Reviewer’s report

Title: The role of barrier membranes for guided bone regeneration and restoration of large bone defects: Current experimental and clinical research.

Version: 1 Date: 30 January 2012

Reviewer: A Masquelet

Reviewer’s report:

This paper is an good review of what could be the future face to the very challenging problem of the bone regeneration guided by barrier membranes. According the authors, the basic characteristics of these membranes are biocompatibility, cell-occlusiveness, space maintaining, tissue integration and clinical manageability.

They make a difference between non resorbables and bioresorbables membranes and in this latter field, natural and synthetic membranes. The authors postulate that a barrier membranes acts as a tube which prevents soft tissue invasion into the defect and allows to guide the bone regeneration process.

However can we expect a spontaneous bone regeneration in a defect without osteoconductive material and osteoinductive substance ?

As the authors say « bone formation occurs only to the marginal stable zone with a central zone of diorganised loose connective tissue.

One step procedure seems to be the main argument of the authors ; nonetheless, in cases of defect resulting from infection or tumor excision we think it’s preferable to use a two steps procedure. Foreign body induced membrane has been conceived for this aim ; Studies have showed that foreign body reaction is the key to understand formation of growth factors and angiogenesis. Thus a two stage procedure cannot be considered as a drawback.

From this point of view, bioabsorbable synthetic membranes are worthy of interest, since they are likely to induce a foreign body reaction and to produce growth factors.

On the other hand, the role of pore size is emphasized to obtain the penetration of vascular connective tissue through the membrane. The tissue infiltrating through the pores is said to differentiate into bone by direct or appositional bone formation.. But what could be the precise process : biological process starting from the extremities of the bone defect or other.. As the authors say « bioabsobable membranes can also be used in combination with bone graft or bone substitutes and growth factors »

The conclusion of the authors is relatively deceiving when they say that « the role of the membrane could be only a part of bone tissue engineering !
One may regret that the authors have not given enough importance to the foreign body induced membrane which has biological properties favoring bone regeneration and which constitutes an excellent model of biological chamber for testing various combinations of osteoconductive and osteoinductive materials.

In summary, in the state of the art, it is difficult to conceive a bone regeneration in an important defect only by the means of a barrier membrane.