Introduction

The development of biodegradable magnesium-based implants has recently been one of the most researched topics in the field of biomaterials (1). However, it is still in its pioneering stages, and standardised protocols for the assessment of the biocompatibility of the implants have yet to be created. With this in mind, we endeavoured to establish an in vitro mucosa model, designed to mimic the in vivo implant–tissue interface environment as closely as possible.

Ideally, resorbable implants support a diseased tissue until healing and remodelling have occurred, and then they slowly degrade, without negatively affecting any part of the organism (2). In this respect, they are superior to their permanent equivalents, as both removal surgery (3), with its accompanying risks, and possible foreign body reactions, can be avoided in the long run (4). As well as applications in osteosynthesis and cardiovascular diseases, magnesium implants can also be used in the treatment of chronic rhinosinusitis (CRS).

The occurrence of restenosis of the paranasal sinus apertures due to reactive scarring is a common complication during the wound healing period in CRS patients who undergo surgery (5). To ensure the ventilation of the sinuses, a stent is sometimes placed during surgery, but the effectiveness of this approach is controversial (6). A short-term insertion might not be able to prevent restenosis (7, 8). Long-term stenting can often cause adverse effects, including the induction of scar tissue, nasal congestion, unpleasant odour, dislocation, infection, and renewed tissue trauma upon stent removal (5, 9, 10). A resorbable stent based on magnesium has the potential to offer a new therapeutic option, as, in addition to the advantages mentioned above, magnesium has also been reported to be beneficial to the healing process (11, 12). However, this particular application has not been investigated up to now.

Numerous studies have reported the favourable biocompatibility of magnesium and its alloys (13–16), but none of these studies were based on the use of nasal mucosa as the target tissue. Furthermore, only very limited information is available on whether the stimulating effects of magnesium ions on cellular functions such as protein synthesis and proliferation, described by some authors (17, 18), might also play a role in the vicinity of degrading metallic magnesium. For these reasons, we investigated a model of in vitro-cultured porcine nasal mucosa, thus enabling the assessment of the biocompatibility of pure magnesium and its potential to affect metabolic parameters at the tissue–implant interface. A porcine model was chosen for the biocompatibility screen-