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In This Issue

The Supplemented Vegan Low Protein Diet in Chronic Kidney Disease

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This article has been approved for 2.0 CPE units. The online CPEU quiz and certificate of completion can be accessed in the Members Only section of the RPG web site via the My CPEU link. This CPE offering is available to current RPG members only and the expiration date is October 31, 2012.

Abstract

A gap in patient care exists in the area of nutrition for chronic kidney disease (CKD) stages 1-4 with only 3.6% of patients seeing a renal dietitian before initiating dialysis. Nutrition education with regard to the type and amount of protein is an important aspect of care. Research supports the benefits of protein restriction and the use of plant-based protein. Furthermore, supplementing the diet of CKD patients on low protein regimens with ketoanalogues of amino acids has been shown to help maintain nutritional status. Each intervention can be viewed independently as an effective treatment for CKD. Combining these approaches creates a supplemented vegan low protein diet (SVLPD). This nutritional intervention improves uremic symptoms and slows progression of kidney damage without a decline in nutrition status. Improvements in nutritional parameters have been shown with SVLPD. Regular follow up and education by renal dietitians improves compliance among patients with SVLPDs. Additional research and in-depth cost benefit analysis for this approach as a best practice for CKD patient care is required.

Introduction

Data from the United States Renal Data Systems (USRDS) reveal increasing rates of kidney failure with an expected 2 million dialysis patients in the US alone by the year 2030 (1). Nutritional interventions to prevent kidney damage, alleviate symptoms of uremia, slow disease progression, and prevent malnutrition if damage has already taken place, should be encouraged as a best practice (2). Manipulation of the diet of CKD patients, especially with regard to the type and amount of protein, is an important aspect of care. Selected studies from 1990-2010 were reviewed regarding diets with various protein sources and levels and their effect on the prognosis of CKD. Research supports the benefits of protein restriction and use of plant based protein sources along with other restrictions such as phosphorus and potassium. While mineral monitoring and limitation is necessary for CKD patients, this paper will focus on protein and its effect on kidney preservation. Supplementing the diet with ketoanalogues of amino acids (ketoacids-KAs) has been shown to improve nutritional parameters in CKD patients (3).

– *Continued on page 3.*

RPG

Renal Nutrition Forum is published quarterly (summer, fall, winter, spring) as a peer-reviewed publication of the Renal Dietitians Dietetic Practice Group of the American Dietetic Association.

Articles about successful programs, research interventions, evaluations and treatment strategies, educational materials, meeting announcements and information about educational programs are welcome and should be emailed to the editor by the next deadline.

Future Deadlines:
March 1, 2012
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From the Editor's Desk

Sara Erickson, RD, CSR, LDN, CNSC
Editor

It is so exciting to introduce myself as the new editor for the RNF! What a valuable learning experience that has introduced me to so many amazing fellow Renal Dietitians. As Maya Angelou once said, "When you give, you get" and this could not be more true in regards to my time with the RPG. As many of you might relate, working as the sole dietitian in a program can become isolating at times. Two of the greatest gifts the RPG has given me are a sense of belonging and increased sense of community within the field of nephrology nutrition. Through the RPG we are able to share knowledge and experience with each other, providing a network that is a beneficial resource. Article contributions are a vital part of this network of communication that is provided by the *Renal Nutrition Forum*. I hope that you, a valued RPG member, will consider sending us topic suggestions and comments as your feedback is always welcome. If there is a particular topic of interest to you or perhaps you have attended a conference, such as the recent ADA FNCE, and would like to share your experience with others, please consider submitting an article as there is always a need for subject matter.

In this issue, there are 4 CPEUs available. Our featured article, co-authored by Jennifer Moore, MS, RD, CSR, NSCA-CPT and Roschelle Heuberger, PhD, RD, expands on the benefits of a vegetarian low protein diet supplemented with ketoanalogues for the Chronic Kidney Disease patient population. This informative review focuses on the importance of nutrition counseling prior to the progression of CKD to dialysis. First time author, Erin Ghaffari, RD, contributed our advanced practice article which provides a detailed account on the nutritional evaluation process of the dialysis patient.

With much enthusiasm we are delighted to offer the first report from a newly developed RPG position, liaison to the ADA House of Delegates. Our HOD Delegate, Pam Kent, MS, RD, CSR, LD, has been involved with the RPG in many different aspects which gives her a unique perspective for this important role.

Also included in this issue are summaries of the NKF 2011 Spring Clinical meeting provided by RPG educational stipend recipients who attended in April. Patti Barba, MS, RD, CSR, provides a synopsis of a cutting edge presentation she attended on phosphate additives and Iris McDuffie, MS, RD, LDN provides a review of her poster presentation on the use of the Nutrition Care Process within dialysis centers. Additionally, celebration of dedicated ADA and RPG members can be found in our member spotlight, which contains much appreciated words of advice from two of our fifty plus year members.

Sincere thanks and gratitude to incoming Managing Editor, Megan Sliwa, RD, LDN and outgoing Managing Editor, Stacey Phillips, RD for your guidance and support through my transition to Editor. I would also like to welcome our new Assistant Editor, Jackie Abels, MA, RD, LD…we are so happy to have you on our team! Finally, thank you to the peer-reviewers who provide invaluable feedback, the authors for their contributions, and to Amy Hess-Fishl, MS, RD, LDN, BC-ADM, CDE, for providing the CPEU test questions. Without you the Forum could not be completed!

Best Regards,

Erratum

From Spring 2011 :

Please accept our apologies, in the OSA Winner Write-up on page 22 in the Spring 2011 *Renal Nutrition Forum* (Vol. 30, No. 2), the winner's name did not appear correctly. The name should have appeared as 'Philippa Norton Feiertag'.

Patients with CKD are on a variety of medications such as ACE inhibitors and angiotensin receptor blockers for comorbid conditions. Diabetic CKD patients require oral agents or insulin. These medications are costly and typically have unwanted side effects leading to poor compliance (4-7).

Dietary changes should be standard practice for quality care in CKD, but the USRDS reports that only 3.6 percent of patients see a renal dietitian for a year or more before initiating dialysis. With a total end stage renal disease (ESRD) Medicare expenditure of 23.9 billion in 2007, up 2.6% from the prior year, upstream preventative interventions need to be implemented to reduce the financial and societal burden of CKD (1). Treating CKD should incorporate a vegan, low protein diet that is supplemented with KAs. Each intervention can be viewed independently as being effective, but their combined efficacy suggests further research to establish a best practice of a SVLPD. This nutritional intervention improves uremic symptoms and slows progression of kidney damage without a decline in nutrition status.

Vegan Diets and Risk Reduction

There is epidemiological evidence that a vegan lifestyle can lower the risk of the two main causes of kidney damage, diabetes mellitus (DM) and hypertension (HTN). Hyperlipidemia is also considered a risk factor for CKD and is a common co-morbidity of DM. Lipid abnormalities, DM, and HTN are improved with a vegan diet through mechanisms including, but not limited to, decreased intake of saturated fat and cholesterol, increased fiber intake, increased plant sterol intake, improved vascular dilatory responses, and improved insulin sensitivity. Evidence suggests that hyperlipidemia and atherosclerosis are not only improved, but even reversed with a vegan lifestyle (8,9). The following sections will elucidate the evidence for the effect of veganism on DM, HTN, and cardiovascular disease (CVD).

Diabetes- The Main Cause of CKD

Worldwide, in the year 2000, it was estimated that 154 million people had diabetes-induced kidney disease. The estimation for the year 2030 is 370 million globally. One explanation for the burden of diabetes around the world is the growing obesity rates and their association with type 2 diabetes. Type 2 patients develop kidney disease much the same as type 1 patients. Diabetes prevention is tantamount but once patients develop the disease, maintenance of tight glucose control is of utmost importance (10). Tight glucose control and lowering of body weight are the cornerstones of DM complication prevention.

It is well known that vegans have lower body weights than omnivores (8). Vegan diets are an effective preventative measure for obesity, and subsequently, DM. There is research supporting the positive effects of a vegan diet in the treatment of DM. There is also research supporting vegan diets in the prevention of risk factors for developing DM such as hyperinsulinemia (11,12).

A pilot study was conducted by Nicholson et al, to examine whether a plant-based diet could improve glycemic control in non-insulin dependent diabetes mellitus (NIDDM). Eleven participants with NIDDM, ages 25 years and older, were randomly assigned to either a low fat vegan diet or a conventional low fat diet for 12 weeks. The protocol included twice weekly support groups which included cooking and nutrition classes along with a group meal. Laboratory tests including fasting serum glucose, hemoglobin A1C, serum lipids and urinary microalbumin were obtained. Subjects completed 3-day diet records at baseline and at the 3 month follow up. The diet records included two weekdays and one weekend day. Adherence was assessed through self-report questionnaires that were handed out at group meals. The results included a 28% mean reduction (195 to 141 mg/dl) in fasting serum glucose (FSG) in the vegan group which was significantly greater than the 12% mean reduction (179 to 157 mg/dl) for the control group ($p=0.005$) (13).

A similar study was carried out on 99 type 2 diabetics randomly assigned to a low fat vegan diet or a diet adhering to the American Diabetes Association (ADA) guidelines. No meals were provided, but each subject consulted with a registered dietitian (RD) for one hour to establish an appropriate diet plan. This was followed up with weekly one hour meetings, nutrition and cooking classes and an appointment with a physician, RD, and/or a cooking instructor. Dietary compliance was monitored by unannounced telephone calls from the RD. Additionally, three day diet records were obtained from each subject at weeks 0, 12, and 22, reflecting two weekdays and one weekend day. Forty-three percent of the vegan group and 26% of the ADA group had a reduction in diabetic medications. Results, when excluding those with reduced medications, showed a drop in hemoglobin A1C by 1.23 points in the vegan group compared with 0.56 in the ADA group ($p = 0.089$). When including all participants, a drop in A1C by 0.96 percentage points in the vegan group compared with 0.38 percent points in the ADA group ($p = 0.01$). Body weight in the vegan group decreased 6.5 kg in the vegan group and 3.1 kg in the ADA group. Body weight change correlated with A1C change ($r = 0.51$, $P < 0.0001$) (11).

In both trials, positive results were seen with the vegan diet. For instance, in the pilot trial, a 28% decrease was seen in fasting serum glucose of the experimental vegan group as opposed to only a 12% decrease in the control omnivorous group. The effect on hemoglobin A1C was not significant in this study. In the larger study, subjects whose medications remained stable throughout the study showed significant changes in fasting serum glucose and hemoglobin A1C. Results combined from the two studies are depicted in Figures 1 and 2. In addition to the effects for diagnosed diabetics, there may be a role for vegan diets to suppress insulin resistance syndrome.

Figure 1: HgbA1C 12 and 22 Week Comparisons (11,13)

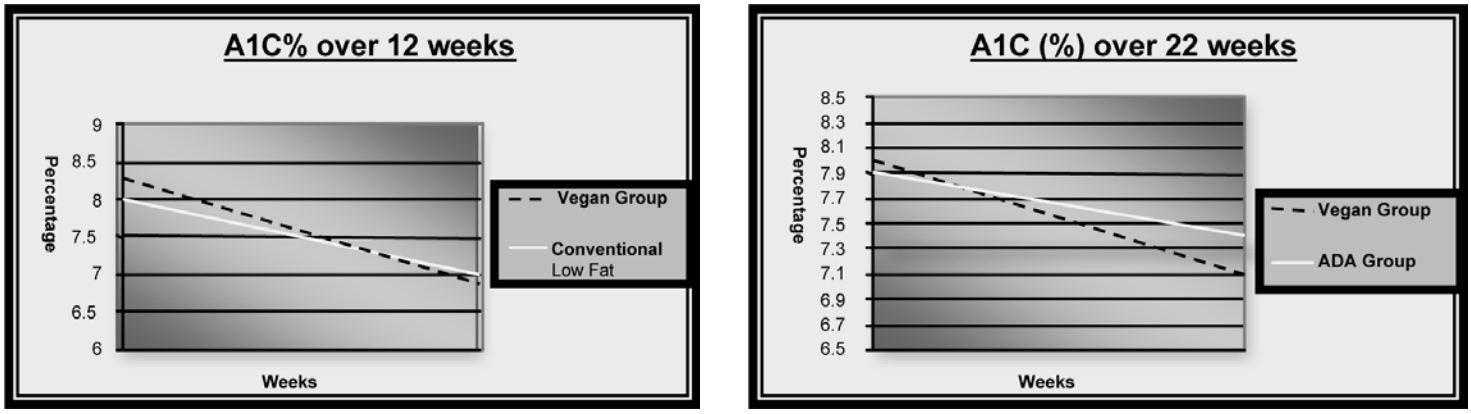
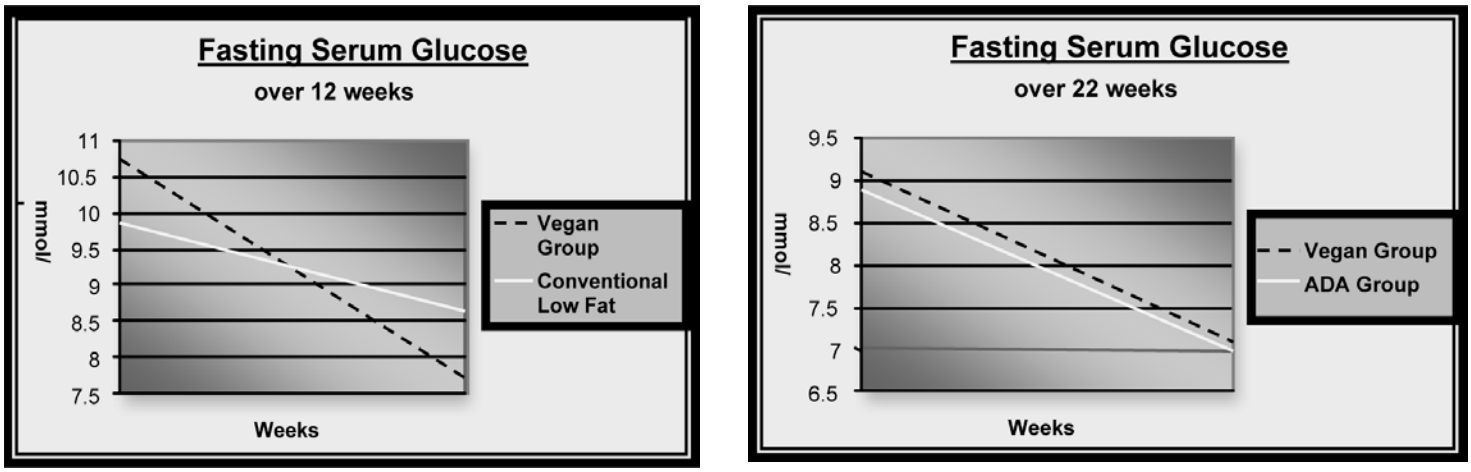


Figure 2: Fasting Serum Glucose 12 and 22 Week Comparisons (11,13)



Insulin Resistance

Insulin resistance precedes the onset of DM which impacts the CKD population. Three studies comparing the difference in insulin sensitivity between vegetarians/vegans and omnivores were reviewed. Each study examined insulin resistance through the Homeostasis Model Assessment for Insulin Sensitivity (HOMA-IR) and showed higher insulin sensitivity in the vegetarian group as seen in Table 1 (14-16).

Hypertension

DM and HTN are often comorbid. Greater than 70% of type 1 diabetics and 90% of type 2 diabetics are also hypertensive (10). One in three dialysis patients in 2007 had HTN listed as the cause of kidney failure (1). Vegetarians/vegans have lower than average blood pressure (BP) than omnivores and BP in vegetarians/vegans does not rise significantly with age (17). Lindahl et al, followed 29 patients with established, hospital verified, long-term HTN. They followed a vegan diet for one year. All of the patients were dissatisfied with the side effects of the antihypertensive medications and held a common fear of being on lifelong medication. Significant improvements in BP were seen with the adoption of the vegan diet. Of the 26 patients in the study, 20 had their antihypertensive drugs discontinued and 6 lowered their dose, usually by half (18). Table 2 shows results for the decrease in BP.

Cardiovascular Disease

Lipid abnormalities are common with kidney damage and persistent proteinuria. These abnormalities not only promote atherosclerosis, but a more rapid progression of kidney disease (19). The National Kidney Foundation's Kidney Disease Outcome Quality Initiative (K/DOQI) guidelines state that all CKD patients are in the "highest risk" group for CVD. Due to prevalence of traditional (lipid abnormalities) and nontraditional (CKD related calcium deposition) causes of CVD, 40% of patients present to ESRD clinics with evidence of CVD. Once renal

replacement therapy is initiated, CVD accounts for 40-50% of deaths in ESRD patients (20). Numerous studies have documented the effectiveness of a vegan diet in the prevention and even improvement of cardiac risk factors and atherosclerosis. Though recommendations for the American Heart Association (AHA) diet have moved toward the Dietary Approaches to Stop Hypertension (DASH) diet, the Lifestyle Heart Trials represent a valid argument for vegan/vegetarian diets to treat and reverse atherosclerosis. Dean Ornish, MD conducted the Lifestyle Heart Trials where 48 subjects were randomized into a strict vegetarian diet comprised of 10% of calories as fat and 4mg cholesterol daily and a control group. Protocols included moderate exercise, stress management, smoking cessation, and group psychosocial support. The control group followed the standard AHA recommendations of no red meat, only skinless chicken, and fish with 30% of calories as fat and 300mg of cholesterol daily. Moderate exercise was recommended but stress management was not included for the control group. Subjects in the treatment arm saw complete or nearly complete resolution of angina and sclerosis in 82% of patients. Subjects following AHA guidelines saw an increase in chest pains and arterial blockages worsened significantly (9). Follow up to this study was completed at one year and five years. More improvements were seen in regression of coronary atherosclerosis after five years than one year in the experimental group indicating not only long term adherence to the program, but also a continued effect on improved CVD risk factors (21).

Table 1: Insulin sensitivity between vegetarian and omnivorous groups (14-16)

	n	Average Age (years)	Mean HOMA-IR	Significance
Hung C, et al	49	36.6	1.09	p = <0.001
Vegetarian				
Omnivore	49	36.9	1.73	
Kuo C-S, et al	42	58.6	4.78	p = 0.002
Vegetarian				
Omnivore	50	55.7	6.75	
Valachovicova M, et al	95	37.8	.99	p = <0.001
Vegetarian				
Omnivore	107	38.7	1.59	

CKD and Vegetarian Nutrition-Source of Protein Debate

Research supports the nutritional management of chronic diseases that cause kidney damage and the replacement of animal with soy protein when damage has already occurred. A vegan diet, especially a vegan soy diet, has been shown to reduce urinary albumin excretion and disease progression. Type 2 diabetics with microalbuminuria who replaced red meat and chicken with soy and made no changes in the amount of protein eaten showed reduced albumin excretion rates (22,23). Additionally, replacing animal protein with soy protein has been shown to reduce urinary urea nitrogen, serum phosphorus, glomerular filtration rate (GFR), and

Table 2: Changes in blood pressure before and after therapy (18)

	Period of Therapy (Months)	Before Therapy Mean (mmHG)	After Therapy Mean (mmHG)	Statistical Significance
Systolic Blood Pressure	0-4	151	144	p = <0.05
	0-12	151	142	p = <0.01
Diastolic Blood Pressure	0-4	88	78	p = <0.01
	0-12	88	83	p = <0.05

renal plasma flow (24,25). Improvement in these parameters, particularly proteinuria (since a high level of proteinuria is associated with a faster decline in renal function), warrants the use of plant sources in the management of patients with CKD. In addition to changing the type of protein, limiting the amount of protein should be considered.

Low Protein Diets – This Historical Standard of Care Became Unpopular

Lowering the amount of total protein intake is an integral component in the management of CKD. This intervention has become uncommon in the US and Europe where 0.8 g protein/kg body weight is more often prescribed (26). Even with this higher protein recommendation, 44 % of patients are still initiating renal replacement therapy malnourished per serum albumin, prealbumin and anthropometrics. Low protein diets (LPD) and supplemented low protein diets (SLPD) have been used for four decades and should be revisited (26). Dietary protein restriction in CKD decreases the accrual of unexcreted waste products while preventing decline in nutritional status. It is known that an increase in renal blood flow and GFR of approximately 20-28% is seen two hours post ingestion of a protein or amino acid load (27). Despite the fact that the K/DOQI guidelines recommend a protein limitation of 0.6-0.75 g/kg of body weight (BW) in CKD patients, protein restriction is many times no longer advised (2).

Patients with CKD commonly have a spontaneous reduction in appetite, protein intake, and a natural aversion to meat as they progress through the stages of CKD. Purposefully restricting protein as a strategy to slow progression in a way that is monitored and controlled benefits the patient by alleviating the uremic symptoms that are causing the decline in intake, decreasing proteinuria, and lessening the strain on the kidneys. Dr. Shanyan Lin, Professor of Medicine, Division of Nephrology, Shanghai Medical University Hua Shan Hospital, states, "A Low-protein diet is a very realistic, effective and efficient way to retard the progression of CKD. It is comparable to even the most advanced way to treat CKD with drugs like ACE inhibitors or angiotensin receptor blockers." Despite evidence displaying the benefit of protein restriction in CKD, negative notions still exist.

MDRD Study

The negative view toward protein limitation in CKD is likely a result of the Modification of Diet in Renal Disease (MDRD) study, a multicenter trial to test the efficacy of protein restriction and BP control on the progression of kidney damage. The MDRD study is the largest study to date that has investigated the efficacy of protein restriction in patients with CKD. The failure of this study to demonstrate a beneficial effect of protein restriction has been interpreted as proof that this therapy does not slow progression of the disease. The study, however, was inconclusive and had many limitations. First, evidence of progressive kidney disease did not have to be proven in order for patients to be enrolled. Approximately 15% of the Study A control group had no decline in GFR thus making measurements impossible. Second, study B patients treated with SVLPD had no control group for comparison. Third, polycystic kidney disease (PKD) is unaffected by nutrition interventions and around 20% of patients had PKD. Fourth, ACE inhibitors can mask the benefits of a LPD and patients with high BP were being treated with them in an unregulated fashion. Lastly, a rapid decline in GFR in Study A was unexpected and followed by a slowed progression, so an increase in the duration of the study would have been necessary to see an effect (28). The initial MDRD study was inconclusive but secondary analysis showed greater consistency with preservation of GFR levels with protein restriction on CKD progression (29).

KA Supplementation-A Missing Addition for Low Protein Diets in the US

Ketoanalogues of essential amino acids (EAAs) have been introduced into the treatment of CKD patients on LPD. This is a more common practice outside the US. KAs lack nitrogen (N) so they do not produce excess uremic waste. However, they can still be converted to EAAs in the liver, muscle, and intestine (30). Benefits of KAs include (31):

1. Aids in the preservation of nutrition status.
2. Aids in the alleviation of uremia by capturing excess N residues and utilizing them for the production of AAs. As a result, dietary protein can be restricted and formation of endogenous urea declines, both of which lessen the work load on the kidneys.
3. Stimulates protein synthesis and inhibits protein degradation.
4. Decreases proteinuria thus causing a rise in serum albumin (ALB).
5. Does not induce hyperfiltration in the kidneys.
6. Improves carbohydrate metabolism abnormalities seen in uremia through enhanced tissue sensitivity to insulin and decreased circulating insulin levels which is advantageous in diabetic nephropathy.
7. Improves lipid abnormalities by decreasing triglycerides (TG) and increasing high density lipoprotein (HDL) levels.

With additional research, a LPD that is plant based and supplemented with KAs will likely prove to be a best practice in the nutritional management of CKD patients.

Outcomes of a SVLPD - Putting it All Together

Research indicates the most effective treatment strategy for CKD patients is a SVLPD. Of the four SVLPD studies reviewed, the dietary protein intake ranged from 0.3 g/kg BW to 0.7 g/kg. Each group was treated with Ketosteril which is a supplement containing Ketoanalogues (Nitrogen free EAA) and EAAs. Calorie ranges were 30-35 kcal/kg BW (30-34). These results are summarized below.

Population Size (n)

Prakash et al: 34 renal patients randomly assigned to two groups by study coordinator. Group 1 (n=16): 0.6 g/kg/d protein plus placebo. Group 2 (n=18): 0.3 g/kg/d protein plus Ketosteril.
Eyre et al: 122 renal patients were recruited from the dialysis registry of one clinic. SVLDP group (n=61): 0.6g/kg/d, Control Group (n=61).
Barsotti 1990: 13 nephrotic patients on unrestricted protein diets were given 0.7 g/kg/d protein with keto/amino acid supplementation.
Barsotti 1991: 20 nephrotic patients recruited from Outpatient Renal Service to follow 0.7g/kg/d protein diet with keto/amino acid supplementation.

Glomelular Filtration Rate (GFR)

Two of the four studies had GFR as an outcome measure. In both of these studies significant decline was seen in the control/placebo groups that were not treated with the SVLPD. Those on the SVLPD maintained GFR rates over time. The following is a summary of GFR (mL/min/1.73m^2) levels from two of the studies:

Prakash et al:
Placebo: pre-trial 28.6 (+/- 17.6)
post-trial 22.5 (+/- 15.9)
(p=0.015)
Ketodiet: pre-trial 28.1 (+/- 8.8)
post-trial 27.6 (+/- 10.1)
(p=0.716)

Eyre et al:
Control Group: 15.7 (initiation), 14.1 (6m predialysis), 7.4 (3m predialysis), 6.7 (1m predialysis), 4.1 (dialysis)

SVLPD Group: 9.9 (initiation), 9.2 (6m predialysis), 5.8 (3m predialysis), 6 (1 months (m) predialysis), 4.7 (dialysis)

Serum Creatinine (Cr)

One of the four studies compared serum Cr levels between the two nutritional interventions. The placebo group showed significant increase in serum Cr while the ketodiet group showed no significant increase. Barsotti et al changed patients from a low sodium diet (LSD) to a SVLPD with no significant increase in serum Cr. The serum Cr (mg/dL) changes are as follows:

Prakash et al:
Placebo: pre-trial 2.37 (+/- 0.9)
post-trial 3.52 (+/- 2.9) (p=0.066)
Ketodiet: pre-trial 2.26 (+/- 1.03)
post-trial 2.07 (+/- 0.8) (p=0.90)

Barsotti, 1991 et al: LSD: 0.8 (+/- 0.2)
SVLPD 0.8 (+/- 0.2)
(p=not significant)

Proteinuria

Urinary protein excretion was evaluated in the two studies by Barsotti and colleagues. Both revealed significantly less protein excretion in the SVLPD groups. The difference in urinary protein excretions are as follows:

Barsotti, 1990 et al: Unrestricted protein diet: 8.7 (+/- 2.6) g/day
SVLPD: 5.6 (+/- 2.4) g/day (p<0.01)
Barsotti, 1991 et al: LSD: 7.6 (+/- 2.3) g/day
SVLPD: 5.5 (+/- 1.9) g/day (p<0.01)

Dialysis Delay

An additional outcome of dialysis delay was investigated in a separate study. Results of a retrospective study of 122 renal patients showed that dialysis can be delayed by as much as six months with a SVLPD (34). Additional research in elderly renal patients showed that for those who were willing to follow a SVLPD, dialysis was delayed for up to one year (35).

Markers of Nutritional Status in CKD

Anthropometric Measures

When observing the effect of a SVLPD on nutrition status, assessment tools include body mass index (BMI), mid-arm muscle circumference (MAMC), and triceps skinfold (TSF). Barsotti and colleagues conducted two studies with CKD patients placed on a vegan diet with 0.7 g/kg body weight of protein plus ketoacid supplementation and 30 kcal/kg. (32,33). Prakash and colleagues conducted a study where patients were placed on 0.6 g/kg protein or 0.3 g/kg vegetable protein supplemented with ketoacids; both at 30-35 kcal/kg (30). Results of each of these studies showed no adverse effects of protein restriction on anthropometric measures. Figure 3 depicts the anthropometric measures seen with the different diet therapies. Control diets and SVLPD had no differential impact on anthropometrics or nutritional status.

Serum Albumin (ALB)

A criticism of SVLPD is limiting the protein intake of CKD patients may increase the risk of hypoalbuminemia, especially in combination with proteinuria. The results of these trials show no significant declines in serum ALB. In the two studies by Barsotti and colleagues, ALB levels increased from 2.6 to 2.9 g/dl. Prakash and colleagues showed serum ALB levels in the placebo group to

be lower (3.84 g/dl +/- 0.36) versus the ketodiet group (3.98 g/dl +/- 0.59) (30,32,33). Although the difference is not statistically significant, these studies still support SVLPD as maintaining adequate protein nutriture in CKD.

Metabolic Acidosis and Malnutrition

Metabolic acidosis leads to malnutrition in CKD patients. The pH of blood is tightly controlled in the range of 7.35-7.45. Uremic acidosis is typically present in CKD, and is associated with increased protein catabolism and negative nitrogen balance (36). In the healthy population, acidity is affected mainly by medications and diet. Studies have confirmed that the urine of omnivores is significantly more acidic than that of vegans. High animal protein diets are associated with increased urinary saturation with uric acid. When on an acidic diet, patients with CKD sustain an increase in blood urea nitrogen (BUN) reflecting not only a high protein intake but also increased catabolism of endogenous protein (37,38).

In a study of 70 patients with advanced CKD (GFR<15 mL/min/1.73m^2) subjects were either treated with a LPD of 0.6 g/kg body weight of protein or a SVLPD of 0.3 g/kg body weight supplemented with EAAs and KAs. Fifty-two healthy matched controls were given a regular diet. Subjective Global Assessment (SGA) was used to measure nutritional status. The results revealed no evidence of severe malnutrition and abnormal parameters were rare in the patients treated with the SVLPD. On the other hand, SGA abnormalities were seen in patients with lower serum bicarbonate levels and higher serum urea levels reflective of higher protein intake (37).

Compliance

In a literature review from 2003-2008, studies indicate that compliant patients benefited from LPD in various ways including decreased proteinuria and improved serum albumin and bicarbonate levels (23). Compliance and adherence to a SVLPD in CKD is an obvious prerequisite for efficacy. Documented compliance to diets with decreased protein was 42% and 51% of patients enrolled (39). Vegan nutrition has been shown to be comparable in acceptability and adherence in type 2 diabetics and premenopausal women (40,41). Two successive studies demonstrate 67.5% and 70% compliance with a SVLPD (34).

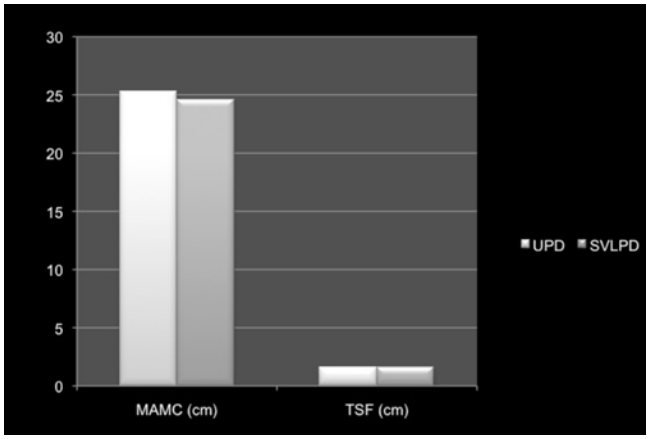
Additionally, there is evidence that society is at a place of openness toward vegan diets or at the very least limiting animal protein consumption. The acceptability of the health benefits of veganism is seen by the number of professional and lay journals that deal with the topic. It has also been frequently presented on the front page of international magazines such as Newsweek and Time (42). Studies have shown that acceptability of vegan diets compares with other medically recommended diet changes (39).

Cost of Prevention

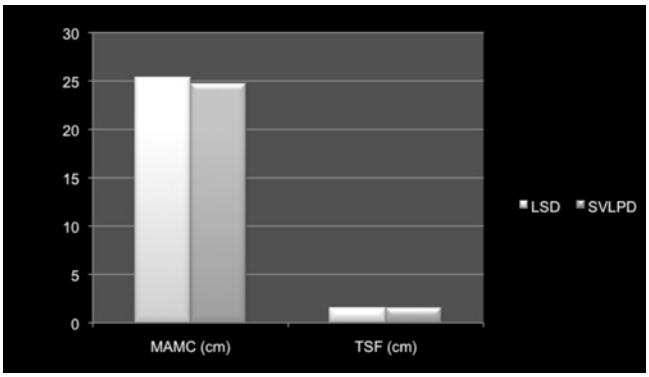
Employment of renal dietitians and financial coverage of KA therapy may be an argument against such nutritional interventions for CKD. That being said, a chronic disease that involves the use of a machine to extend life, sometimes by decades is a costly one. Section 2991 of the

Figure 3: Nutrition Interventions and Anthropometry (30,32,33)

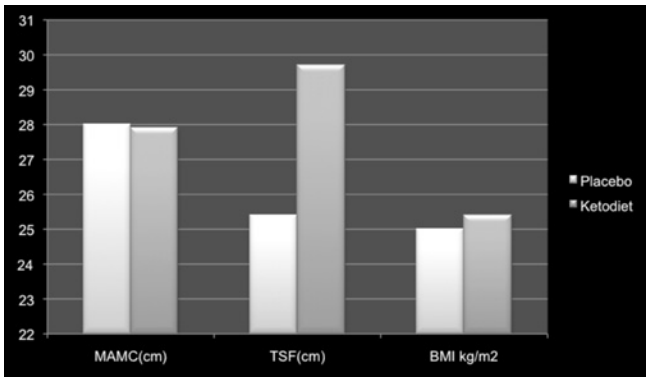
Barsotti 1990 (32)



Barsotti 1991 (33)



Prakash 2004 (30)



BMI: Body Mass Index; LSD: Low Sodium Diet; MAMC: Mid-Arm Muscle Circumference; SVLPD: Supplemented Vegan Low Protein Diet; TSF: Triceps Skinfold; UPD: Usual Protein Diet

Social Security Amendment of 1972 entitled patients with ESRD to receive dialysis or transplantation if they qualified for Medicare. The first Medicare hearing after this entitlement held in 1975 found the cost of the program was much higher than had been predicted. The enormous expense of the program has become problematic (40). The costs associated with renal replacement therapy include but are not limited to medical staff, numerous home and in-center medications, supplies for treatment, and frequent hospitalizations. The first month a patient initiates dialysis costs $15,000 for Medicare patients and $32,000 for those with private health insurance. Considering 99,886 patients initiated hemodialysis and 6,376 initiated peritoneal dialysis in 2007, the first month costs reach over one billion dollars. This does not include any hospitalizations or loss of work force (1).

When viewed on a per patient per year basis, Medicare costs alone rose to $70,581 reaching a total of $24 billion (1,43). As stated above, research has shown a delay in the need for dialysis in patients following a SVLPD for 6 months to a year (35). When viewed from a Medicare spending standpoint, this delay could save around $85,581 per patient considering initiation and yearly costs.

Ketosteril, however is not made in the US and is expensive. Fresenius Kabi, a German company, makes the supplement and the cost of 100 tablets is approximately $2,605.72 (44).

Conclusion

Transitioning from curative medicine toward prevention for CKD is imperative. A SVLPD monitored by a renal dietitian achieves the goal of providing effective treatment for CKD patients. It reduces the accumulation of waste products, lessens kidney strain, and prevents malnutrition. Nutritional care for CKD stages 1-4 is suboptimal at best in the US. While diabetics and ESRD patients are instructed and monitored, a gap in care for CKD patients exists. This is evidenced by the lack of multidisciplinary CKD clinics in our nation and few nephrologists who employ dietitians. Only 3.6% of patients have worked with a renal dietitian for one year prior to dialysis and 90% received no dietary counseling at all prior to dialysis (1). A SVLPD administered by a renal dietitian is a best practice for nutritional intervention in CKD. Establishment of SVLPD treatment plan guidelines needs to occur, along with increased training of renal dietitians on implementation to ensure the vegan diet is comprised of whole foods as opposed to low protein, vegan foods that have little nutritional value. CKD patients should see a multidisciplinary team that includes a renal dietitian on a consistent basis since routine follow up improves adherence (45,46). Current research regarding ketoanalogue therapy should be scrutinized more closely by nephrologists and primary care physicians who see CKD patients for possible integration into their practices. Additional research is required to quantify the degree of efficacy of a SVLPD, thus justifying the costs. Lobbying should be done for funding to treat CKD much in the same way it was done in 1972 for ESRD. Cost savings, and life savings, either through extension of survival or the quality of life justifies continued investigation. Any therapy that delays or prevents dialysis, such as SVLPD should be aggressively pursued.

References:

1. US Renal Data System, *USRDS 2009 Annual Data Report: Atlas of Chronic Kidney Disease and End Stage Renal Disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2009.
2. National Kidney Foundation. *K/DOQI Clinical Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification, and Stratification*. New York, NY: 2002.
3. Segasothy M, Bennett WM. Vegetarian diet: relevance in renal disease. *Nephrol*. 1997; 3:397-405.
4. Heart Advisor. *ARBs vs. ACE inhibitors: which is better for hypertension? ACE inhibitors are generally preferable, but ARBS offer an effective alternative for patients suffering side effects.* Available at: http://www.allbusiness.com/pharmaceuticals-biotechnology/pharmaceutical/13191699-1.html. Accessed on September 1, 2010.
5. Heart Failure. *Do Ace Inhibitors and ARBs mix well? Analysis urges caution.* Available at: http://www.theheart.org/article/817489.do. Accessed August 30, 2010.
6. Struthers AD, Anderson G, MacFadyen RJ, Fraser C, Macdonald TM. Nonadherence with ACE inhibitors is common and can be detected in clinical practice by routine serum ACE activity. *CHF*. 2001; 7:43-50.
7. Factors associated with insulin-injection non-compliance. *Diab Care*. 2010;33:240-245, 450-452.
8. American Dietetic Association and Dietitians of Canada. Position of the American Dietetic Association and Dietitians of Canada: Vegetarian Diets. *Can J Diet Pract Res*. 2003;64(2): 62-81.
9. Ornish D, Brown SE, Scherwitz LW, et al. Can lifestyle changes reverse coronary heart disease? The Lifestyle Heart Trial. *Lancet*. 1990; 336(8708): 129-33.
10. Mitch WE. Risk of developing ESRD in patients with diabetic nephropathy-lessons from the USA. *Am J Nephrol*. 2005;25(1):1-28.
11. Barnard ND, Cohen J, Jenkins DJ, et al. A low-fat vegan diet improves glycemic control and cardiovascular risk factors in a randomized clinical trial in individuals with type 2 diabetes. *Diabetes Care*. 2006; 29(8): 1777-1783.
12. Jenkins DJ, Kendall CW, Marchie A, et al. Type 2 diabetes and the vegetarian diet. *Am J Clin Nutr*. 2003; 78: 610S-6S.
13. Nicholson AS, Sklar M, Barnard ND, Gore S, Sullivan R, Browning S. Toward improved management of NIDDM: a randomized, controlled, pilot intervention using a low fat, vegetarian diet. *Prev Med.* 1999; 29: 87-91.
14. Hung CJ, Huang P, Li Y, Lu S, Ho L, Chou H. Taiwanese vegetarians have higher insulin sensitivity than omnivores. *Br J Nut*. 2006; 95(1): 129-135.

15. Kuo C, Lai N, Ho L, Lin C. Insulin sensitivity in Chinese ovo-lactovegetarians compared with omnivores. *Eur J Clin Nutr.* 2004; 58: 312-16.
16. Valachovicova M, Krajcovicova-Kudlackova M, Blazicek P, Babinska K. No evidence of insulin resistance in normal weight vegetarians-A case control study. *Euro J Nutr.* 2006;45(1):52-54.
17. Rouse IL, Armstrong BK, Beilin LJ. Blood pressure lowering effect of a vegetarian diet: controlled trial in normotensive subjects. *The Lancet*. 1983; 8: 5-9.
18. Lindahl O, Lindwall L, Spangberg A, Stenram A, Ockerman PA. A vegan regimen with reduced medication in the treatment of hypertension. *Br J of Nutr*. 1984; 52(1): 11-20.
19. D'Amico G, Gentile MG, Manna G, et al. Effect of vegetarian soy diet on hyperlipidaemia in nephritic syndrome. *Lancet*. 1992; 339(8802):1131-34.
20. National Kidney Foundation. *NKF K/DOQI Guidelines 2000.* New York, NY: 2000.
21. Ornish D, Scherwitz LW, Billings JH, et al. Intensive lifestyle changes for reversal of coronary heart disease. *JAMA*. 1998; 280(23):2001-07.
22. Azadbakht L, Esmaillzadeh A. Soy-Protein consumption and kidney related biomarkers among type 2 diabetics: a crossover, randomized clinical trial. *J Ren Nutr.* 2009; 19(6): 479-486.
23. Aparicio M. Protein intake and chronic kidney disease: literature review, 2003 to 2008. *J Ren Nutr.* 2009; 19: S5-S8.
24. Teixeira SR, Tappenden KA, Carson LA, et al. Isolated soy protein consumption reduces urinary albumin excretion and improves serum lipid profile in men with type 2 diabetes mellitus and nephropathy. *J Nutr.* 2004:134; 1874-1880.
25. Cupisti A. Effect of dietary factors on proteinuria and endothelial dysfunction in renal patients. *J Ren Nutr.* 2009; 19(5S): S9-S12.
26. Chaveau P. Nutritional intervention in chronic kidney disease. *J Ren Nutr.* 2009; 19(5S):S1-S2.
27. Kopple JD. Nutrition, Diet, and the Kidney. In: Shils ME, Shike M, Ross AC, Caballero B, Cousins RJ, eds. *Modern Nutrition in Health and Disease*. Baltimore, MD: Lippincott Williams & Wilkins; 2006: 1475-1511.
28. Mitch WE. Diet therapy in uremia: The impact on nutrition and progressive renal failure. *Kidney Int.* 2000; 57(75): S38-S43.
29. Levey AS, Greene T, Beck GJ, et al. Dietary protein restriction and the progression of chronic renal disease: what have all of the results of the MDRD study shown? *J Am Soc Nephrol.* 1999; 10: 2426-2439.
30. Prakash S, Prande DP, Sharma S, Sharma D, Bal CS, Kulkarni H. Randomized, double-blind, placebo controlled trial to evaluate efficacy of ketodiet in predialytic chronic renal failure. *J Ren Nutr.* 2004; 14(2): 89-96.
31. Garneata L. Pharmaco-economic evaluation of keto acid/amino acid-supplemented protein-restricted diets. *J Ren Nutr.* 2009;19(5S): S19-S20.
32. Barsotti G, Cupisti A, Morelli E, Ciardella F, Giovannetti S. Vegan supplemented diet in nephrotic syndrome. *Neph Dial and Trans.* 1990; 1: 75-77.
33. Barsotti G, Morelli E, Cupisti A, Bertoncini P, Giovannetti S. A Special, Supplemented 'Vegan' Diet for Nephrotic Patients. *Am J Nephrol.* 1991;11(5): 380-385.
34. Eyre S, Attman P, Haraldsson B. Positive effects of protein restriction in patients with chronic kidney disease. *J Ren Nutr.* 2008; 18(3) 269-280.
35. Brunori G, Viola BF, Maiorca P, Cancarini G. How to manage elderly patients with chronic renal failure: conservative management versus dialysis. *Blood Purif.* 2008;26:36-40.
36. Ahmad S. Nutritional Issues. In: Knowles M. *Manual of Clinical Dialysis.* London, UK: Science Press; 1999:99-109.
37. Cupisti A, D' Alessandro C, Morelli E, et al. Nutritional status and dietary manipulation in predialysis chronic renal failure patients. *J Ren Nutr.* 2004;14(3): 127-133.
38. Ausman LM, Oliver LM, Goldin BR, Woods MN, Gorbach SL, Dwyer JT. Estimated net acid excretion inversely correlates with urine pH in vegans, lacto-ovo vegetarians, and omnivores. *J Ren Nutr.* 2008;18(5): 456-465.
39. Aparicio M, Chauveau P, Combe C. Low protein diets and outcome of renal patients. *J Nephrol.* 2001;14(6):433-439.
40. Barnard ND, Scialli AR, Turner-McGrievy G, Lanou AJ. Acceptability of a low-fat vegan diet compares favorable to a step II diet in a randomized controlled trial. *J Cardiopulm Rehabil.* 2004; 24(4): 229-235.
41. Barnard N, Scialli AR, Bertron P, Hurlock D, Edmonds K. Acceptability of a therapeutic low-fat, vegan diet in premenopausal women. J *Nut Edu.* 2000;32(6): 314-319.
42. Leitzmann C. Vegetarian diets: what are the advantages? *Diet Div and Health Prom.* 2005; 57: 147-156.
43. Lockridge R. The direction of end stage renal disease reimbursement in the United States. *Semin Dial.* 2004; 17(2): 125-30.
44. Pharma Professional Services. Available at: http://www.druginfosys.com/AlterBrandResult.aspx?code=2595&packing=4286. Accessed on July 12, 2010.
45. Renal Business Today. The Importance of CKD Clinics. Available at: http://www.renalbusiness.com/articles/2007/11/the-importance-of-ckd-clinics.aspx. Accessed on July 19, 2010.
46. Lenz O, Mekala DP, Patel DV, Fornoni A, Metz D, Roth D. Barriers to successful care for chronic kidney disease. *BMC Nephrol.* 2005;6:11.

Nutritional Assessment of an Adult Receiving Dialysis

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This article has been approved for 2.0 CPE units. The online CPEU quiz and certificate of completion can be accessed in the Members Only section of the RPG web site via the My CPEU link. This CPE offering is available to current RPG members only and the expiration date is October 31, 2012.

Introduction

Approximately one in nine (20 million) Americans have Chronic Kidney Disease (CKD) and many more are at risk mainly due to the increase in obesity and diabetes. There are approximately 450,000 Americans with Stage 5 CKD (formally known as End Stage Renal Disease or ESRD) requiring dialysis or transplant (1). This represents a significant healthcare issue due to the impact dialysis treatment has on the individual patient, clinical healthcare provision (adequate and comprehensive care), and the financial implication for the healthcare delivery system. Medicare spends about $20 billion annually for the care of patients with CKD and an estimated $16.3 billion annually for providing dialysis (2). Careful management of CKD improves the quality of life for the individual and potentially saves resources by preventing inpatient hospitalizations and slowing the progression of co-morbidities. Nutrition plays a key role in the management of Stage 5 CKD beginning with a thorough nutritional assessment, education, and plan. This paper will discuss the importance of a nutrition assessment and what should be included in the assessment, specifically the anthropometric, biochemical, clinical and dietary components of those patients either receiving hemodialysis or peritoneal dialysis.

Practical Steps to the Nutrition Assessment

When one is evaluating the nutritional status of a patient receiving dialysis, certain steps should be taken to assure a complete assessment (3,4). It is essential to review the medical history, anthropometrics, diet patterns, and lab values. A review of the medical history reveals any concurrent diseases, potential nutrient/drug interactions, recent hospitalization or weight changes. Anthropometric or physical assessment includes a measured height, frame size, current weight, subjective global assessment, arm anthropometrics (triceps skin fold and mid-arm muscle circumference) and the physical appearance of the patient. A diet history should be taken that includes usual intake, any recent changes in appetite or intake, food allergies or intolerances, pica, avoidance of any foods due to religious or cultural beliefs, any previous diet instruction, and use of herbal or nutritional supplements. When assessing the current intake, total calories (kcal), carbohydrate, protein, fat, sodium, potassium, calcium, phosphorus, fluid, vitamins and mineral intake should be evaluated. For the peritoneal patient, calories and carbohydrate from dialysate also need to be factored in. Understanding the living situation, family support, and activity level are key factors as well. Reviewing the laboratory results will highlight specific areas of concern including nutritional status, uremia, bone health, electrolytes, iron status, vitamin and mineral status, hydration and glycemic control if the patient has diabetes. Following the collection of information, an individualized diet prescription and pattern needs to be developed being as liberal as possible to ensure adequate intake of kcals, protein (60% high biological value), sodium, potassium, phosphorus and fluids. Diet instruction also needs to be given including written materials based on the patient's education level and reading level to promote understanding and comprehension. Finally, follow up should be completed within one to three months to assess the understanding and adherence to the diet as well as a nutritional assessment on a regular basis (3,4).

Anthropometric Assessment

The anthropometric assessment is very important to the dialysis patient to assess weight, wounds, dentition, amputation and nutritional status. The National Kidney Foundation (NKF) Kidney Disease Outcomes Quality Initiative (K/DOQI) recommends obtaining the following information on a regular basis: dry weight, percent of usual body weight (% UBW), percent of standard body weight (% SBW), height, skeletal frame size, body mass index (BMI), skinfold thickness, mid-arm muscle area circumference (MAMC) or diameter and the presence of any amputations. Body weight can be somewhat difficult to determine due to the accumulation of fluid commonly seen in dialysis patients (5). Standard body weight (SBW) is also used to determine malnutrition among dialysis patients. SBW is the median body weight of normal Americans of the same height, gender, skeletal frame size and age range determined from the National Health and Nutrition Examination Survey II (NHANES II) data (3).

Dry weight, the weight after treatment of those receiving hemodialysis or the weight when the peritoneum is empty in those receiving peritoneal dialysis, should be recorded and monitored frequently. Determining dry weight is difficult due to a variety of factors such as hypoalbuminemia, congestive heart failure, reduced plasma osmolality, hypoxemia, ischemia, septicemia, and fever or anti-hypertensive medications. In these situations, the patient will appear fluid overloaded but the ultrafiltration goal will be too aggressive, possibly causing the patient to experience unpleasant symptoms of hypotension, cramps or dizziness. Dry weight cannot be assessed by one single parameter but by looking at a variety of parameters such as blood pressure, presence of edema, treatment history, and serum albumin along with other non-clinical factors (6).

A patient's % UBW will allow the dietitian to determine if there has been any recent weight changes, if weight is stable, or any change in nutritional status. The % UBW is determined by

dividing actual body weight by the patient's usual body weight and multiplying by 100 (5). A patient's % SBW is also used to assess nutritional status and is found by dividing actual body weight by SBW, then multiplying by 100. Determining the patient's height is essential for the nutritional assessment. If the patient is unable to stand, recumbent height, or knee height can also be used to determine the patient's stature (3,5). Knee height is obtained by having the patient lie in the supine position with the knee and ankle at a 90 degree angle. A fixed blade of the knee height caliper is placed under the heel while the moveable shaft is parallel to the fibula, just behind the head of the fibula. Pressure is applied to the tissue to measure the distance between the heel and the top of the knee (3,7). To obtain the patient's height, the measurement of the knee height is plugged into a basic equation based on the patient's sex: Male height (cm) = 88.48 – (0.24 – age) + (2.02 x knee height) and female height (cm) = 64.19 – (0.04 – age) + (1.83 x knee height). The knee height measurement should be taken twice and agree within 5 mm (3). Another equation adapted by Chumlea, Guo and Steinbaugh can also be used. The knee height equations are broken down by race (black or white), gender and age. It is important to use the left leg when using these equations (7).

Knee Height Equation

Age*	Equation**
Black Females:	
> 60	S= 58.72 + (1.96 KH)
19-60	S= 68.10 + (1.86 KH) – (0.06A)
6-18	S= 46.59 + (2.02 KH)
White Females:	
> 60	S= 75.00 + (1.91 KH) – (0.17A)
19-60	S= 70.25 + (1.87 KH) – (0.06A)
6-18	S= 43.21 + (2.14 KH)
Black Males:	
> 60	S= 95.79 + (1.37 KH)
19-60	S= 73.42 + (1.79 KH)
6-18	S= 39.60 + (2.18 KH)
White Males:	
>60	S= 59.01 + (2.08 KH)
19-60	S= 71.85 + (1.88 KH)
6-18	S= 40.54 + (2.22 KH)

*Age in years rounded to the nearest year
**S= stature, KH= knee height, A= age in years

Another anthropometric measurement used in the nutritional assessment of the dialysis patient is frame size. Frame size is used with the height and weight tables and can be determined either by wrist circumference or elbow breadth. However, some researchers do not believe that frame measurements improve the ability to differentiate between body fat from body weight and do not recommend their use (7). Wrist circumference can be found by measuring the circumference of the right wrist just above the wrist bone. If the right wrist is swollen the left wrist can be used but it is important to note it. Once the measurement is taken in centimeters, it is divided by the patient's height (in centimeters). That result is then compared with the conversion tables (3). Wrist circumference can also be found using a quick method. The patient is asked to "…encircle their nondominant wrist with the thumb and index finger of their dominant hand at the level of the radius and ulnar styloid process" (2,4). The patient is considered small frame if the thumb and index finger overlap, medium frame is the thumb and index finger touch and large frame if the thumb and index finger do not touch (3,5). Elbow breadth is measured by having the patient stand, facing the assessor with their feet together. The right arm should be extended in front of the body at a 90 degree angle with the inside of the arm facing the patient's body. Either the thumb and index finger or calipers are placed against the two prominent bones on either side of the elbow. The distance is then measured to the nearest 0.1 cm. It is best to take this measurement at least two different times. Frame size is then determined using a chart from the Meropolitian Life Insurance Company with the patient's height and elbow breadth (7).

Determining Frame Size Using Elbow Breadth

Males:

Height*		Small Frame		Medium Frame		Large Frame	
in.	cm	in.	mm	in.	mm	in.	mm
61-62	155-158	< 2 ½	< 64	2 ½-2 ⅞	64-73	> 2 ⅞	> 73
63-66	159-168	< 2 ⅝	< 67	2 ⅝-2 ⅞	67-73	> 2 ⅞	>73
67-70	169-178	< 2 ¾	< 70	2 ¾-3	70-76	> 3	>76
71-74	179-188	2 ¾	< 70	2 ¾-3 ⅛	70-90	>3 ⅛	>79
> 75	>189	2 ⅞	< 73	2 ⅞-3 ¼	73-83	>3 ¼	>83

Females:

Height*		Small Frame		Medium Frame		Large Frame	
in.	cm	in.	mm	in.	mm	in.	mm
57-58	145-148	< 2 ¼	< 57	2 ¼-2 ½	57-64	> 2 ½	> 64
59-62	149-158	< 2 ¼	< 57	2 ¼-2 ½	57-64	> 2 ½	> 64
63-66	159-168	< 2 ⅜	< 60	2 ⅜-2 ⅝	60-67	> 2 ⅝	> 67
67-70	169-178	< 2 ⅜	< 60	2 ⅜-2 ⅝	60-67	> 2 ⅝	> 67
> 71	> 79	< 2 ½	< 64	2 ½-2 ¾	64-70	> 2 ¾	> 70

** height is measured without shoes.*

Body mass index (BMI) is an important calculation used to assess the dialysis patient. BMI is the weight in kilograms divided by the height in meters squared (8). Once the patient's dry weight has been established, the BMI can be calculated. BMI levels less than 19 and greater than 28 has been linked with higher morbidity and mortality (5).

Body composition is used in the nutritional assessment and is associated with patient survival. Mortality is found to be significantly higher in patients with muscle atrophy (8). Skinfold thickness is used to assess body fat and energy stores. When tracked over time, this measurement can detect early malnutrition. Skinfold thickness should be taken after dialysis at four sites: triceps, biceps, subscapula, and iliac crest (3,5). Muscle mass can be estimated by measuring the mid-arm circumference (MAC). This can be found by measuring the arm midway between the acromial and olecranon process, perpendicular to the long bone and where the triceps skinfold measurement (TSF) is taken (3,7). The mid-arm muscle circumference (MAMC) is calculated using the following formula involving the MAC and triceps skinfold: MAMC = MAC – (3.1416 x TSF/10) (8). Excess fluid can affect these measurements so it is recommended to take these measurements post treatment in hemodialysis (using non-access arm) and when the peritoneum is empty in those receiving peritoneal dialysis (5).

Another factor to consider when doing an anthropometric assessment is any amputation(s) the patient may have. Adjusting for the amputation is necessary for computing the patient's kcal and protein needs. According to the Guidelines for the Nutrition Care of Renal Patients, the following is used for amputation adjustments: (5)

Amputation adjustments

Body Segment:	Average Percentage (%) of Total Body Weight
Entire arm	5.0
Upper arm (to elbow)	2.7
Forearm	1.6
Hand	0.7
Entire leg	16.0
Thigh	10.1
Calf	4.4
Foot	1.5

Interdialytic weight gain (IDWG) is the weight gained between dialysis sessions. These gains should be kept to a minimum. Gains greater than 5% of estimated dry weight (EDW) are considered excessive, indicating the patient may be consuming too much fluid and can cause false laboratory results, hypertension, peripheral edema, ascites and pleural effusion (4). One study found that patients with IDWG greater than 3% of EDW had a higher incidence of myocardial infarction, coronary artery bypass graft (CABG) operations, coronary artery dilation and death (5). IDWGs less than 2% of EDW are considered low which can be reflective of inadequate intake of foods and fluids and can cause falsely elevated lab results due to dehydration (4).

Biochemical Assessment

There are several biochemical parameters that must be assessed when determining the nutritional status of a patient receiving dialysis. These lab results need to be monitored regularly with some more frequently than others. Some of the reference ranges are different for patients with CKD than that of people with healthy kidneys.

One laboratory parameter used by dietitians to assess the dialysis patient is serum creatinine. Serum creatinine is the nitrogenous waste product of muscle metabolism not associated with protein intake but reflective of muscle mass. In CKD, the higher the creatinine result, the greater degree of renal failure. This value usually reaches a stable state once dialysis is started (5). After the person has been receiving regular dialysis, the predialysis creatinine level is indicative of protein intake and skeletal muscle (9).

Serum albumin (Alb) is a very important laboratory value used to assess the dialysis patient. This important nutritional marker is an indicator of morbidity and mortality and emphasizes the need for nutrition management (4). It is a measure of both muscle and visceral protein and is considered to reflect both nutritional intake and inflammation (10). Alb is the most commonly used indicator of protein status, it is an independent predictor of total and cardiovascular mortality, is readily available in the clinic setting, and is recommended by K/DOQI (4,7,11). Mortality risk is strongly correlated with low Alb and, therefore, regular monitoring is recommended (9). Alb is a negative acute-phase reactant which is influenced by stress and inflammation including the dialysis treatment. High levels can indicate severe dehydration or a recent albumin infusion, while low levels can be due to fluid overload, liver or pancreatic disease, steatorrhea, nephrotic syndrome, protein-energy malnutrition, inflammatory gastrointestinal disease, infection, burns or surgery (3).

Another indicator of acute-phase response to inflammation is the C-reactive protein (CRP). Both synthesis and serum concentrations of this protein (in addition to others) are increased during inflammation thus designating them as acute-phase proteins (5). CRP levels are strongly associated with serum Alb levels in both hemodialysis and peritoneal dialysis patients and are a better indicator of cardiovascular mortality than albumin (10).

Normalized protein catabolic rate (nPCR) can be used to estimate protein intake and is determined from urea kinetics. During a steady state, protein intake is equal to or slightly greater than nPCR, although this result can be affected by lack of uniformity in post dialysis measures of BUN levels (9).

Renal osteodystrophy or mineral bone disease (MBD) is another challenging aspect for the multidisciplinary team, especially the dietitian. Abnormalities in bone and mineral metabolism are associated with increased mortality and morbidity (12). Calcification is the hardening of soft tissues. When found in the myocardium, cardiac valves and coronary arteries, it has been significantly linked to congestive heart failure, cardiac arrhythmias, ischemic heart disease and death. Calcification in the lungs can cause pulmonary hypertension, right ventricular hypertrophy, right side congestive heart failure, pulmonary fibrosis and impaired

pulmonary function. Vascular calcification can involve all arteries in the body. It can be so widespread, the arteries become stiff, causing difficulty during dialysis access surgeries along with the detection of both blood pressure and pulse (12). The laboratory values associated with renal osteodystrophy include parathyroid hormone (PTH), serum calcium, phosphorus and calcium phosphorus product. K/DOQI has recommended target levels to help negate problems associated with MBD. Most patients do not achieve the goal levels for all four target areas. The Dialysis Outcomes Practice Patterns Study (DOPPS) looked at laboratory data for approximately 2200 patients receiving hemodialysis in the United States and found 26.2% of patients were in range for PTH, 44.4% for phosphorus, 46.1% for calcium and 60.8% for calcium phosphorus product (12). These low numbers indicate the need for a coordinated and aggressive plan by all members of the treatment team. More recently, Kidney Disease: Improving Global Outcomes (KDIGO) has published evidence-based clinical practice guidelines for the "…prevention, diagnosis, evaluation, and treatment of metabolic bone disease in individuals with CKD" (13). KDIGO is an international initiative which has not been completely adopted by all practicing nephrologists in the United States.

PTH is secreted by the parathyroid gland and regulates calcium and phosphorus in the blood (bone physiology). This hormone is able to regulate calcium from the kidneys, GI tract and bones. Active vitamin D is needed to maintain calcium homeostasis by increasing calcium absorption from the gut. Vitamin D needs two hydroxyl groups added to become active. This activation occurs first in the liver and second in the kidney. In advanced CKD, the second addition of the hydroxyl groups does not occur which impairs absorption of calcium from the GI tract. When the parathyroid gland senses low calcium, PTH is triggered, releasing calcium from the bones and thus causing weak and brittle bones (5). K/DOQI's reference range for PTH is 150-300 pg/mL while KDIGO recommends between 2 and 9 times the normal limit (normal limit is 10-65 pg/mL) (3,13). K/DOQI recommends checking PTH levels every 3 months (5) while KDIGO recommends every 3 to 6 months (13).

An important mineral associated with renal osteodystrophy is calcium (Ca). Ca is the most abundant mineral in the body with 99% found in the bones and teeth and the remaining 1% located in the extracellular fluid, intracellular structures and cell membranes (5,7). It is needed for muscle contraction, nerve conduction, blood clotting, enzyme reactions, and as a hormone trigger. Serum Ca is bound to Alb and needs to be adjusted when Alb levels are low. The formula for adjusting Ca levels based on Alb is as follows:

Corrected Ca (mg/dL) = [(4- reported Alb) x (0.8)] + reported Ca

Alb = serum Alb level (g/dL), Ca = serum Ca level (mg/dL) (5).

Low Ca levels trigger PTH secretion which can lead to parathyroid gland hyperplasia and increase the rate of calcification. The Ca reference range for the dialysis patient is the same as those without kidney disease, 8.5-10.2 mg/dL (13).

Phosphorus control is an extremely challenging area for dietitians with approximately 44.4% of patients achieving laboratory values within the reference range in the United States. Phosphorus is mainly found bound to calcium which forms bone tissue and is also a component of fat, protein and cell membranes (5). It is also needed for energy production and storage. As renal function decreases, the body is unable to filter and excrete excess phosphorus in the urine. Accumulation of phosphorus in the blood stimulates the release of PTH which then releases calcium from the bones. Phosphorus binding medication (binders) is commonly prescribed, acting as a sponge to "soak up" dietary phosphorus, which is then excreted in the stool. These medications need to be taken with every meal and snack. Phosphorus clearance is poor in both hemodialysis and peritoneal dialysis. Approximately 800 mg of phosphorus is removed during a hemodialysis session and about 250-300 mg is removed during a peritoneal exchange. Because of the poor clearance, binders are extremely important. K/DOQI's reference range for serum phosphorus levels is 3.5-5.5 mg/dL and KDIGO recommends "towards normal" (3,13).

Potassium is the primary cation found within the cells of the body and must be assessed in the dialysis patient. Potassium is also located in extracellular tissues and involved with muscle activity, especially the heart. The kidneys are the main filter for this ion. When the kidneys are not functioning properly, potassium levels rise. Too much or too little potassium could weaken muscles and affect the heart (5). Normal potassium range for a dialysis patient is 3.5-5.0 mEq/L (7).

Another common condition among dialysis patients is anemia and there are several laboratory tests used to diagnosis this. Hemoglobin (Hgb) is one of the most important measures of anemia. Hgb is the oxygen carrying pigment of red blood cells. In someone with functioning kidneys, erythrocytes are produced in the bone marrow and released into circulation every 120 days. Erythropoietin, a hormone produced by the kidneys, triggers the production of red blood cells or erythrocytes (5). In CKD, erythropoietin is not produced therefore erythrocytes are not made. Due to the lack of erythrocytes, oxygen is not properly carried to all other cells in the body, thus resulting in anemia. Some symptoms of anemia are fatigue, shortness of breath, trouble sleeping and loss of appetite. With the development of synthetic recombinant human erythropoietin (EPO), anemia management among dialysis patients has greatly improved (5). Hgb results varies amongst dialysis patients for several reasons including comorbidities, intercurrent events and practice patterns. The amount of EPO needed to maintain Hgb within target ranges vary from patient to patient (14). The Hgb range for dialysis (10-12 g/dL) is different from the healthy public and does not vary between males and females (3).

Adequacy of dialysis is very important for the dialysis patient and correlates with morbidity and mortality. Urea kinetic modeling (UKM)

measures the adequacy of dialysis per a single session of dialysis. K/DOQI recommends UKM to be performed at least one time per month per patient. Urea reduction ratio (URR) is the simplest measure of urea clearance using pre-dialysis and post-dialysis blood urea nitrogen (BUN) results. The Centers for Medicare and Medicaid Services (CMS) recommends a URR > 65%. The formula for URR calculation is:

$$URR = \left[\frac{\text{Pre-BUN} - \text{Post-BUN}}{\text{Pre-Bun}} \right] \times 100$$

BUN is the measurement of nitrogenous waste products of protein. It can be either elevated or decreased for several reasons and can not be used exclusively to assess nutritional status or adequacy of dialysis (5). The reference range (60-80 mg/dL) is also increased for someone with CKD Stage 5 as long as they are anuric, well-dialyzed and eating adequate protein (3).

Kt/V is also used to determine the adequacy of dialysis. Kt/V is best described by K/DOQI as "the fractional clearance of urea as a function of its distribution volume" (5). K (clearance) is used to represent the dialyzer clearance measured in liters per minute (including any residual renal clearance unless the patient is anuric), t is the treatment time in minutes and V is the distribution of urea. The following formula is used to calculate single pool Kt/V:

$$Kt/V = -Ln[R - (0.008 \times t)] + [4 - (3.5 \times R)] \times (UF/wt)$$

Ln =the natural logarithm; R = ratio of postdialysis to predialysis BUN; t = time of dialysis in hours; UF =the amount of ultrafiltration in liters; wt = postdialysis weight in kilograms (5).

It is recommended to obtain a Kt/V monthly to ensure the patient is receiving the prescribed and most appropriate dose of dialysis for his or her condition, body size and residual renal function. Kt/V > 1.2 is recommended for the hemodialysis patient and if not achieved, adjustments in the dialysis prescription need to be made. Kt/V is also calculated in the peritoneal dialysis patient measuring urea clearance by dialysis and urine output and total creatinine clearance in liters per week which measures creatinine clearance removal related to the patient's body size. K/DOQI's Kt/V recommendation for peritoneal dialysis is based on modality and can range from 2.0 to 2.2 (5).

Medical History

The clinical assessment of the dialysis patient should include a review of the medical history (7). This will provide the dietitian with information regarding past and current nutritional status, recent changes and areas that should be addressed in the plan of care. The medical history will also provide information regarding comorbid conditions, medications, hospitalizations, current intake and any condition(s) that may affect intake, weight changes, psychosocial history, and information regarding the current physical exam (5,7). The medication list should provide information on prescription or over-the-counter medication as well as any vitamin, mineral or herbal supplements. Possible drug-nutrient interactions can then be determined. The psychosocial assessment is an important aspect when obtaining a patient's history. Information about education level, alcohol or substance abuse, support systems, and financial status can be found in this section (7). This information will provide guidance when developing a personalized nutrition plan of care and when choosing appropriate nutrition education materials.

Next, a physical exam should be conducted to look for signs and symptoms of malnutrition. Protein-energy wasting (PEW) is very common among dialysis patients and is associated with increased mortality (4). This is described as the decrease in body stores of protein and fat (8). One important tool used to assess the adult dialysis patient is the Subjective Global Assessment (SGA). The SGA has been recommended by K/DOQI since 2000 for assessing the nutritional status of a dialysis patient (14,15). The SGA is a useful, fast, easy and low-cost assessment tool effective in identifying malnutrition (14). It is based on a medical history and physical examination combined with the practitioner's evaluation to obtain a numerical score. The patient is then rated as normal or acceptable nutritional status, mild to moderately malnourished or severely malnourished (5,7,14,16,17). Medical history includes weight loss, dietary intake, functional capacity and gastrointestinal symptoms that have nutritional impact (5,16). The physical examination includes visually looking for loss of subcutaneous fat (below the eyes, biceps and triceps), muscle mass (temples, clavicle, shoulder, scapula, knee, quadriceps and calf), fluid status (view the sacrum in activity-restricted patients and ankles for mobile patients) and dental status (3,5,7,14,16).

There have been many modifications to the SGA used in practice in the dialysis setting. The most common variation is the Malnutrition-Inflammation Score (MIS) that is included within the SGA. These additional components rate BMI, serum albumin and serum iron binding capacity. These markers may indicate the risk of PEW due to inflammation. The MIS has been found to be comparable with serum C-reactive protein and serum interleukin-6 concentrations for anticipating hospitalizations and mortality (15).

Dietary Assessment

Poor appetite is commonly reported in the dialysis population and is associated with inadequate dietary intake, higher inflammatory markers, reduced quality of life, increased hospitalizations and a four-fold increase in the risk of death (18). A thorough dietary history should be taken from the patient or surrogate. This includes a review of usual food intake, meal patterns and factors that could affect intake (5,7). The dietitian should also consider the patient's ability to chew and swallow as well as changes in appetite and intake. Questions regarding food intolerance or allergies, preparation of meals, ability to obtain food, alterations in taste and any gastrointestinal issues should also be asked (7). K/DOQI recommends the use of dietary interviews and diaries

such as three or seven day food records, food frequency questionnaires or twenty four hour recalls, to obtain information regarding protein, energy and nutrient intake (4). Information obtained from these records should be used within the plan of care for that patient (5). Conducting a thorough dietary assessment at least every six months allows for early recognition and treatment of nutritional issues (11). This assessment also allows improved management of the intake of potassium, phosphorus, carbohydrates, sodium, calcium, vitamin or other trace elements and fluid intake by the dialysis patient.

There are several diet modifications that are necessary for the dialysis patient. Dietary protein needs are higher in people receiving peritoneal dialysis compared to those on hemodialysis due to increased protein losses across the peritoneal membrane. When peritonitis occurs, the protein needs increase by as much as ten-fold due to inflammation (5). Potassium and fluids are more restricted with the hemodialysis patient than with someone receiving peritoneal dialysis while there is no change in phosphorus restriction between the two modalities. Several studies have found that promoting self management affects the adherence to the diet modifications and fluid restrictions (17,19).

Conclusion

Due to complications and the significant financial impact CKD has on the Medicare system, the nutritional assessment is an extremely valuable tool used in the care of the dialysis patient. It allows the dietitian to identify patients at risk for malnutrition, provides the foundation for determining the appropriate nutrition intervention and monitoring the impact the intervention has made. It also allows the dietitian to develop an individualized plan of care for the patient and ultimately improves both the morbidity and mortality of the dialysis patient. Dietitians are extremely valuable members of the health care team and can greatly improve the lives of the patients they manage.

References

1. U.S. Renal Data System, USRDS 2007 Annual Data Report: Atlas of End-StageRenal Disease in the United States, National Institutes of Health, NationalInstitute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2007. Available at http://www.usrds.org/2007/view/11econ.asp. Accessed on April 10, 2011.
2. St Peter, WL. Introduction: chronic kidney disease: a burgeoning health epidemic. *J Manag Care Pharm.* 2007(Dec);13(9 Suppl D):S2-5.
3. McCann L. *Pocket Guide to Nutrition Assessment of the Patient with Chronic Kidney Disease*. 4th ed. New York, NY: National Kidney Foundation; 2009.
4. Bailey JL, Franch HA. Nutritional considerations in kidney disease: Core curriculum 2010. *Am J Kidney Dis.* 2010; 55(6): 1146-1161.
5. Byham-Gray L, Wiesen K. *A Clinical Guide to Nutrition Care in Kidney Disease.* American Dietetic Association; 2004.
6. San Miguel S. Haemodialysis dry weight assessment: A literature review. *Ren Soc Aust J.* 2010; 6:19-24.
7. Lee RD, Nieman DC. *Nutritional Assessment.* 5th ed. New York, NY: McGraw-Hill. 2010.
8. Carrero J, Chmielewski M, Axelsson J, et al. Muscle atrophy, inflammation and clinical outcome in incident and prevalent dialysis patients. *Clin Nutr.* 2008; 27(4):557-564.
9. Combe C, McCullough KP, Asano Y, Ginsberg N, Maroni BJ, Pifer TB. Kidney disease outcomes quality initiative (K/DOQI) and the dialysis outcomes and practice patterns study (DOPPS): Nutrition guidelines, indicators, and practices. *Am J Kidney Dis.* 2004;44:S39-S46.
10. de Mutsert R, Grootendorst DC, Indemans F, Boeschoten EW, Krediet RT, Dekker FW, for Netherlands Cooperative Study on the Adequacy of Dialysis-2 Study Group. Association between serum albumin and mortality in dialysis patients is partly explained by inflammation and not by malnutrition. *J Ren Nutr.* 2009;19(2):127-135.
11. Campbell KL, Ash S, Zabel R, McFarlane C, Juffs P, Bauer JD. Implementation of standardized nutrition guidelines by renal dietitians is associated with improved nutrition status. *J Ren Nutr.* 2009;19(2):136-144.
12. Carver M, Carder J, Hartwell L, Arjomand M. Management of mineral and bone disorders in patients on dialysis: A team approach to improving outcomes. *Nephrol Nurs J.* 2008;35(3):265-270.
13. Uhlig K, Berns JS, Kestenbaum B, et al. K/DOQI US commentary on the 2009 KDIGO clinical practice guideline for the diagnosis, evaluation, and treatment of CKD-mineral and bone disorder (CKD-MBD). *Am J Kidney Dis.* 2010;55(5):773-799.
14. Brooks D. Frequent Assessment of Longitudinal Laboratory Trends: A key to minimizing hemoglobin variability in patients on dialysis. *Nephrol Nurs J.* 2007;34(4):435-439.
15. de Mutsert R, Grootendorst DC, Boeschoten EW, et al. Netherlands Cooperative Study on the Adequacy of Dialysis-2 Study Group. Subjective global assessment of nutritional status is strongly associated with mortality in chronic dialysis patients. *Am J Clin Nutr.* 2009; 89(3):787-93.
16. Keith J. Bedside nutrition assessment past, present and future: A review of the subjective global assessment. *Nutr Clin Pract.* 2008; 23(4):410-416.
17. Su CY, Lu XH, Chen W, Wang T. Promoting self-management improves the health status of patients having peritoneal dialysis. *J Adv Nurs.* 2009;65(7):1381-1389.
18. Zabel R, Ash S, King N, Bauer J. The relationship between subjective appetite sensations, markers of inflammation and appetite in dialysis patients. *J Hum Nutr Diet.* 2009;22(2):343-350.
19. Yokoyama Y, Suzukamo Y, Hotta O, et al. Dialysis staff encouragement and fluid control adherence in patients on hemodialysis. *Nephrol Nurs J.* 2009;36(3):289-297.

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Member Spotlight

Iris McDuffie, MS, RD, LD
Recipient of an RPG educational stipend for the 2011 National Kidney Foundation Spring Clinical Meeting in Las Vegas, NV
Renal Dietitian
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Utilization of the Nutrition Care Process Model in Outpatient Dialysis Centers was one of the hot topics presented at the 2011 NKF Spring Conference in Las Vegas. Yes, it has been said what happens in Vegas stays in Vegas. However, based on the chatter generated from the poster presentation and the interest in the topic, I have to say that does not apply to this! It will go far beyond Vegas.

The Nutrition Care Process Model (NCP) provides a consistent structure in the delivery of care given by dietitians. This process validates nutrition care, increases the utilization and demand for service and will allow the predictability of patient outcomes. The purpose of this study was to determine the current documentation practices among Dietitians in Nephrology Centers of America-American Renal Associates (NCA-ARA) and whether the NCP process was being used. To determine the attitude, belief and knowledge of the NCP, a twenty question survey was emailed to approximately 80 of the NCA-ARA Dietitians. Nineteen surveys were returned. The survey of questions contained open ended questions using the hedonic scale. The survey results indicated that 16% of participants always/sometimes used Problem, Etiology and Sign/Symptoms (PES) diagnosis statements from the NCP model with 5% always using these statements. Fifty-eight percent rarely/never used diagnosis statements. Sixteen percent believed that it would definitely be beneficial to their facility, 68% were neutral, 11% believed that it would not be beneficial, and 5% were unsure. Eighty-nine percent were not opposed to their method of charting reflecting the language of the NCP (63% definitely yes and 26% neutral). In conclusion, few dietitians are consistently using the NCP as the method of documentation within the NCA/ARA dialysis centers. Therefore, the use of this model in an outpatient dialysis center would be vital to the dialysis patients needs for constant nutrition assessments and reassessment. Based on the knowledge gained, a template was developed denoting the Nutrition Diagnosis Statement (PES), Intervention, Monitoring and Evaluation would be documented. Given the findings from this study and the interest generated from the poster session, it is very clear that implementation of the NCP would be a vital for Outpatient Dialysis center to adopt. I am very interested in extending this study and would love to have the opportunity to develop webinars for facilities to use as part of the initial process to implement this model.

Thanks to ADA Renal Practice Group for the opportunity to share my passion with other Dietitians and Healthcare Professionals. For additional information regarding my poster presentation you may contact me via email or The National Kidney Foundation at nkfnews@kidney.org.

Why Use the Nutrition Care Process?

- **Helps streamline work**
- **Allows for more efficiency**
- **Aids in communication between other dietitians and healthcare professionals**
- **Allows for consistency between dialysis centers**

Member Spotlight – Perspective from Two RPG Fifty-Year Members

Rachel Stern, MS, RD
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Looking back….

Fifty years! It hasn't seemed that long. But considering all that has happened in this field, 50 years doesn't seem adequate to accommodate so many changes. During my internship (Massachusetts General Hospital) 50 years ago, I learned to make Borst Butter Soup; people were restricted to as little as 200 mg sodium, more often 400 mg. We used special milk – dialyzed to remove sodium. They knew how to dialyze milk at that time, but not how to dialyze patients. Protein restrictions were as low as 20 grams if needed. Issues like phosphorus, magnesium, vitamin D, calcium were not even on the horizon then, and there was no such thing as phosphate binders. Life for people with kidney disease has improved tremendously since then, thankfully. One thing that does remain: the weird gout diet ("no meat extracts") – has anyone looked at that with a critical eye?

I never worked exclusively with renal patients (hope you don't kick me out of the DPG), but in many jobs renal issues loomed large, and I often needed to call upon my knowledge of kidney function and disease, food composition, and counseling skills. For example, before retiring a few years ago, I worked about 15 years with HIV/AIDS and many people had kidney problems and were often on dialysis. I joined this DPG after I retired but when a family member developed kidney failure, to help keep me up-to-date.

Words of Wisdom

Some advice to newcomers: 1) never forget your basic sciences – chemistry, physiology, nutrition science - because applications will change all the time along with appearance of fads and quacks, and the basics will help you evaluate and adapt, something those who merely call themselves "nutritionists" can't do. 2) don't be in it for the money, because you'll be disappointed, but for the satisfaction of helping and problem-solving. 3) with the population aging and many now living with chronic diseases, incidence of kidney disease is bound to increase. Get ready!

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Who says time doesn't fly when you're having fun? And how the field of dietetics has changed over the years! What an amazing, challenging, educational journey. By just listening to patients and their families and how they face life's myriad of obstacles, I have learned more than possible from any text book. When thinking about some of my favorite memories, one in particular is always with a laugh. During our second week of internship, my roommate at the Medical College of Virginia tossed her red jeans in the washer with her 'whites', and had to wear light red uniforms for the next few weeks. I owe much gratitude and appreciation to the many co-workers, colleagues, friends and patients in the dietetics world, who have helped to enrich my life. *My best wishes to all!*

Congratulations to the 2011 Council on Renal Nutrition Award Winners!

This year's award recipients were presented with their awards at the National Kidney Foundation Spring Clinical Meeting in Las Vegas; April 26-29, 2011.

Recognized Renal Dietitian Award
Louise Clement, MS, RD, CSR, LD

Outstanding Service Award
Jean Stover, RD, LDN

Recognized Renal Dietitian – Region II
Nichole Haynes, MS, RD, CSR, LD

Recognized Renal Dietitian – Region III
Sarah Kruger, MS, RD

Recognized Renal Dietitian – Region IV
Jane Louis, RD, LD, CSR

Recognized Renal Dietitian – Region V
Nancee Vander Pluym, MS, RD

Member Spotlight

Patricia DiBenedetto Barba, MS, RD, CSR
Recipient of an RPG educational stipend for the 2011 National Kidney Foundation Spring Clinical Meeting in Las Vegas, NV
Renal Dietitian
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This article reports on the session entitled "RD Beware: Additives in the Food Supply" that was presented by Janeen León, MS, RD, LD and Lisa Gutekunst, MSEd, RD, CSR, CDN on April 29, 2011 at the National Kidney Foundation Spring Clinical Meeting in Las Vegas, NV.

Objectives of the Session

- Review available and new studies examining the phosphorus (PO4) content of popular foods
- Look at ways to reduce risk in the general and Chronic Kidney Disease (CKD) population
- Examine where we are headed to combat this problem
- Review role of PO4 in the body and nutritional needs
- Discuss the different phosphates found in food
- Look at evidence showing risk associated with high PO4 intake
- Review high-risk groups

PO4 is a necessary mineral to all humans:
Energy: Adenosine triphosphate (ATP)
RNA / DNA
Cell structure: Phospholipids
Bone structure: Calcium phosphate
Teeth: Apatite
Metabolism: Activation of B vitamins, hormones, enzymes
Binds with hemoglobin for oxygen delivery

For purposes of this review the writer will assume that the reader is already aware of the metabolic pathways intimately involved with PO4 metabolism, bone formation and tooth health. Also the enzymatic action in vitamin, hormone and enzyme function.

The average PO4 intake recommendation for patients with chronic kidney disease (CKD) is ideally between 800 – 1000 mg/day or 10-12 mg/gram of protein per day. Phosphate binder dosage is based on estimated PO4 intake. However, no binder is 100% effective. If we assume 80-90% efficiency then with an intake of 1000mg PO4 there is a remaining 100-200 mg PO4 that would be absorbed. The following table shows the approximate binding capacity of the phosphate binders presently available in the U.S.

BINDER CAPACITY

1gm Calcium Carbonate binds 39mg PO4
1gm Calcium Acetate binds 45mg PO4
Magnesium Carbonate: Unknown
5mL Aluminum Hydroxide binds 22.3mg PO4
800mg Sevelamer binds 64mg PO4
1gm Lanthanum Carbonate binds 137mg PO4

Source: K/DOQI Clinical Practice Guidelines for Bone Metabolism and Disease in Chronic Kidney Disease. Table 22.

Of particular importance to the patient and renal dietitian is the dietary source of PO4. Animal sources contain organic phosphates in intracellular compartments, which are easily hydrolyzed and readily absorbed. Plant sources, such as beans, peas, cereal, and nuts, contain PO4 that is mostly in the storage form of phytic acid or phytate. Humans do not have the degrading enzyme phytase so the bioavailabilty of PO4 from plant-derived food is relatively low, possibly <50%. Therefore, counseling our patients to avoid many excellent plant sources of protein for fear of over consumption in PO4 may not be well grounded.

So where do we get all the PO4 in the daily diet? A large amount comes from the food additives that our modern society uses in processed food in order to keep them stable and lengthen shelf life. These additives can also be found in fresh foods as they promote greater longevity and tenderness. From a historical perspective it is noteworthy how things have changed over the past 45 years in this country. In 1968 the recommended daily allowance (RDA) was 1000mg PO4 per day. In the latest dietary reference intakes (DRIs) PO4 the recommendations have changed to 1250mg for children and just 700mg for adults. This is not for patients with CKD, but for those with normal kidney function.

Learning to read a food label is a start for locating phosphate additives. We must learn to look on the ingredient list for the additives listed below and teach our patients to do the same.

PHOSPHATE ADDITIVES

- Dicalcium phosphate
- Hexametaphosphate
- Monocalcium Phosphate
- Phosphoric Acid
- Pyrophosphate
- Sodium Acid Pyrophosphate
- Sodium Phosphate
- Sodium Tripolyphosphate
- Tricalcium Phosphate

Another issue we as dietitians need to be concerned with is the phosphorus + potassium additives. There are 11 approved for meats in the U.S., the following is an example of some of these additives.

PHOSPHORUS + POTASSIUM ADDITIVES

- Dipotassium phosphate
- Dipotassium phosphate dibasic
- Dipotassium monohydrogen orthophosphate
- Potassium tripolyphosphate
- Tetrapotassium phosphate
- Tetrapotassium pyrophosphate

Without a doubt most fast foods contain additives. Foods with additives are typically higher in PO4 than matched non-additive products. Knowing the names of the additives is an adjunct to begin label reading, but to actually quantify the amount of PO4 in a food, beverage, or supplement product we need a public policy on what to put on a food label. Knowing there is extra PO4 in a food is good, but a long way from knowing the actual amount.

The International Society of Renal Nutrition and Metabolism (ISRNM) will meet next year in Honolulu, HI. Part of the agenda at this meeting will be to set a plan in place to address overall population risk for cardiovascular disease (CVD) due to alterations in PO4 intake. We also need to bring the message to cardiologists of this epidemic. It will also facilitate working with international RDs to examine worldwide trends in phosphate additive use. We can only make changes if the medical community understands that this is a global problem.

Who is affected the most by this issue? All patients with CKD and most significantly those CKD patients at the lower income levels. People at or below the poverty level may not be able to afford the local, non-additive food options and may eat more fast food. However, they may have lower PO4 intake due to eating less for economic reasons.

Hyperphosphatemia is a significant cause of CVD morbidity and mortality. Without labeling regulations it is difficult to determine which foods are high in PO4. We are a society on the move with multiple activities, often with family members going in different directions – it is safe to say that, in 2011, the family mealtime does not occur as often as it used to!

This of course leads to the need for extensive research on phosphate additives to determine what foods were more renal friendly than others. Much of this information is still not published, but Ms. León shared some of her findings with the audience.

There was extensive cooperation among a group of dietitians to contact local and national food chains to help develop a listing of food items found in grocery stores, fast food restaurants, snack manufacturers, and beverage companies. It will be of great help when this data is published and available to the professionals as well as the consumers.

J. León's unpublished findings show that an average fast food item may contain between 2-6 phosphate additives. Burger products, including cheese burgers, an item that renal dietitians usually try to discourage, have the least amount of PO4. Lisa Gutenkust and Janeen León compared the PO4 content of two fast food meals and showed the high amount of phosphate binders needed due to the phosphate additives present in the food. This fact shows us just how prolific these additives are and the potential harm facing the population.

Wouldn't it be a better world for our patients, their health and outcomes if they had this kind of information for most of the foods that they regularly consume? In an ideal setting it is easy to say, cook from scratch and don't add ingredient X, Y or Z, but this is not an ideal world!

We all have increasing patient loads, additional roles in the clinics (hence more paperwork), meetings and seemingly less time for our patients. So it now becomes imperative that we have a change in the labeling laws that will ensure full disclosure of food composition. A healthy choice could be made by all and the appropriate dosing of binders based on actual amounts of PO4 in the food eaten could affect the pill burden all of our patients are under. The presentation by these women was timely, concise and gives hope to all that we will have change in the future based on their efforts, the international society, and we in the grass roots.

I want to thank RPG for the stipend that helped make this trip possible and I hope this synopsis of the session will encourage more dietitians to go to these meetings. Listen, learn and find a way to pitch in and help with whatever is of interest to each individual.

Welcome!

to the new Assistant Editor for the Renal Nutrition Forum:

Jackie Abels, MA, RD, LD

Thank You…

Our Thanks to all of our clinical peer reviewer members who made this issue possible:

Desiree DeWaal, MS, RD, CD
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Visit RPG's web site: www.renalnutrition.org for CPEU offerings and valuable professional and patient resources

Web Site Extras

Did U Know? The Webinar Section Under Materials for Purchase tab: Offers a series of 4 webinars for purchase with approved CPEUs for each webinar. The topics covered include modules that provide an overview of topics found on the Certification Specialty Exam in Renal (CSR).

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www.renalnutrition.org/members_only/resources.php

Have you completed one of the Online Website Polls offered every quarter? If not please do…..we value your input! www.renalnutrition.org/

Member input & suggestions are a vital part of improving the member resources offered by RPG, such as the web site. Please submit your ideas and suggestions to Cathy M. Goeddeke-Merickel, Web Site Coordinator via cmgmerickel@gmail.com

"Reach high, for stars lie hidden in your soul. Dream deep, for every dream precedes the goal." ***-Pamela Vaull Starr***

ADA House of Delegates (HOD) Report

Pam Kent, MS, RD, CSR, LD
HOD RPG Delegate

A new and exciting opportunity for the Renal Practice Group (RPG) is the addition of an official RPG delegate to the HOD, representing and advocating for the needs and issues of RPG members. The spring 2011 HOD meeting focused on the dietetics professional market place relevance.

The "Market Place Relevance Regulatory and Competitive Environment of Dietetic Services" HOD backgrounder February 2011 report identified significant competitive threats which could impact dietetic professionals. The report detailed trends in the current and future competitive environment and assessed legal, regulatory and market impacts on the profession and can be found in the governance section at www.eatright.org.

Although it is difficult to define what the American health care delivery system will look like, it is important to prepare for future practice trends. Some of the trends are common to most health care professionals; others are more specific to dietetic and nutrition-related practice.

Competition will be greater for dietetics professionals in emerging and growth practice areas, where fewer regulations and increased or limited funding combine to attract a variety of competitors willing and able to provide services. Government regulations often operate as a benchmark by which private insurers and state insurance regulators set their respective policies for payment of nutrition services. Demographic changes are creating opportunities and threats for the dietetics practitioners. Preventive care and wellness programs will be focused on addressing the obesity epidemic, perhaps the most significant health care problem that is affecting every generation and demographic group.

In preparation for the spring 2011 HOD meeting, the RPG surveyed members regarding what will be needed for renal practitioners to establish and retain marketplace relevance in a continuously evolving and competitive environment. The discussion questions focused on trends that will impact our future work and professional environment from a societal perspective, economic and business perspective, legislative and regulatory perspective as well as a health and science perspective. Below is a summary of the responses that were submitted and forwarded to the HOD.

1. Trends from a societal perspective:
   Due to the obesity epidemic there will be a trend towards more patients with diabetes and renal disease for our profession to treat and manage. There will be an increased need for nutrition services across the continuum of kidney disease. Dietetic professionals also need to be trained in cultural diversity.

2. Trends from an economic and business perspective:
   There will be less financial support for our services with more patients to treat and less resources to spend on health care. Our talent pool will decline with the reduction of internships available to prepare the next generation of renal professionals.

3. Trends from a legislative/regulatory perspective:
   Centers for Medicare & Medicaid Services (CMS) bundling payment system for ESRD care has impacted the dietetics professional and has increased patient ratios, as well as patient management. There needs to be a streamlined approach to government legislated health care documentation processes. More professional time is spent with paperwork instead of attending to the patient in order to get paid for the services.

4. Trends from a health and scientific perspective:
   A major concern in the nephrology community is the addition of phosphorus additives in the food supply. Phosphorus is a progression promoter of chronic kidney disease (CKD) and is associated with mortality and morbidity in the renal population. The generally recognized as safe (GRAS) limits were set for phosphorus in the early 1990s. Many Americans are consuming greater than the upper limit of phosphorus additives. The GRAS limits for phosphorus intake need to be revisited.

As dietetics professionals, we need to understand the forces that impact our profession and why we will need to operate differently to maintain relevance. We will need to continue to demonstrate our value and remain proactive as we prepare for the changing health care landscape.

If you would like to submit a comment or question, please feel free to contact your HOD delegate at pamkentRD@yahoo.com.

MEMBER APPOINTMENT!

Jessie Pavlinac appointed to NQF Steering Committee for Renal Project

ADA past-president and RPG member, Jessie Pavlinac, MS, RD, CSR, LD will serve as a member of the National Quality Forum's Steering Committee for the Renal Endorsement Maintenance Project to assist in identifying, endorsing, and improving measures for renal conditions. To learn more visit the News and Events section at *www.eatright.org/quality.*

Calendar of Events

November 2011

American Society of Nephrology Kidney Week 2011
Pennsylvania Convention Center, Philadelphia, PA
November 8-13, 2011
www.asn-online.org/education_and_meetings/

2011 Organ Donation Congress
11th Congress of the International Society for Organ Donation and Procurement
Buenos Aires, Argentina
November 27-30, 2011
www.tts.org/

February 2012

Annual Dialysis Conference
San Antonio, TX
February 26-28, 2012
http://som.missouri.edu/Dialysis

CRRT 2012 Conference (Continuous Renal Replacement Therapies)
Hilton Bayfront; San Diego, CA
February 14-17, 2012
http://www.crrtonline.com/

2012 Canadian Society of Transplantation Annual Scientific Conference
Fairmont Château Frontenac Québec, Québec
February 23-25, 2012
http://www.cst-transplant.ca/AnnualConference.cfm

April 2012

2012 American Society Pediatric Nephrology Annual Meeting
Boston, MA
April 28-May 1, 2012
http://www.aspneph.com/

May 2012

National Kidney Foundation 2012 Spring Clinical Meetings
Gaylord National; Washington, DC
May 9-13, 2012
www.kidney.org/news/meetings/clinical/index.cfm

June 2012

American Transplant Congress 2012
Boston, MA
June 2-5, 2012
www.atcmeeting.org/2012/

1st World Renal Nutrition Week
International Society of Renal Nutrition and Metabolism (ISRNM)
Honolulu, HI
June 26-30, 2012
www.renalnutrition.com

July 2012

24th International Congress of the Transplantation Society
Berlin, Germany
July 15-19, 2012
http://transplantation2012.org/

October 2012

ADA Food & Nutrition Conference & Expo
Philadelphia, PA
October 6-8, 2012
www.eatright.org/fnce/

ASN Kidney Week 2012
San Diego Convention Center; San Diego, CA
October 30-Nov 4, 2012
www.asn-online.org

Renal Dietitians Chair Message

Rachael Majorowicz, RD, LD
RPG Chair

Hello, RPG! I would like to introduce myself as the current Chair for the Renal Dietitians Dietetic Practice Group (RPG). I am honored to be elected to serve such a talented and knowledgeable group. Our strong member numbers, even through the economic decline, speaks to the value of the services and resources provided by the RPG…and be assured that RPG's Executive Committee (EC) is constantly seeking ways to improve these! So, thank you for renewing your membership or if you are a first-time member, thank you for joining!

The mission of the RPG continues to be "leading the future of dietetics by promoting and supporting its members working in nephrology nutrition." To achieve this, the RPG EC has approved numerous projects and resources for the upcoming year, a few of which include:

- Each Renal Nutrition Forum (RNF) will continue to provide several free CEU's and high quality articles to keep you up-to-date
- An update of the popular Certification as a Specialist in Renal Nutrition (CSR) webinars, to be offered in 2012
- Additions to the RPG web site, which now hosts the previous CSR webinars, continuing education credits and online recording, and many more features
- RPG hosted a member breakfast at ADA's 2011 Food & Nutrition Conference & Expo (FNCE) in San Diego on Sunday, September 25th. The RPG EC enjoyed meeting many of you there for a relaxed, networking breakfast prior to the frenzy of the day's sessions
- RPG provided an exciting spotlight session at FNCE, "The Skinny on Bariatric Surgery: Illuminating the Evidence from Early Stage CKD through Transplant," offered on Monday, September 26th from 3:30-5:00 PM, presented by Judy Beto, PhD, RD, LD, FADA and Maria Collazo-Clavell, MD

Additionally, RPG remains committed to joint efforts with the Council on Renal Nutrition (CRN). Under this partnership, we anticipate the updated *A Clinical Guide to Nutrition Care in Kidney Diseases* next year, as well as other potential initiatives that are in progress.

I would also like to thank the outgoing 2010-2011 RPG committee members for their time, talents and efforts to serve the members of RPG:

- Patricia Williams, RD, LDN (Immediate Past Chair)
- Kathy Ricketts, MS, RD, LDN (Nominating Committee Chair)
- Sandra Oliviero, MS, RD, CSR, CD (Area Coordinator/ Lending Library)

Conversely, please welcome the following members new to the Executive Committee:

- Elizabeth Neumann, RD, LD (Nominating Committee)
- Betty Parry Smith, MS, RD (Nominating Committee)
- Pam Kent, MS, RD, CSR, LD (House of Delegates Liaison)

I am constantly impressed with the willingness of our members to volunteer their time to ensure the success of RPG and to further the profession. As a mother of two young children, I am acutely aware of how challenging this can be, yet also aware of how rewarding these opportunities are. If you have any interest in further involvement, contributing to projects, or simply want to offer suggestions, please don't hesitate to contact any member of the EC!

RPG Executive Committee met in Minneapolis, MN on May 13-15, 2011 for the annual Strategy Summit/Transitional Meeting.

Pictured left to right:
Cathy Goeddeke-Merickel, Sarah Kruger, Pam Kent, Megan Sliwa, Kathy Madigan, Sara Erickson, Susan DuPraw, Stacey Phillips, Jane Louis, Rachael Majorowicz

WANT TO GET INVOLVED?
Let us know!

Contact Membership Chair:
Cynthia Terrill, RD, CSR, CD
cindy.terrill@hsc.utah.edu

CRN Chairperson Message

Lisa Gutenkunst, MSEd, RD, CSR, CDN
NKF-CRN Chair

It has been an exciting spring, with many items accomplished and many more ideas and projects to come.

In April, I had the pleasure of meeting members of the RPG committee at the Joint CRN/RPG Breakfast held during the National Kidney Foundation (NKF) Clinical Meetings in Las Vegas, NV. During the breakfast, our groups discussed possible joint projects including the promotion of the Kidney Friendly Shelf at grocery stores and ways to prevent disparities in care for our dialysis population. I look forward to working with everyone to accomplish these goals.

In upcoming events, please mark your calendars for the 2012 NKF Clinical Meetings! They take place May 9-12, 2012 in Washington, DC. This is a great opportunity to immerse oneself in learning about advancements in renal nutrition, networking, and making life-long connections. Additionally, for those of you new to renal nutrition, the meetings offer a pre-conference day long seminar called Strategies 1 that focuses on al that you need to know about practicing in this field. For those of you with years of experience, we also offer a pre-conference seminar called Strategies 2 that focuses on one in-depth topic. This year, Strategies 2 examined malnutrition in the renal disease population and attendance was sold out.

Also, we have a very unique and exciting event happening in June, 2012. The International Society of Renal Metabolism and Nutrition will hold its bi-annual conference in Honolulu, HI on June 26-30, 2012. This is the first time in many years that this conference is taking place in the US. I will have more information about this conference in upcoming issues.

I hope everyone had a wonderful summer and I look forward to addressing you again in the fall!

AAKP seeks authors for aakpRENALIFE!

Articles/information needed ASAP:
• Kidney Friendly Eating on a Budget
• Tips on How to be Supermarket Savvy
• Recipes for CKD or ESRD Patients
Article Length: 750 – 1,000 words

For more information, please contact:
Jerome Bailey at jbailey@aakp.org

Congratulations to Registered Dietitians, MAY 2011 Board Certified Specialists in Renal Nutrition (CSR)

Arkansas
Laura Joseph

California
Lubna Akbany
Judith Boccanfuso
Masako Harada
Kathy Hixson
Carolyn Kinder
Iryanthi Kurniadi
Dale Lumsden
Sheryl Mailander
Kristan Pontillo
Adrienne Mary Rongavilla
Marty Torres

District of Columbia
Margaux Neveu

Florida
John Dodd
Constance Guzik

Iowa
Beth Nichols

Louisiana
Jennifer Zeringue

Missouri
Andrea Dothage
Gina Henry

New Jersey
Hedy Badolato
Andrea Cortellessa
Dolores Laratta

New York
Kathleen O'Neill
Linda Shearer
Sharon Sorgule
Gloria Van Houten

North Carolina
Solita Garcia
Ginger Hyde Codd

Ohio
Andrea Kman
Lois Ann Morris
Kristin Sheridan
Laura Smith

Oregon
Marcelle Fitterer
Jessie Pavlinac

Pennsylvania
Carol Bergen
Leslie Fleckenstein
Amy Gallagher
Cynthia Ledney

South Carolina
Susan Weakley

South Dakota
Janice Mitchell

Tennessee
Nichole Haynes
Cathi Martin
Ritalynn Solomon-Dimmitt

Texas
Helen Carr
Kamey Janak
Jane Louis
Lisa Margo
Mary Rockwell
Robin Russell
Johneta Turner

Virginia
Ann Allison
Sharon Brandi
Deborah Burt
Jennifer Craig
Kristina Greenberg

Washington
Kirsten Thompson

Wisconsin
Jennifer Blasiola
Laura Rech
Rachael Woznick

2011-2012 RPG Executive Committee

Mission: Renal dietitians practice group is leading the future of dietetics by promoting and supporting its members working in nephrology nutrition.
Vision: RPG members are a valued source of expertise in nephrology nutrition.

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sdupraw@eatright.org

For all inquiries please email:
helpU@renalnutrition.org

RNF Guidelines for Authors

Article length:
Article length is determined by the Editor for each specific issue. The feature article (including abstract) is approximately 3000 words (not including tables/graphs). Other articles are usually 1000-1500 words; member highlights and reports are approximately 400-500 words.

Text format:
Times New Roman font, 12 point, double space.

Tables/Illustrations:
Tables should be self-explanatory. All diagrams, charts and figures should be camera-ready. Each should be accompanied by a title and brief caption that clearly explains the table, chart, diagram, figure, illustration, etc.

References:
References should be cited in the text in consecutive order parenthetically. At the end of the text, each reference should be listed in order of citation. The format should be the same as the Journal of the American Dietetic Association.

Reference citation examples:
Article in periodical:
Knower WC, Barrett-Connor E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Eng J Med.* 2002;346:393–403.

Book:
Institute of Medicine. *Dietary Reference Intakes: Applications for Dietary Assessment*. Washington, D.C.: National Academy Press; 2001.

Chapter in a book:
Walsh J. Which insulin to use and how to start. In: Using Insulin. San Diego, Calif.: Torry Pines Press; 2003.

Web site:
Medscape drug info. Available at www.medscape.com/druginfo. Accessed August 15, 2011.

Author information:
List author with first name, middle initial (if any), last name, professional suffix and affiliation below the title of the article. Also include the primary author's complete contact information including affiliation, phone, fax and email address.

All submissions for publication should be submitted to the editor as an email attachment (MS Word file). The feature articles from the Renal Nutrition Forum will be posted on the Members Only Section of the RPG website (password protected). Thus, please include a brief abstract along with feature article submissions.