

ORIGINAL ARTICLES

Lost in Space: Emergency Digital Camera Data Recovery

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Introduction: The purpose of this article is to inform 21 clinicians about a software application that can be downloaded free from the Internet to recover damaged, corrupted, or deleted photographs from digital cameras or digital camera media cards.

Digital photography has become the standard for clinical photography over the past decade. Although digital photography offers many advantages over film or slide photography, some distinct disadvantages exist. One of the biggest disadvantages is that a digital camera media card may become damaged or corrupted and hundreds of images can be lost in a fraction of a second. The average surgeon who takes many pictures each day will likely, at some point, be faced with a loss or potential loss of data.

Materials and Methods: Many clinicians are unaware that digital images are usually recoverable in minutes with simple, free software designed specifically for that purpose.

Results: Software designed to recover lost digital images has the potential to recover photographs, video, and audio files.

Discussion: This article also explains precautions and caveats for avoiding data loss when dealing with digital camera media. This article is a "9-1-1" for digital camera emergencies, and clipping it out and tucking it in your desk drawer may at sometime make a bad camera day better.

There is no doubt that we are experiencing a paradigm shift in clinical photography.¹⁻¹³ Clinical photography has always been a mainstay in cosmetic surgery for diagnosis, chart records, medico-legal reasons, and marketing. With the technological advances in digital photography over the past decade,

it has never been easier to obtain high-grade, controlled, clinical photographs.

The learning curve for clinical digital photography has been reasonable because most cosmetic surgeons were experienced with film clinical photography.² However, some significant factors are "new" to clinical digital photography. One task paramount to digital photography is a back-up strategy to preserve data. Albeit rare, it was possible in the past for a surgeon to lose his or her entire slide collection to a fire or flood. Today, a single virus, computer crash, or laptop thief can obliterate thousands of images in a fraction of a second. The requirement of a back-up strategy cannot be overstated, and those surgeons who have experienced massive data loss can attest to the angst, stress, inconvenience, and sorrow that accompany such an event.

Although factors in our control can result in data loss, other factors not in our control can also lose or corrupt digital photography data. Most digital cameras have removal media cards that store the clinical photographs as binary computer code (Figure 1).

All the pictures you take are really a mass of ones, zeros, and characters. If a portion of this code is disrupted or corrupted, the pictures can become unreadable. If you are a surgeon who takes a lot of clinical digital photographs, the chances are that at some point in time you will take the camera card out of your camera to download images and see an error message that your data are corrupted or a command to format (erase) the camera card. Even more common is when a useful image is inadvertently deleted from the camera or removable card. These problems can happen with removable media cards or with download cables from the camera to the computer. In short, if you take digital pictures, you can lose data. Many surgeons are unaware that simple and free technology exists to recover erased, corrupted, or lost images on the digital camera or removable media. Do not abandon corrupted digital

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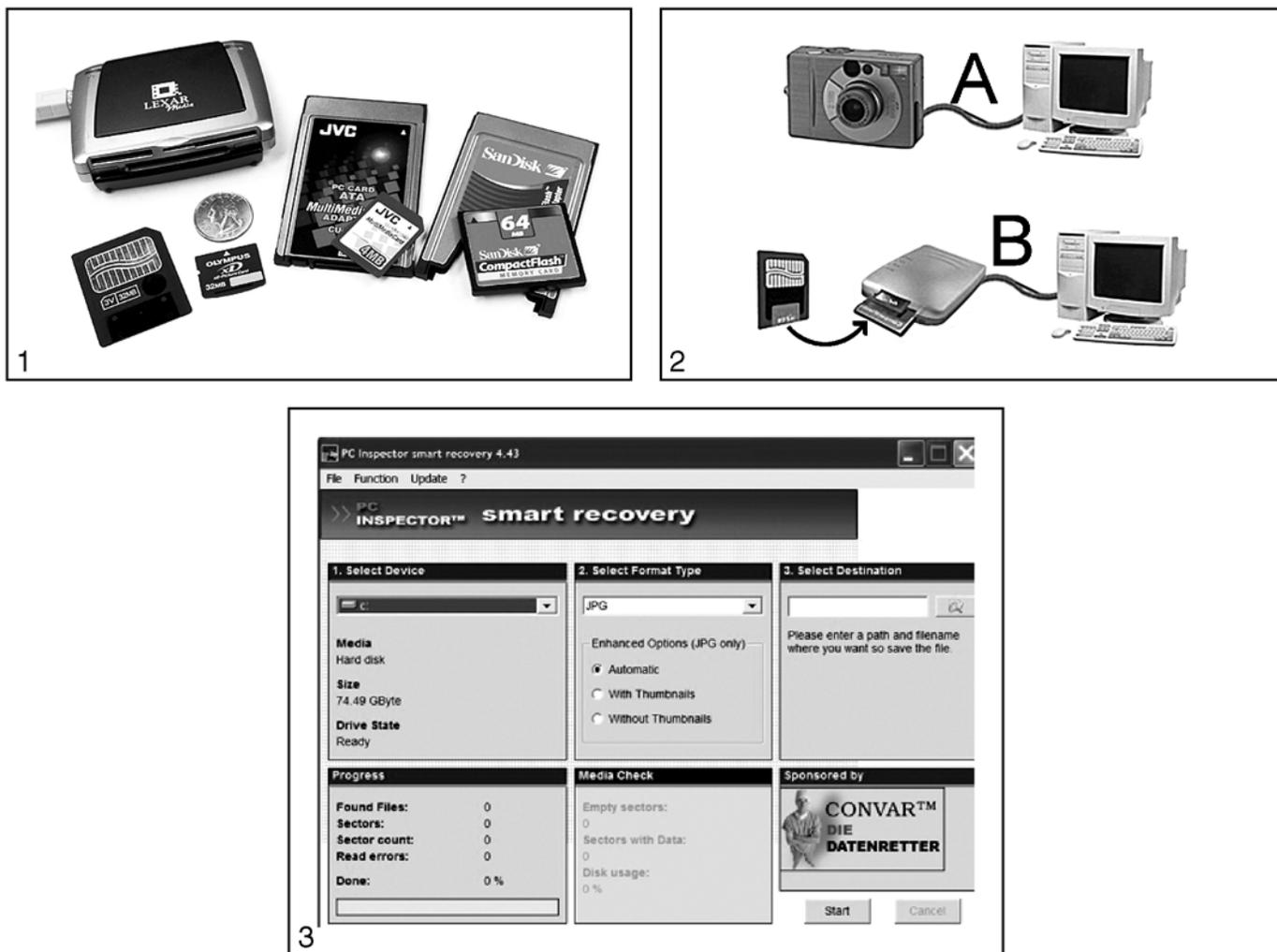


Figure 1. Various common removable media cards and card readers used with today's digital cameras.

Figure 2. (A) If you download your images directly from the digital camera, the media can be read from your computer. (B) If you use a removable media to download your images, or if Windows does not recognize your camera as a logical drive, then you need to use a card-reading device connected to your computer.

Figure 3. The opening screen shows the basic choices in the Smart Recovery program.

camera data; they are frequently recoverable. Still images and certain video and voice files that have been corrupted can also be recovered.

PC Inspector Smart Recovery (Pirmasens, Germany, <http://www.convar.com>) is a little-known, free software program available on the Internet that can frequently recover your lost images and deleted or corrupted data. It is a great feeling to recover lost images that are important or irreplaceable, whether the lost data were vacation pictures or unique clinical photographs. PC Inspector Smart Recovery supports the image file types .jpg, .tif, .crw, Fuji .raf, and Olympus .orf. Video files in the .avi, QuickTime .mov

format and audio files in the .wav, .dss audio format can also be restored.

Generally, a corrupted media card from a digital camera will cause the camera to alarm or present an error message. Some cameras will show a flashing symbol, beep, show a card error, or present a message to format the media card. Formatting the card will erase all of the data on the card, so it is not a first-line option. Although the Smart Recovery program can recover data from formatted media cards, the recovered images may be a smaller resolution. Rule number 1 is do not format the media card; however, if this is done, the images may still be recovered.

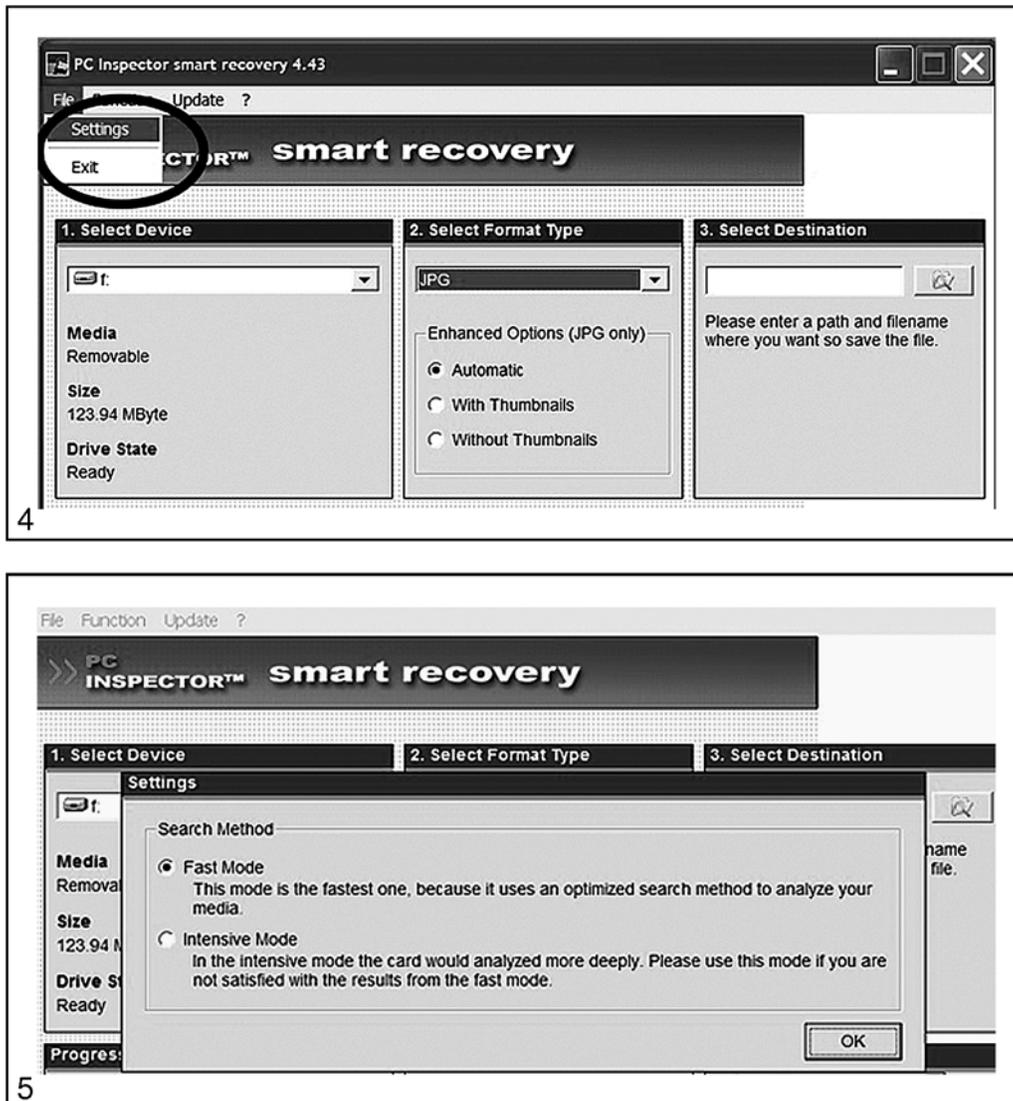


Figure 4. The “settings” tab is used to configure the basic search options.

Figure 5. A “Fast Mode” and an “Intensive Mode” are available, depending on the degree of the data corruption.

Using Smart Recovery

PC Inspector Smart Recovery is a data-recovery program for Flash Card, Smart Media, SONY Memory Stick, IBM Micro Drive, the xD Micro card (used by Olympus and Fuji), Multimedia Card, and Secure Digital Card. This software runs on all Win 9.x, NT 4.0, Windows 2000, and XP operating systems.

To use the Smart Recovery program, it must first be downloaded from the Internet free of charge by entering the Web address <http://www.convar.com>.

Once the program is downloaded, the media must be accessed in 1 of 2 ways (Figure 2). Next, several basic selections need be made (Figures 3 through 5):

- Step 1: Identify the correct drive where the damaged data reside. This would be the drive represented by your camera or cable connection or your card reader.
- Step 2: Identify the file extension used by the camera (most frequently .jpg).
- Step 3: Identify a location on your computer to store the recovered images. You simply tell the computer where to store the recovered images.

An additional setting choice is the use of the “Fast Mode” or the “Intensive Mode” for the search-and-recovery method (Figure 3). This is accessed under the “settings” tab in the FILE menu (Figure 4). Generally,

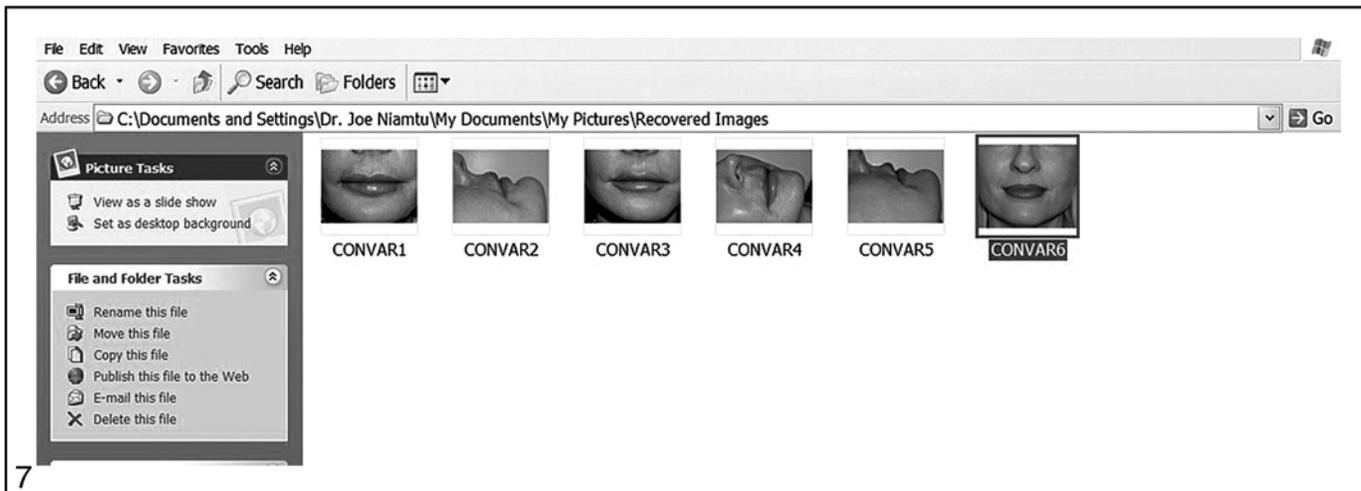
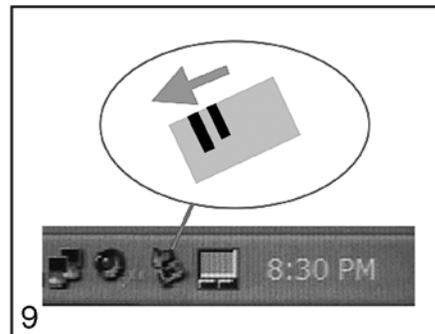
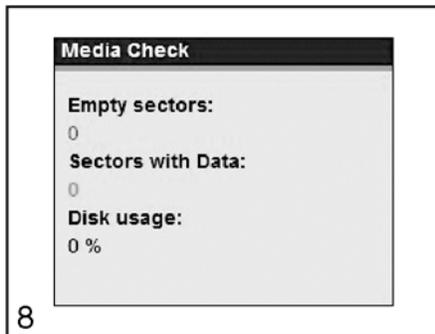
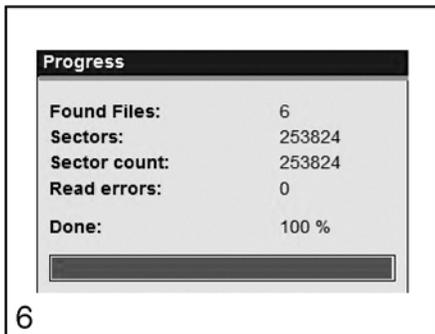


Figure 6. The progress window in the Smart Recovery program shows the progression of the image- recovery process. In this case, 6 lost images were recovered on the author’s media card.

Figure 7. This figure shows the actual recovered images that were corrupted in the recovery referenced in this article.

Figure 8. The “Media Check” function allows you to check the functionality and status of your memory data card and will report damaged sectors and other problems.

Figure 9. The “Safe to Remove Hardware” icon at the lower right-hand corner of the Window’s screen.

the Fast Mode is appropriate, but if you are not happy with the results or if you have highly corrupted media, the Intensive Mode may be required. The software will alert you if the Intensive Mode is, indeed, required. The only difference between these settings that you will see is that the Intensive Mode takes longer to scan.

After you make these simple settings, the software automatically scans the damaged media and attempts to recover the files. Figure 4 shows an actual situation experienced by the author where 6 corrupted digital images were recovered. In another situation, the author recovered 116 lost images from a single corrupted camera card.

The number of files found will be displayed in the progress box, and if there are unrecoverable files (mechanically damaged media or improper connection

with the download cable) they will be shown as “read errors” (Figure 6). Figure 7 shows the actual damaged files that were recovered in the above-referenced recovery.

An additional useful tool of the Smart Recovery software is the “Media Check” function (Figure 8). This allows you to search the media card for any damage or remaining files. A few cameras “flash”; that is, when erasing the memory card, they overwrite it with a fixed pattern. If this happens, data recovery is not possible because there are no longer any useful data on the card. To use the Media Check function, first select the drive corresponding to your card reader. Once you have selected the drive, the values “Media,” “Bytes per sector,” “Media size (in Bytes),” and “Status” should appear. If the status is not “Available,” there is

a physical problem with your card, or the card reader has not been properly recognized. In this case, check your card, the card reader, and the driver software. With the Media Check function, you can also examine the functioning of the memory cards. The author recommends testing cards regularly for damage, thus avoiding losing data.

It is the author's hope that most of the readers of this article never experience significant media corruption with loss of valuable clinical or personal images, but it is likely that this problem will present itself at some time or another. Although it is impossible to totally prevent, there are a number of steps that can be taken to protect digital media damage. Media cards that are frequently used in common digital cameras are very sensitive and must be handled with care. One caveat is to never insert or remove the cards from the digital camera while the camera is powered-up. In addition, removing the media card while the camera is registering the image (the writing process) will corrupt the data. Some media cards (Figure 1) are flexible, and forceful insertion into the camera or card reader can warp or bend the card and damage it. Obviously, these cards should be kept from temperature extremes and moisture. Also, many of these cards have exposed conductive surfaces (gold contacts shown in some of the cards in Figure 1) and should be sheathed in the proper protective sleeve that accompanied the card. Exposing the circuitry of these cards to static, abrasive surfaces, or magnetic fields may damage the cards or media.

These media card data may also be damaged by removing them from the computer without enabling the "Safely Remove Hardware" application. Media cards, digital cameras, or card readers are recognized by Window's operating systems as a separate hard drive. The card reader must be "turned off" before removing the media card. This is done by activating the Safely Remove Hardware icon on the Windows task bar in the lower right-hand corner of the screen (Figure 9). This allows safe removal of the media; failure to do this can lead to corruption of the media.

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