The use of Tissue-Engineered Cell sheets to improve healing after Radiofrequency Ablation in the Esophagus

P. Elbe 1, E. Jonas 1, J. Enger 1, M. Westerberg 1, H. Pettersson 1, M. Kondo 2, S. Sjöqvist 1, N. Kanai 3, T. Ohki 3, M. Yamato 3, T. Okano 3, M. Egami 3, A. Dlugosz 1, P. Blomberg 1, M. Löhr 1

1 Karolinska Institutet, Stockholm, Sweden 2 Department of Oral and Maxillofacial Surgery, Tokyo. 3 Tokyo Women’s Medical University, Tokyo, Japan

Introduction
RFA has proven to be a safe method to eradicate Barrett’s esophagus. However some patients do not heal properly with squamous cell epithelium after RFA. The patients, sometimes referred to as “poor healers”, are usually patients with long Barretts segments and hiatus hernias. Transplantation of tissue-engineered autologous oral mucosal epithelial cell sheets in the esophagus has shown to be able promotes re-epithelialization of the esophagus after ESD. We wanted to investigate if cellsheets could improve the healing after RFA as well.

Aims & Methods
The first patient selected was a 71 year old male with a C6M10 Barrett’s esophagus according to the Prague classification. He had intestinal metaplasia but no dysplasia. 24 hour manometry and pH-metry showed a severe reflux with reduced clearance of the distal esophagus. The second patient was a 72 year old female with initially a 11 cm long Barrett’s esophagus with recurrent high grade dysplasia (HGD). The patient had previously been treated three times with endoscopic resection (ER) and six times with RFA but did still have four cm long, almost circumferential area with columnar lined epithelium containing HGD but no visible lesion. 24 hour manometry and pH-metry showed mild reflux but hyperperistaltic movements. We collected specimens of oral mucosal tissue from the patients and the epithelial cells were cultured for 16 days on temperature-responsive cell culture surfaces. At the day of the RFA a temperature reduction released the cells and we could thereby endoscopically transplant the cellsheets.

Results
During the four week period the first patient had complete re-epithelialization. He experienced no dysphagia nor any stricture or other complications. RFA and cellsheet transplantation have reduced the area of columnar lined epithelium in the second patient but she still have some columnar lined epithelium left and additional RFA is planned. No patient had any complications.

Conclusion
Transplantation of tissue-engineered autologous oral mucosal epithelial cell sheets in the esophagus after RFA seems to promote re-epithelialization. Further studies are needed to show if this could be a procedure to treat patients with poor healing after RFA.

References

Peter Elbe
Division of Surgery, Department of Clinical Science, Intervention and Technology (CLINTEC), Karolinska Institutet
and Department of Surgical Gastroenterology, Karolinska University Hospital, Stockholm, Sweden
peter.elbe@ki.se