by different colour solutions to determine the amount of tissue vascularised by either intrinsic or extrinsic vascular pathway. Specimens were investigated by means of micro-computed tomography, histologic and morphometric analysis.

**Results**
At 2 weeks both, micro-computed tomography and histology demonstrated a dense network of newly formed vessels, originating from the AV loop or from the surrounding of the chambers. After 4 weeks, all constructs were filled with cell-rich, highly vascularised connective tissue and both vascular pathways (intrinsic and extrinsic) showed capillary connections. Therefore all vessels were filled with the AV loop perfused solution even in the originally extrinsic peripheral vessels. Intrinsically perfused vessels demonstrated increasing vessel diameters in terms of vessel maturation.

**Discussion and Conclusions**
The vascular supply of tissue engineered constructs can either be achieved by an extrinsic or an intrinsic model vascular pathway. When it comes to transferring newly created constructs to distant parts of the body, an intrinsically vascularised tissue with an axially vascularisation is required. Using the AV loop (AVL) model, which was first mentioned by Erol and Spira in 1979 (1), several types of tissues have been engineered in vivo (2, 3) and specimens have been vascularised by intrinsic vascularisation (4, 5). This study demonstrates for the first time the enhancement of angiogenesis using a newly developed cellular titanium chamber in an axially vascularized tissue by an additional extrinsic vascular pathway. After 4 weeks the matrices were completely vascularised and both pathways were connected, allowing transplantation of the entire construct using the AV loop pedicle.

**References**

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All authors have nothing to disclose.