Can autologous vascular endothelial cell seeding increase the patency rate of small-diameter No-React®-trated bovine internal mammary arteries? An in vivo juvenile sheep


Background
This study was performed to evaluate the possibility of seeding No-React® treated bovine internal mammary arteries (SIMAs) and to record any improvement in patency rate.

Methods
During the in vitro study, twelve seeded SIMAs were divided into two groups: group I (n=6) was endothelial cell (EC) seeded and group II (n=6) EC seeded after pre-coating with fibrin glue to evaluate the binding capacity. During the in-vivo part of the study, eight juvenile sheep received either a seeded or a non-seeded SIMA. In the seeded group (n=3), a piece of jugular vein was harvested to culture autologous ECs. SIMA grafts were coated and seeded in a special bioreactor. In the control group (n=5) non-seeded SIMA grafts were implanted. No anti-coagulation was administered. Explantation was performed at 3 and 6 months post-implantation. Grafts were evaluated by gross examination, histology and immunohistochemistry.

Results
By inserting two million ECs in the vitro study, the seeding density in group I was $1.29 \times 10^5 \pm 0.09 \times 10^5$ cells/cm$^2$ and $2.27 \times 10^5 \pm 0.17 \times 10^5$ cells/cm$^2$ in group II (p<0.003). In the in vivo study, the mean EC density of the implanted seeded grafts was $2.35 \times 10^5 \pm 0.04 \times 10^5$ cells/cm$^2$. At explantation, the seeded grafts showed less inflammatory reaction and a higher patency rate compared with the non-seeded grafts. Histology showed a monolayer of ECs on the inner surface of seeded SIMAs at follow up.

Conclusions
Seeding of No-React® treated SIMA arterial grafts with autologous ECs increases the patency rate.

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