Computer Backup, Clones, and Stem Cells

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Paradoxically, computer backup has never been easier or less expensive, but it has never been more important. Of the 5 critical considerations in dental computing,[1] backup is by far the most critical. As dentists continue to seize the advantages of computers, we have an increasing need to reassure ourselves and our patients that our records are safe (Figure 1).

The hurricanes in Florida are a recent example. Some businesses, including some dentists, will undoubtedly never recover. The physical destruction of all of their records is just too great an

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obstacle. But what if they had all of their records, charts, x-rays, clinical notes, accounting records—everything—in a package the size of a paperback book or even a package of cigarettes? What if a dentist whose office was literally swept away could go to almost any computer in the world and regenerate his whole office computer system and the information it contained?

Hurricanes are thankfully infrequent in California (where this author lives), but fires, theft, and computer failures are fairly common.[2] It is the role of a good computer backup to protect us from any and all of these catastrophes. But what constitutes a "good" backup? It needs the following: (1) to be stored outside of the office, (2) to have multiple copies, (3) to be done on at least a daily basis, (4) to be tested, and (5) to *have the ability to restore the entire office computer system in the event of a total catastrophic event.* (And the easier and less expensively it can accomplish this, the better.) Unfortunately, "traditional" data backups do not fulfill these criteria and leave dentists exposed to some extreme risks.

Figure 1. Bad things happen! Even if your patient records never end up "extra crispy," you have a responsibility to be prepared. The good news is that the data on this very badly damaged computer was saved and restored by Drivesavers (drivesavers.com), a data recovery service. An additional discussion of disaster recovery is available at PaperlessDentistry.com. (Photo used with permission of Drivesavers.com.)

CLONES AND STEM CELLS

Dentists have a good grasp of biology, and I think it is helpful to discuss computer backups in biological terms. We all know what a clone is: an exact duplicate or identical twin. *Your office computer system, at least the file server, should have an off-site "clone."* Usually the most practical place for this is in the dentist's home. If the office burns to the ground, the home clone still has all of the software and data.

Keeping that software and data current, however, used to be a problem as our files got bigger, especially with the use of digital x-ray and images. The transportation of the current data and software is the job of the "stem cells." A clone contains stem cells, ie, cells from which an entire new system can be "grown," but stem cells alone do not constitute a clone. Stem cells are not the twin, but they contain all of the information necessary to grow a new twin. More about that in a minute.

HOW YOUR CLONE AND STEM CELL BACKUP OPERATES

On day one of your new backup regimen, you have 2 computers set up by you or your IT person. They are interchangeable: they both have all of the same versions of the same software installed and tested and they both con-
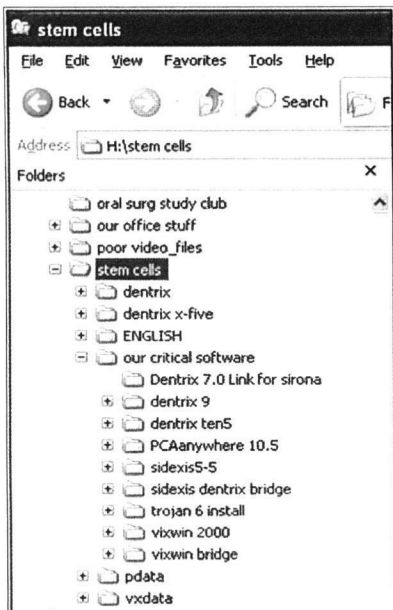
Figure 2. The computer stem cells for our office are shown in this list of the computer file directories we transfer each day between the office computer system and my home clone computer system. In the event of a total catastrophe, the files in these stem cells are sufficient to get my office computer system duplicated on a new computer in about 30 minutes.

Figure 3. The USB-connected, solid-state memory device (on the left) and external hard drive (on the right) are examples of containers used to transport stem cells between the office computers and the home backup computer. The type of container is not important. The important point is that the transfer is done on a daily basis and tested at least weekly.

Figure 4. Stem cells to go! Devices such as the Apple iPod contain a small hard drive with enough capacity to store all of my office stem cells ... with room left over for music and audio books to listen to on the way home! Cost-effective multi-tasking...that's what paperless dentistry is all about.

Computer Backup...

tain all of the same information and records. They are both configured as file servers, the central storage computer for your computer network. They can be interchanged without the other computers on the network "noticing" any difference. (Especially with more complicated systems, this takes a little IT know-how but can and must be done.) One computer stays at the office and the other computer goes home, where it is plugged in and tested.

But on day 2, after entering information all day on the office computer, the home computer is no longer a clone because it contains only the older information. We need the stem cells to keep the 2 computers in sync. The stem cells, which can be stored in any of a large array of vehicles, are used to transport the changes between the 2 systems so they always stay clones. After transporting the changes to the new computer, testing is very easy: just take a quick look at the day sheet and the appointment schedule for today. You might also check your checkbook balance and any documents you were working on at the office, such as your patient newsletter, etc. You don't need to do this testing each day, but you should probably do it at least once a week. It shouldn't take more that 2 minutes.

WHAT'S IN THE STEM CELLS?
It is clear from this example on day 2 that your stem cells need to contain all of the data from all of the different software programs you use to store information in your office. In the past, this was all a traditional backup was expected to do. But a traditional backup does not contain enough information to grow an entire new clone; it only contains copies of the data. *Stem cells, on the other hand, contain both the data and the additional information necessary to generate a new clone.* The additional information is a copy of all of the installation CDs for the critical software used in your office: your practice management software,

imaging and x-ray software, accounts payable software, and "bridging" or "linking" software—every installation disk for every piece of software that is critical to the functioning of your office (Figure 2).

SOFTWARE UPDATES
What happens when you decide to install an update from one of your software vendors? (First of all, don't be too hasty. Let others be the unofficial beta testers. You should wait at least 6 months after its release before you even think about installing an update, but that's another article.) First, do a complete backup of your server. Label, date, and set this backup aside; this is most easily done by copying it to its own directory on one of your workstation computers. It is sometimes very difficult, but it is usually possible to get back to your previous configuration if your update trashes your system. With Windows XP, using the "system restore" may get you back to the previous version of your software, but it will not "un-convert" any changes to databases. Next, copy (not install) the update CD to its own directory on your server hard drive. This directory should be included in the files copied to your stem cells so that it will automatically be transferred to the home clone. Then, from the copy of the installation CD on the server hard drive, perform the update on each machine on the network. Lastly, after thoroughly testing your office system, use the stem cells to transfer the update installation CD to your home computer and do the update there.

STEM CELLS LOWER MAINTENANCE
This approach using stem cells also makes it much easier and faster to reinstall software on a network computer or to install a new or replacement computer on your network. Everything you need is already on your file server. This is not quite as fast as using an "image" from Norton's Ghost or PowerQuest's Drive Image (both now owned by Symantec, powerquest.com), but it is still very fast, very reliable, works with any new computer, and usually with several differ-

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ent versions of Windows.

WHAT DO STEM CELLS LOOK LIKE?
Outside, stem cells can look like any of the popular media storage devices, from the very small "thumb drive" solid-state units that can store 1 or 2 gigabytes on your keychain to the jumbo size external hard drives that connect with either USB 2.0 or Firewire with capacities large enough for all of the images in a busy group practice (Figure 3). You can even use the Internet, although these services tend to be much more expensive than other methods. My personal favorite right now is an Apple iPod with a 40-gig hard drive. I can easily fit all of my images, data, installation CDs, and several audio books on it with lots of room to spare. Not only does it entertain me on the way home, but I can stop at any computer store along the way and clone a whole new system of computers (Figure 4).

WHAT SOFTWARE?
There is a wide selection of very good backup software that is inexpensive. Karen's Replicator[2] and Second Copy[3] are widely used. I personally just use batch files, because they are versatile and free. If I want some compression for data files, I use WinZip,[4] which can also be used from within a batch file. Some database engines need to be turned off before their data files are accessible for backup. This can also be done from within a batch file, but some backup software can also be configured to do this. The details of which software to use can be debated forever and is probably best left to the person actually responsible

for the initial setup of stem cell replication. But the testing of the results, the final "proof" that the whole system is actually working correctly, *should in all cases be done by the dentist* as outlined previously.

COMPUTER TO COMPUTER BACKUP

The same software used to create and maintain the stem cells on the transportation devices can also be used to copy the stem cells automatically to other computers in the office. Most computers sold in the last few years have hard drives large enough to contain several sets of stem cells from several different dates. An end-of-week and end-of-month set of stem cells can be kept for the very rare occasion when they might be needed. Why not? They're free and require no labor after the initial setup. These on-site stem cells also provide an easy way to get a system up and running if the server fails. If IT support is needed, it can usually be handled with a short telephone call or (better) over the Internet. The single disadvantage of this type of backup is that it is not off site. *Therefore, it should be used in addition to, not in lieu of, the off-site backup discussed previously.* The state of California now requires that computerized patient records have an

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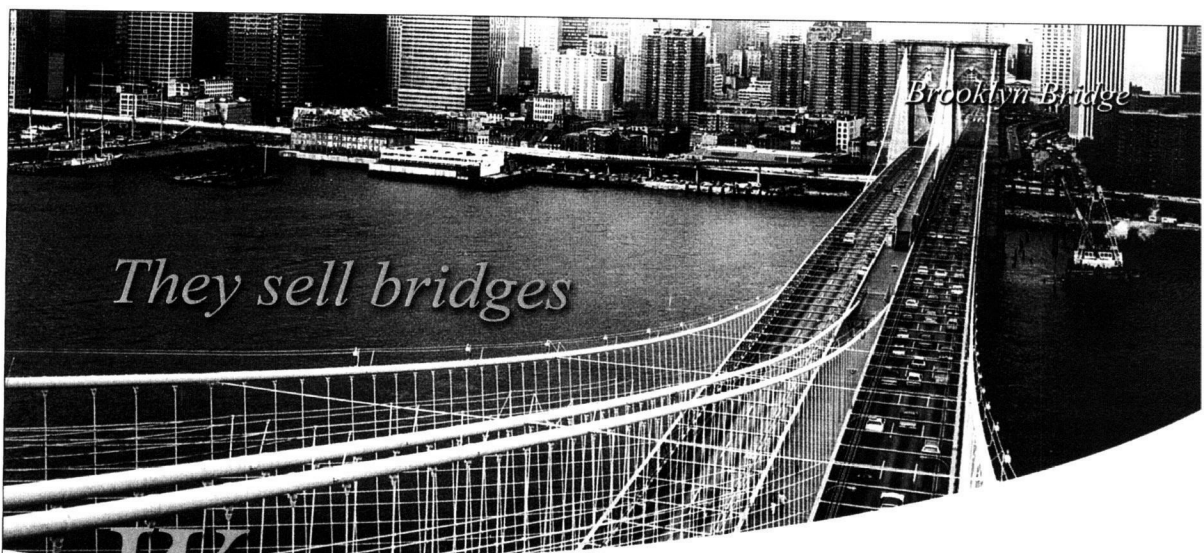
off-site backup.[5]

BELT AND SUSPENDERS

Many dentists will spend full, happy careers without ever encountering any loss of computer data. Unfortunately, some will not. While some of these recommendations may seem overly complicated and cautious, they are really straightforward and inexpensive to set up and maintain. *A tested, off-site, daily stem cell backup system is a necessity for dentists storing their critical records where they belong...in their computers.*◆

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