Global cooperation in higher education: 'supercourse'

A clarion call was just issued by *Nature Medicine* for cooperation in global science[1]. It argued that cooperation prevents duplication and saves precious resources. We suggest that a similar summons should be made for cooperation in biomedical higher education, as this too will help all scientists and scholars worldwide. We present here a model demonstrating the feasibility of such cooperation.

Most higher education is traditional classroom instruction. This 'information technology' was developed 2,000 years ago. Classroom teaching has survived through the years because it works and it is cost effective. Despite this, classroom instruction is also redundant and inefficient, with considerable waste[2]. For example, a lecture called "Introduction to Epidemiology" has probably been written 5,000 times by 5,000 different people.

How can we eliminate the waste from the existing approach of lecture manufacturing, to achieve a lean production system? This can be accomplished with faculty cooperating with other faculty, globally. A new approach, called the 'supercourse'[3], could yield better training for students by improving lectures. Its core is the construction of a free internet library of lectures. It is based on a model of sharing by software developers called open source, in which software is put on the internet for all to share and develop. Similarly, lecture manufacture can be greatly enhanced by having scholars put their best lectures on the internet for all to see and develop.

It is feasible. The 'supercourse' has in its network more than 1,400 faculty from 104 countries who have contributed more than 100 lectures and 700 reviews of the lectures for free. Thus, the 'supercourse' "teaches the teachers" in areas in which they are not familiar, and therefore eases lecture development. Moreover, quality is monitored with statistical quality control of Deming[4]. By using low bandwidth, internet scholars in the remotest areas of developing countries can be reached; at the same time, the internet is very powerful, as hypertext links are pathways to different sets of knowledge and cognition. The latest research can speed from journals into the classroom by direct linkage of lectures with journal articles.

The time of preparation can be reduced by more than 80%, and students receive much better instruction. A 'shareware library' is a boon to new assistant professors who start out with no lectures and little time, experienced professors who have a few dull lectures, and teachers in developing countries who have little access to the biomedical literature. It is time to establish the global cooperation among faculty to make our instruction better and less of a burden.

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3. Supercourse Faculty. The global health network supercourse: Epidemiology, the internet and global health. *Telemed. J.* **5**, 303–307 (1999).
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What is a functional recovery after spinal cord injury?

To the editor—The article by McDonald *et al.* published in *Nature Medicine* in Dec 1999 deserves comment[1]. First, related not only to the paper of McDonald *et al.* but also to many published reports on recovery after spinal cord lesion, is the definition of a functional recovery. BBB scores must be interpreted very carefully for hindlimb motor function. This function can be defined more specifically as locomotion, but authentic locomotion requires both functional and electrophysiological definition[2,3]. This was not true in the recent works[4–6]. This issue is especially essential when dealing with substitutive restoration, such as that done by McDonald *et al.* It is now well known that animals lesioned but not transplanted can show various hindlimb movements, such as paw shaking, that have nothing in common with locomotion except that the hindlimbs are moving[7].

Moreover, the interpretations of McDonald *et al.* for the mechanisms of recovery are very unlikely. It is now widely agreed that the prerequisite for locomotion is the existence of a serotonergic and/or noradrenergic drive of the central pattern generator[2,3]. Monoaminergic axons are unmyelinated. Thus, it is very unlikely that remyelination by grafted cells can account for such a mechanism. Alternatively, monoaminergic neurons could have differentiated from grafted stem cells. To explore this, it would have been necessary to analyze the transmitter phenotype of the grafted cells.

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McDonald et al. *reply*—We thank Privat *et al.* for their interest in our study. We much admire their work identifying the salutary effects of monoamines upon stimulated non-voluntary or assisted central pattern generator function.

We used the well-accepted BBB open field locomotor rating scale, designed to measure functional changes in voluntary hindlimb function, particularly in intermediate portion of the scale (8–12). Although reflex-like movements can contribute to lower BBB scores (1–4), we feel that the voluntary weight-supported ambulation that we found in rats transplanted with embryonic stem cells, but not in control rats, is promising. Finally, although we agree that serotonergic or noradrenergic drive is important for proper locomotor function, it is clear that myelination of long tracts, impaired in diseases like multiple sclerosis, is also important for such function.

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