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Report on the 9th International Conference on Lactoferrin – structure, function and applications. October 18 – 22nd 2009, Beijing, P.R. China

From Sunday the 18th of October until Thursday the 22nd I have attended the ninth international conference on lactoferrin. This conference included a variety of topics, international speakers and both academia as well as industry. I will highlight the most interesting presentations during the sessions that were given each day.
After welcoming by the chair of the conference: Prof. Jianhua Wang at Sunday evening the scientific sessions started at Monday morning with four sessions during the day regarding structure-function relationships, receptors and ligands for lactoferrin, regulation of cell proliferation and differentiation and lastly immunomodulating effects of lactoferrin.
During the first session Edward Baker (Auckland, New Zealand) reviewed the variety of different lactoferrins (human, bovine etc.) and structures in which he focussed on the different functions and overlapping functions of these lactoferrins.
Ben Ashby from Sidney, Australia showed promising effects of a variety of (bovine) lactoferrin derivatives on an *in vitro* model of corneal wound healing, in which he found spectacular results.
During the second session Bo Lonnerdal (Davis, CA, USA) reviewed the characterized lactoferrin receptors on a variety of human cells, but also stressed that various cell types can have various receptors for lactoferrin, so there is no single lactoferrin receptor. Also, different lactoferrins (apo or holo) can have different effects on the dynamics of receptor expression.
Annick Pierce (Villeneuve d'Ascq, France) informed us about delta lactoferrin, which is an intracellular lactoferrin isoform which acts as a transcription factor that interacts *in vivo* via a delta-lactoferrin response element, found in the Skp1, Bax and DcpS promotors.
The third session involved presentations of Yoshiharu Takayama (Tsukuba, Ibaraki, Japan) on the regulatory capacity of bovine lactoferrin on cells involved in bone formation (osteoclasts and osteoblasts) and of Mattias Munnich (Goteborg, Sweden) that I found very interesting. He developed a (patented) human lactoferrin-derived peptide PXL01 (not including the first eleven amino acids) that, when applied in gel, could prevent post-surgical adhesions ('verklevingen') of which no current treatment exists; it was also able to diminish scar formation. He showed very promising results and is now setting up a clinical trial phase 2 with his company.
The last session on monday was on immunomodulatory effects of lactoferrin which started with a review of Jillian Cornish (Auckland, New Zealand) on lactoferrin as an effector molecule in the skeleton (lactoferrin is able to prevent bone degradation, which could prevent osteoporosis in post menopausal women). Followed by a review on the roles of lactoferrin in immunity by Dominique Legrand (Villeneuve d'Ascq cedex, France). He discussed that upon release of lactoferrin by neutrophils, depending on the physiological status of the host, lactoferrin can act anti-inflammatory but also pro-inflammatory. This is because lactoferrin is able to directly interact with cells of the innate and adaptive immune system. Lactoferrin is able to modulate migration, maturation and functional properties of these cells.
Hereafter it was my turn to present my work on hLF1-11, I reviewed the immunomodulatory effects that I have found of the antimicrobial peptide hLF1-11 that is derived from human lactoferrin and comprises its N-terminal eleven amino acids. I explained the effects found on cells of the innate immune system that resulted in an overall upregulation of the innate immune response of the host.
On Tuesday three sessions were planned: lactoferrin in pathologies, antimicrobial activity of lactoferrin and lactoferrin-derived peptides and molecular design and expression of

lactoferrin-derived protein (peptide). Session one covered the use of lactoferrin in hypoferremia and anaemia by Piera Valenti (Rome, Italy), since lactoferrin is an iron carrier and Sandra Gessani who was replaced by Piera Valenti due to illness, informed us about the effects of bovine lactoferrin on human dendritic cell differentiation and found exactly the same results as I have with hLF1-11 (inhibition of maturation therefore a stronger innate response, increased phagocytosis etc.) even though the N-terminus of bovine lactoferrin is of very different amino acid composition. This was very interesting for me to find out.
Hans Vogel informed us about complexes lactoferrin can make for example with lysozyme or osteopontin. In the second session Susan Mosquito Guillen (Lima, Peru) showed protective effects of bovine lactoferrin on *S. typhimurium* infection in mice and Hiroyuki Wakabayashi (Zama Kanawaga, Japan) showed that lactoferrin inhibits biofilm formation of periodontopathic bacteria. The last session showed a variety of designed peptides that showed antimicrobial properties, but these investigations were only in the begin stadium of their development as therapeutics.
The sessions on wednesday and thursday focussed mainly on the large scale production of lactoferrin, including an overview on the use of stier Herman by Pharming from Leiden. But also the use of transgenic goats, cattle and even rice was mentioned, including their quality controls.
The last session of the conference focussed on applications of lactoferrin and Theresa Ochoa (Lima, Peru) showed us the set-up of a major clinical trial to prevent diarrhea in children by the use of lactoferrin.
Annick Pierce summarized the conference as being allround, with every aspect of lactoferrin being discussed, but also stressed that al lot of questions still remain unanswered. Therefore the bridge between academia and industry needs to be narrowed and this conference plays an important role in this process.
I had a great time attending this conference; it was a good opportunity for me to present my work here. Since I did this at the beginning of the conference I came in contact with a lot of scientists, but also companies. I liked the presence of both academia and industry and have been able to add a lot of names to my network. The enthusiastic response on my presentation motivated me a lot and the discussions that followed gave me a lot of inspiration.
Thank you, NVVI, for giving me the opportunity to present my work at this conference!