

Per Olaf Grände

Per-Olaf Grände (University Hospital of Lund, Sweden), one of the originators of the [Lund concept](#)

“The Lund concept was introduced towards end of the 1980s and the beginning of the 1990s in Lund [Sweden], and the reason was that we had quite high mortality rates at that time in our brain injury patients. “We tried to find the reason for the increased mortality and thought maybe we could try to find another approach to it. What we found was that the kinds of treatments used at that time were actually going against basic physiology, so we constructed a new guideline more or less entirely based on basic physiology for brain volume and brain perfusion.”

“When we did this, we noticed that some of the components were actually directly in contrast to the components used in the traditional guidelines at that time, especially the [Rosner concept](#), which was quite popular and was also used by us before this.

“At that time, we changed our therapy towards one that was entirely based on basic physiology, and we noticed very soon that we reduced mortality. From the start, it was a desk guideline, and then we started using it with some patients in whom the prognosis was very poor. We knew that, and yet a lot of these patients survived. We were therefore allowed to continue with it and now it’s an established therapy. So have the assumptions than 20 years ago, and it has been used for 20 years in clinical practice. There have been a lot of outcome studies showing good results with the Lund concept, in spite of the fact that some of the components were directly in contrast to the traditional guidelines. “For example, in the Rosner concept, which was the most commonly used one between 1992 and 1996, he said that you should increase arterial blood pressures as far as possible to have an absolutely minimum cerebral perfusion pressure [CPP] level of 70 mmHg. But we know from a basic physiological point of view, this would increase brain edema, rather than reducing it.

“They hadn’t thought about the fact that, if you increase arterial blood pressure, you increase brain edema. They only thought about the fact that, if you increase arterial blood pressure, you improve flow and oxygenation of the brain. They didn’t consider that simultaneously you increase CPP.” Professor Grände said: “So we introduced the concept that we should not increase arterial blood pressure... We said that it should be a normal blood pressure – a normal cerebral perfusion pressure. It’s very funny nowadays because we were so criticised for this concept from the beginning, because we didn’t want to increase CPP to high levels.” He added: “However, there are now other studies from the United States, from Claudia Robertson,³ and others, showing that we were correct. Now they have changed the US guidelines. In 1996, the US guidelines also recommended high arterial blood pressure, with high doses of norepinephrine, but current US guidelines recommend exactly the same cerebral perfusion pressure as us. They have approached the ideas of the Lund concept, but also other concepts. The difference between the guidelines nowadays is not as large as it was in the beginning, because other guidelines have approached the Lund concept in many aspects.” Clearly, it’s taken a while for it to be widely recognised and adopted, what does Professor Grände think held it back? After all, we are talking about ideas that make logical physiological sense. Professor Grände said: “Well, the US guidelines and the UK guidelines that were introduced in the middle of the 1990s were based on meta-analytic approach. This differs from our guidelines, which were based on a basic physiological approach. As you may know, a meta-analytic approach is a very widely accepted approach in medical research today, and has been for many years. “So it was very difficult to criticise an accepted way of research, and the Lund concept was criticised from the start because it was not based on clinical results at all. Since then, we have confirmed many of the components with animal experiments, but the US and the European guidelines do not accept animal experiments because they say that you can’t transfer the results to man. It is difficult to do that, and of course they may be right

in many aspects.” He continued: “This was a weakness of the Lund concept, in that we had only a few clinical studies confirming the concept. Nevertheless, this concept of keeping cerebral perfusion pressure in the normal range – I would say between 60 and 70 mmHg – is same value in all guidelines today. This is one example of how they have accepted the components of the Lund concept, because they have been verified in clinical studies. We personally have not done it, but Claudia Robertson and others, have, and when it’s verified in clinical studies, they accept it.”

Addressing the need for outcome studies in greater detail, Professor Grände said: “We were also criticised because we had no randomised outcome studies at all, but I have always replied that, actually, there are no randomised outcome studies for the other guidelines.” He stated: “However, there was one randomised study from China in 2010,⁴ which showed significantly improved outcomes with the Lund concept compared with conventional treatment. In 2012, a study came from Bosnia and Herzegovina,⁵ and this showed a significant improved outcome with the Lund concept compared with traditional treatment. Furthermore, there are a lot of studies that are not randomised that have shown good outcomes.” Finally, comparing the Lund concept with more traditional guidelines, Professor Grände said: “In the conventional guidelines, they recommend and use quite a lot of norepi-

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