

## DISASTER PREPARATION FOR PERITONEAL DIALYSIS PROGRAMS

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*Note from the editor: The following article is written with reference to United States emergency procedures, but is a useful resource for personnel in other countries to develop their own disaster preparation plans.*

Few circumstances can create fear like a natural disaster. Frustration from loss of control as one waits for the event to conclude can result in an inability to act when needed. This feeling can be even more acute for those with chronic kidney disease requiring dialysis. Schedules are disrupted in the clinic due to shifting demands for resources, such as transportation, personnel, and utilities. For the home self-care patient, it may bring a sudden change in modality and isolation from resources; evacuation may become necessary. All home patients must be prepared for natural disasters in order to effectively provide self-care and there are several resources to assist patients and providers in planning.

Natural disasters come in many forms, often a factor of locale. Those who reside near the oceans are more prone to threat from hurricanes and tsunamis, those who live along geographic fault lines are more exposed to earthquakes, and blizzards are more common in northern climes. Other natural threats such as wild fires may occur anywhere and may impede evacuation by usual routes. Some natural disasters can be anticipated and have advanced warning; others come surreptitiously. High winds, tornadoes, floods, and severe lightening can come at any time and may disrupt utility services that may negatively impact home self-care patients. Home patients must know what types of events can disrupt their ability to dialyze and how to prepare themselves with alternate plans to avoid interference of their self-care. Since disaster preparations are much more complex for home hemodialysis patients, we will confine this discussion to peritoneal dialysis (PD) patients.

According to the National Oceanic and Atmospheric Administration (NOAA) website, the predictions for the 2005 Atlantic hurricane season are to have above-normal activity atop the crushing 2004 season from which many have yet to recover. NOAA predicts 12 to 15 tropical storms (maximum sustained winds of 35 - 73 mph or 63 - 118 km/hr), with 7 to 9 expected to develop into hurricanes (maximum sustained winds of at least 74 mph or 119 km/hr), three to five of which could be major hurricanes.

Health care providers can easily stay abreast of predictions, changing weather systems, and recommended actions via the Internet and the National Weather Service (NWS) Emergency Broadcasting System. Many reliable weather-related websites are sponsored by both governmental and commercial entities. Some websites even offer a number of products to keep one alert to changing weather threats by transmitting directly to your portable digital assistant (PDA), or wireless application protocol (WAP) cellular phone. Websites for Emergency Management Services for each state can typically be accessed through a main web page for state government services. One example is the website for the Florida Division of Emergency Management (FDEM) at

[www.floridadisaster.org/eoc/index.htm](http://www.floridadisaster.org/eoc/index.htm). This website contains online links to other agencies such as the National Hurricane Center, a listing of all county emergency management offices, recommendations for family preparedness, emergency shelter operational status, and direct online communication capability with FDEM, and additionally, there is information about terrorism threats. One can easily search for similar websites in their local area. Healthcare providers should designate specific staff members to check websites or local weather sources daily during hurricane season to avoid surprises. The NWS provides an Emergency Broadcasting System for regional and local weather-related emergencies. This signal typically broadcasts to emergency weather-band radios and selected participating commercial radio and television stations.



It is critical in emergency planning to know what types of hazards may present problems and to define the threats that can be anticipated. A good reference to dialysis providers is available on the Internet from <http://www.cms.hhs.gov/providers/esrd.asp> using the link titled "Publications", access the file for "Emergency Preparedness for Dialysis Facilities: A Guide for Chronic Dialysis Facilities" (Revised 2/20/03). This document advises providers of their obligations under the Medicare Program (United States), and discusses the various phases of mitigation and response planning for natural disasters such as fires, tornadoes, hurricanes, floods, severe winter weather, and earthquakes. Additionally, this document addresses other types of threats such as biological hazards, bombs, workplace violence, and civil disorder. This publication provides concise direction for self-assessment of hazards, mitigation, and plan development, as well as tools for completing or reporting assessments that may facilitate recovery or reimbursement for expenses related to operation during disasters.

*Continued on page 2*

### Contents



Disaster Preparation for Peritoneal Dialysis Programs  
Page 1 & 2

Hepatitis C Virus and Renal Disease: An Update, Part I  
Page 3



Is Egg Albumin-based Oral Supplementation a Good Option for Malnourished PD Patients?  
Page 4

International calendar of events  
Page 5

A companion piece developed to educate patients about disaster planning is also available from the CMS website at [www.medicare.gov/Publications/Pubs/pdf/10150.pdf](http://www.medicare.gov/Publications/Pubs/pdf/10150.pdf). The document "Preparing for Emergencies: A Guide for People on Dialysis" discusses the potential for disruption of dialysis services due to circumstances beyond control and advises patients of simple preparation that can facilitate survival and self-reliance. Communication with facility staff and awareness of threats to health and safety are the key goals of the publication.



Beyond providing written instructions to patients on emergency preparations, home therapy nurses should review with their patients disaster preparedness plans annually. In Florida, where the threat of hurricanes exists six months per year, we review information and technique with our patients in April or May so that all preparations are in place by the arrival of the Atlantic hurricane season on June 1st. The disaster action plan for our program includes the following steps (performed and documented annually):

- Obtain updated contact information (address, main phone number, cell phone number, emergency contact name and phone number) and document in medical record and on any emergency phone lists utilized by the clinic.
- In areas where flooding or hurricane evacuations may be possible, ask the patient to identify his/her residence on an elevation map or hurricane evacuation map. It is important for patients to know their level of risk in developing an emergency plan.
- All patients should have a specific disaster plan identified and shared with clinic personnel that include at least the following elements:
  - Evacuation level of the residence and shelter site to be used if evacuated
  - Contact numbers for local emergency management and shelter locations
  - Location of friends or relatives in other locations that may serve as an evacuation site from the primary residence
  - Emergency contact information to reach dialysis clinic personnel after a storm
  - Community-wide emergency plans that have been developed by the renal community should be shared in writing with all patients
  - Re-location plans for the dialysis clinic if it is in an evacuation zone
  - Phone numbers for PD products supplier
  - Emergency food and water for a minimum of 4 days for all (humans and pets) who will be housed during the event
  - Medications for at least 7 days for all members of household, as applicable
- All patients undergoing automated PD (APD) should demonstrate proficiency in performing manual exchanges (CAPD). When electrical power is not available, the cyclor will not work so all patients must be ready to switch to manual exchanges based on weather conditions and availability of utilities. Strong summer thunderstorms, wild fires, tornadoes, tropical storms, hurricanes,

floods, and winter storms all have the potential to disrupt utility service. Patients must be fully prepared to perform manual exchanges until electrical power is restored.

- All PD patients should check the status of their manual supplies to assure the following:
  - A supply of manual exchange equipment for a minimum of 7 days of CAPD
  - All expiration dates are good through November (this will take a patient through hurricane season which ends November 30th)
  - A selection of dialysate concentrations (e.g., 1.5%, 2.5%, and 4.25%)
  - Clearly marked boxes for manual supplies to make them easily recognizable and easy to pack in case of emergency evacuations
  - Extra universal connector and catheter extension set for emergencies

A calm and well-organized approach to disaster planning will assure that healthcare providers are in a position to continue services in spite of external threats. It is never too late to develop a facility disaster plan. Personnel will be better able to develop their own personal emergency plans knowing their part in the dialysis facility's plans. Managers should be cognizant of social issues that may impact the availability of staff members and have contingency planning that accounts for the responsibilities of single parents with young children or aging parents; those who are involved in community emergency planning (as volunteers), who may be called from your clinic to serve the greater community during a disaster; or those who are in military reserves or National Guard units who may be called suddenly to active duty.

When there is time in advance to prepare, as there is with an approaching hurricane system, managers should also consider timing. What time of the month is it? Is it nearly payday? Will your staff be able to manage without paychecks? How many staff are scheduled for vacations? Is your monthly billing ready to submit to insurers? Are your computer systems protected from losses of data and protected from the elements? Cash is always needed after an emergency as bank automated tellers and the like will be non-operational and many vendors will turn to "cash only" sales. Brainstorming through the "worst case scenario" will allow the healthcare team to identify potential hazards and threats and recognize resources. Develop an emergency plan as a team to allow input from several critical areas (e.g., administrative, clinical, physical plant, and human resources) and prevent inadequate plans. Our patients depend on us to survive; by identifying threats and developing contingency plans, we can help them to continue in their independence and self-care.



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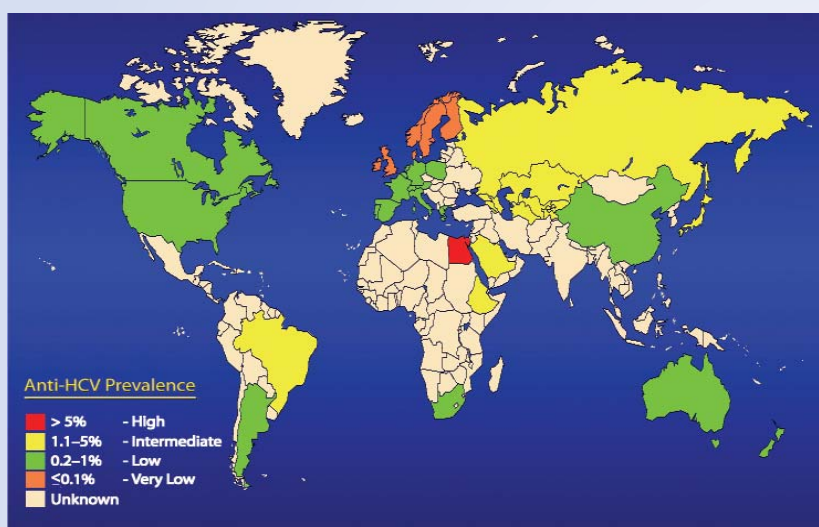
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# HEPATITIS C VIRUS AND RENAL DISEASE: AN UPDATE, PART I

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The World Health Organization (WHO) currently estimates that 2.2% of the world's population is infected with the hepatitis C virus (HCV)<sup>1</sup>. Renal disease and HCV are often diagnosed in the same patient as many health care providers are well aware. The purpose of this article and the one to follow is to update the reader on current epidemiology of HCV, the relationship to renal disease, transmission routes, current management and treatment as well as treatments on the horizon. Part 1 will discuss epidemiology, association to renal disease and transmission routes.

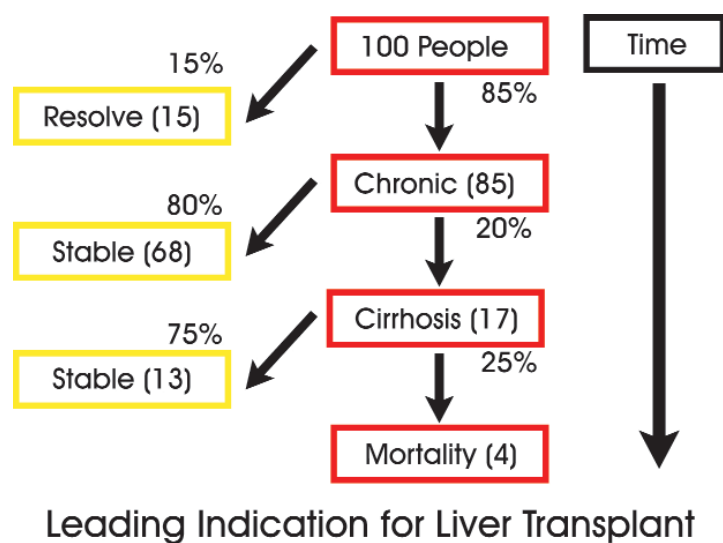
**Figure 1: Worldwide prevalence of HCV based on blood donors**  
(All figures courtesy of Centers for Disease Control and Prevention)



HCV has become a global concern to the extent that WHO has created the Global Burden of Hepatitis C Working Group. According to WHO, approximately 130 million people are infected with HCV with Africa and the Eastern Mediterranean being the largest regions affected. Figure 1 shows prevalence of the virus based on blood donors identified world-wide. While an acute infection is rarely identified, 75% of those who are infected develop chronic disease. The actual mortality rate associated with HCV is a low 10-15% with age playing a large role. A person younger than 40 years old has less than 10% chance of developing cirrhosis in 20 years. However, if he or she was infected after the age of 40, the chances increase to 20% and these numbers double with passing time. Hepatocellular carcinoma (HCC) will develop in 1.6% of the HCV infected population. Of these, the death rate in an industrialized nation is 80% and in a developing nation 90%<sup>1,2</sup>. Figure 2 depicts the natural history the virus tends to follow<sup>3</sup>.

In 2001 the National Surveillance of Dialysis-Associated Disease in the United States found the average HCV-positive antibody in dialysis centers to be 8.6%<sup>4</sup>. In some clinics it was reported to be as high as 40%. Worldwide, the numbers range from 5-50%. The incidence of HCV in the dialysis unit has declined in the last 15 years with the advent of routine screening in 1990; however, HCV is still prevalent 1.4% of the time with overall rates in some countries of 15%. This high prevalence remains a concern since studies have shown that patients with both chronic kidney disease (CKD) and HCV infection

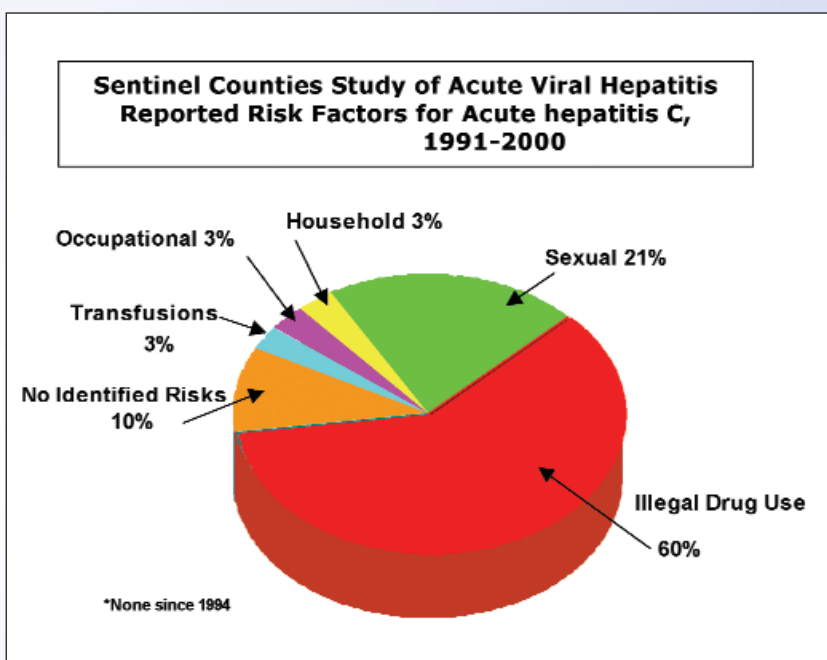
**Figure 2: Natural History of Hepatitis C Virus**



have a higher mortality rate than HCV-negative CKD patients. In these situations cirrhosis and HCC account for 5.5% and 8.8% of the deaths, respectively<sup>5</sup>.

HCV continues to primarily be transmitted through contact with a contaminated parenteral source. The source could be transfusion of blood products (although this is less likely since screening became prevalent in the early 1990's), illegal drug injection or occupational exposure to blood (mostly accidental needle sticks). Other possible sources of infection include sexual contact (multiple sex partners, high risk sexual behavior), birth to HCV-infected mother, intranasal drug abuse, household contact, nosocomial and unknown. Figure 3 shows the Centers for Disease Control and Prevention's (CDC) most recent numbers on risk factors for HCV. In the renal population, particularly the dialysis population, transmission is nosocomial. The contamination is usually found in the clinic setting where breakdowns in proper aseptic and cleaning techniques occur. This places the peritoneal dialysis (PD) patient and home hemodialysis (HHD) patient who have less exposure to the dialysis unit at minimal risk resulting in an overall lower prevalence than hemodialysis patients undergoing in center dialysis.

**Figure 3: Risk Factors of HCV**



Hepatitis C and renal disease are often observed together, not only in the dialysis setting, but in nephrologists' offices. HCV is associated with the comorbidities of cryoglobulinemia, glomerulonephritis, in particular, membranoproliferative glomerulonephritis (MPGN). Cryoglobulinemia is more common in women and is usually seen after many years of infection with HCV. It can be severe and fulminant. MPGN is seen with cryoglobulinemia but in a much more severe form. When a patient has MPGN, there is associated glomerular injury and inflammation<sup>3</sup>.

Unlike hepatitis A and B there is no vaccine for HCV. This makes the management and treatment of the patient with HCV and CKD complex. The difficult side effects related to the treatment and the multiple comorbidities associated with CKD add to this complexity. There have been major changes in the treatment regimens and new recommendations in recent years. There are also new innovations on the horizon that are worth mentioning. These will be the focus of the second part of this update on Hepatitis C to be seen in the next edition of PDServe Connection.

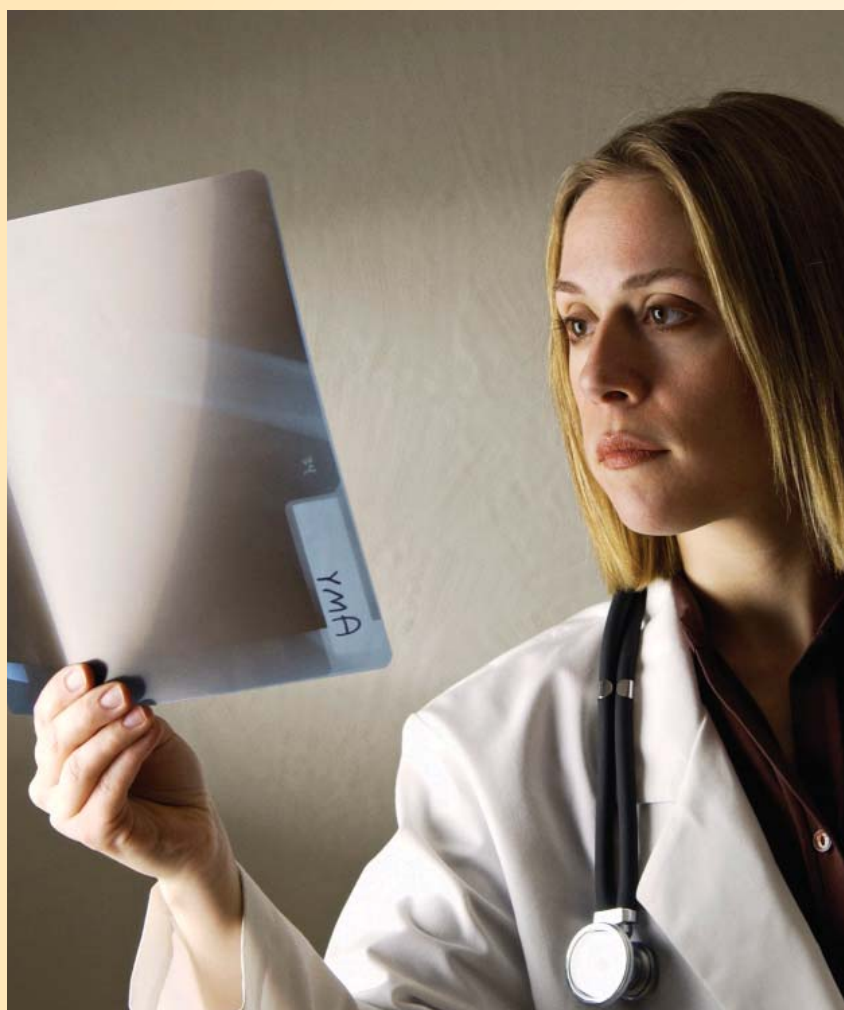
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# IS EGG ALBUMIN-BASED ORAL SUPPLEMENTATION A GOOD OPTION FOR MALNOURISHED PD PATIENTS?

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Malnutrition is a clinical condition that strongly influences dialysis patient outcomes. The CANUSA study produced evidence that malnutrition and hypoalbuminemia are important prognostic indicators in PD patients<sup>1</sup>. The association among malnutrition, inflammation and atherosclerosis (MIA syndrome) in this group of patients has been a commonly recognized clinical phenomenon for some time<sup>2</sup>. In PD patients the additional factor contributing to malnutrition is the loss of albumin through the peritoneal membrane. Since the most important causes of death in PD patients are cardiovascular complications resulting from atherosclerosis, possible interventions for breaking the vicious cycle of MIA are the focus of interest of many clinicians.



One area of interest is the improvement of nutritional status. Gonzales-Espinoza et al. recently published the results of a randomized controlled trial investigating the effects of oral egg albumin-based supplementation in CAPD patients<sup>3</sup>. Subjects were allocated to a study group (n=13) or to a control group (n=15). All patients were significantly malnourished according to the baseline mean serum albumin and Subjective Global Assessment (SGA) scores. Both groups received conventional nutritional counseling and the study group received the oral supplement. During a six-month time period patients had monthly biochemical and clinical evaluations, as well as quarterly assessments of dialysis adequacy and nutrition. Nutritional status was assessed by 24-hour dietary assessment, SGA, biochemical and anthropomorphic parameters. There were no significant differences in nutritional parameters, dialysis adequacy or peritoneal transport rate between the groups at baseline.

The following results were observed:

- Serum albumin concentrations increased significantly in the study group ( $2.64 \pm 0.35$  vs  $3.05 \pm 0.72$  g/dL) but not in the control group ( $2.66 \pm 0.56$  vs  $2.80 \pm 0.54$  g/dL;  $p < 0.05$ )
- Calorie and protein intake significantly increased in the study group over the six-month observation period ( $p < 0.05$ ). The protein intake increase was significantly higher among study group patients ( $1.0 \pm 0.3$  vs  $1.7 \pm 0.7$  g/kg;  $p < 0.05$ )
- The increase in non-protein nitrogen appearance rate (nPNA) was significantly higher in the study group ( $p < 0.05$ )
- Tricep skin-fold thickness (TSF) and mid-arm muscle area (MAMA) revealed a non-significant trend to a greater increase in the study group compared to the control group
- At the end of follow-up, the frequency of patients with

moderate or severe malnutrition decreased 6% in the control group and 28% in the study group

- The most important predictors of serum albumin at the final evaluation were the use of oral supplement administration and protein intake ( $p < 0.05$ )
- Secondary predictors of serum albumin were peritoneal transport rate and MAMA (both  $p = 0.06$ )

The main finding was the increase of serum albumin level and a higher calorie and protein intake in the study group. Oral administration of egg albumin-based supplementation was also associated with a trend toward increased anthropometric parameters and improved SGA evaluation. The authors discussed some aspects of possible interference with the results. Residual renal function decreased in both groups during the study, but to a lower extent in the study group. However, in both groups the median value contributed to less than 5% of the total dialysis dose since the beginning and was considered negligible. Inflammation could not be ruled out since no markers of inflammation were measured. Since signs of acute inflammation were not present and patients in both groups had a similar transport rate as well as CAPD regimen, the authors assumed that a difference in inflammatory status was unlikely. They concluded that egg albumin-based oral supplementation may be an effective, safe and inexpensive method of improving nutritional status in PD patients.

There are only a few other studies that deal with oral nutritional supplementation in PD patients<sup>4-8</sup>. Most of these studies have been inconclusive, possibly related to the fact that a low serum albumin level in PD patients is a consequence of many different processes including dialysis protein loss, dialysis dose, inflammation, acidosis and reduced oral intake<sup>9,10</sup>. Thus, oral protein supplementation may not be sufficient to increase serum albumin levels and to improve prognosis in PD patients with hypoalbuminemia. Other reasons for unsatisfactory results include the lack of adequate power to detect a significant difference between groups, patients' noncompliance with the supplementation, inadequate assessment of inflammation and other factors that may affect serum albumin and compensatory reduction in habitual oral intake.

The study reported by Gonzalez-Espinoza et al. enrolled only a limited number of patients in the open label trial with relatively short follow-up. Although they reported good compliance, the non-significant increase of the nPNA in the study group associated with significant increase of dietary protein intake in this group suggests noncompliance with the albumin supplementation and/or reduction in habitual oral intake<sup>11</sup>. The lack of data on inflammatory status prevents patient stratification for further analysis. Despite the limitations of this study, and until we have clinical trials that will better define the role of oral protein supplementation in improving nutrition, oral protein supplements should be considered in our quest to improve the outcome of PD patients.

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## INTERNATIONAL CALENDAR OF EVENTS

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*September 23-24, 2005* 4th Annual Conference on Prevention in Renal Disease. Toronto, Canada. Contact: Prevention in Renal Disease, 399 Bathurst Street, ON M5T2S8 Canada, Telephone: (416) 603-7974 or visit their website at [www.nephroprevention.com](http://www.nephroprevention.com) for more information.

*October 5-8, 2005* European Society for Artificial Organs (ESAO) XXXII Congress and the International Federation for Artificial Organs (IFAO). Palazzo della Cultura e dei Congressi, Piazza della Costituzione, 4/a-Bologna, Italy 40128. Email for Organizing Secretariat: [info@omniameeting.com](mailto:info@omniameeting.com); Telephone: +39 06 4871366; Fax: +39 06 4815339 and Email for Scientific Secretariat: [Sergio.stefoni@unibo.it](mailto:Sergio.stefoni@unibo.it); Fax: +39 051 340871 or visit the website at [www.omniameeting.com](http://www.omniameeting.com) for more information.

*October 15-18, 2005* 7th European Peritoneal Dialysis Meeting. Prague, Czech Republic. Contact: EuroPD Congress Secretariat c/o In Conference Ltd., 10b Broughton St. Lane Edinburgh, EH1 3LY, UK; Email: [margaret@in-conference.org.uk](mailto:margaret@in-conference.org.uk); or visit their website at [www.europd.com/](http://www.europd.com/) for more information.

*November 8-13, 2005* 2005 ASN 38th Annual Renal Week 2005 – Pennsylvania Convention Center - Philadelphia, Pennsylvania. Contact email: [email@asn-online.org](mailto:email@asn-online.org) or visit their website at [www.asn-online.org](http://www.asn-online.org) for more information.

*January 25-27, 2006* 8th International Conference on Dialysis, Advances in CKD, 2006 – Caesars Palace – Las Vegas, Nevada. Contact email: [conference@rriny.com](mailto:conference@rriny.com) or visit their website at [www.renalresearch.com](http://www.renalresearch.com) for more information.

*August 25-29, 2006* ISPD 11th Congress of the International Society for Peritoneal Dialysis, Hong Kong. The motto of the Congress is “Achieving PD Excellence”. Contact: ISPD 2006 Congress Secretariat, International Congress Consultants, Limited; Telephone: (852) 2559-9973; Email: [info@ispd2006.org](mailto:info@ispd2006.org) or visit their website at [www.ispd2006.org/](http://www.ispd2006.org/) for more information.

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