PERITONEAL DIALYSIS (PD) – PERITONEAL EQUILIBRATION TEST (PET)

Cross references	NSW Health PD2007_036 - *Infection Control Policy* SGH-TSH CLIN027 - *Aseptic Technique - Competency and Education Requirements* SGH_WPI – *Continuous Ambulatory Peritoneal Dialysis (CAPD) Freeline Solo Exchange Procedure* SGH_WPI – *Automated Peritoneal Dialysis (APD) Set-up and Connection Procedure – HomeChoice Dialysis Machine* SGH_WPI – *Automated Peritoneal Dialysis (APD) End of Therapy and Disconnection Procedure – HomeChoice Dialysis Machine*
1. Purpose	To ensure the process of peritoneal equilibration testing (PET) is performed correctly and according to best practice guidelines

2. Process

Peritoneal Equilibration Test or PET is the assessment of peritoneal membrane transport function (of fluid and solutes) in patients on PD. This test determines solute equilibration and peritoneal membrane transport rates through measurement of dialysate to plasma ratio at specific times during dialysate dwell. Initial PET should be completed between 4 to 8 weeks after commencement of maintenance PD therapy. Repeat or subsequent PETs may be requested by the renal doctors if a change in peritoneal membrane transport function is suspected or when clinically indicated.

2.1 Devices

2.1.1 Equipment

- PET form (see Appendix A)
- PET Patient Information Sheet (see Appendix B or C)
- Alcohol swabs
- Micropore tape
- Patient Labels
- Tourniquet
- Cotton Balls
- Pathology request forms
- Patient labels

2.1.2 Key parts

- Drawing-up needle (18G)
- 23 G needle
- 21 G needle
- Specimen jars
- 20ml syringe

- Vacutainer Needle
- Vacutainer Needle Adapter
- Biochemistry blood tube
- PD fluid
- Minicap

2.1.3 Key site

- Rubber bung on PD fluid/drain bag
- Abdominal PD catheter

2.2 Preparation

1. Schedule PET 4 weeks after commencement of maintenance PD. It is ideal for PET to be completed between 4 to 8 weeks after commencement of maintenance PD therapy. The result from PET will assist the clinician to determine the type of PD therapy best suited for a patient.
2. Educate the patient and/or carer on the importance of and preparation for PET by explaining and providing the following:
    a. PET information sheet (for APD or CAPD patients – see Appendix B & C);
    b. A new procard with PET specific APD program (for APD patients only)
3. The day before the PET test, the patient will:
    a. Dialyse as usual with 2.5% PD fluid the evening before the PET.
        i. Note: Do not combine different strength PD fluid. Use 1.5% PD fluid for patients unable to tolerate 2.5%.
    b. Dwell PD fluid for 8-12 hours (for CAPD patients) or 4-8 hours (for APD patients) before commencing PET:

    Last CAPD exchange must be attended 8-12 hours before PET

    Or

    APD patients must finish their therapy with last fill 4-8 hours before PET

2.3 Procedure

1. Before commencing PET, weigh the patient and record on PET form (see Appendix A);
2. Ensure overnight dwell time is appropriate (8-12 hours for CAPD patients or 4-8 hours for APD patients):
    a. Note the time the last evening bag was instilled for CAPD patients or time when the APD therapy ended;
    b. Note start time of first drain for PET;
    c. Calculate overnight dwell time and record on PET form.
3. Perform a CAPD exchange as per CAPD Freeline Solo Exchange Procedure; Renal Department Protocol. Use the same PD fluid strength used overnight to fill the patient:
    a. Drain out all PD effluent and record weight of drain bag on PD form

b. Collect PD effluent sample from drain bag using aseptic technique ensuring all the key parts/sites are protected:
    i. Wear PPE
    ii. Alcohol swab the rubber bung on drain bag;
    iii. Attach drawing up needle to 20 ml syringe;
    iv. Push needle into the centre of the bung on drain bag;
    v. Aspirate 20 ml PD effluent and transfer to patient labelled specimen jar marked as “overnight PD fluid”
c. Patient to lie down on a bed to start filling. Record start time of fill on PET form.
d. Patient to roll from side to side every 2 minutes whilst filling.
e. Record end time of fill on PET form.
f. Collect another PD effluent sample using aseptic technique ensuring all the key parts/sites are protected:
    i. Once patient is full, drain out 200mls PD effluent into the empty PD fluid bag.
    ii. Shake and invert PD fluid bag thoroughly
    vi. Wear PPE
    vii. Alcohol swab the rubber bung on PD fluid bag;
    viii. Attach 23 G needle to 20 ml syringe;
    ix. Push needle into the centre of the bung on drain bag;
    x. Aspirate 20 ml PD effluent and transfer to patient labelled specimen jar marked as “0 hour PD fluid”
    iii. Infuse the remaining 180 mls PD effluent back into the patient
g. Open a new minicap
h. Perform hand hygiene
i. Don sterile gloves
j. Disconnect patient using non-touch disconnection technique
k. Apply a new minicap to catheter using non-touch technique
l. Secure the catheter in place with micropore tape
m. Dwell PD fluid for 2 hours.

4. After dwelling PD fluid for 2 hours:
    a. Collect patient’s blood as per Venepuncture; SESLHD Clinical Business Rule
    b. Send patient’s blood to pathology with a patient labelled pathology request form for serum albumin, urea, creatinine and glucose tests.
    c. Collect another PD effluent sample using aseptic technique ensuring all the key parts/sites are protected:
        i. Wear PPE
        ii. Perform hand hygiene
        iii. Don sterile gloves
        iv. Connect patient to a PD fluid (Freeline solo) bag

v. Drain out 200mls PD effluent into the drain bag
vi. Shake and invert drain bag thoroughly
vii. Alcohol swab the rubber bung on drain bag
viii. Attach 23 G needle to 20 ml syringe;
ix. Push needle into the centre of the bung on drain bag;
x. Aspirate 20 ml PD effluent and transfer to patient labelled specimen jar marked as “2 hour PD fluid”
xi. Infuse the remaining 180 mls PD effluent back into the patient
xii. Open a new minicap
xiii. Perform hand hygiene
xiv. Don sterile gloves
xv. Disconnect patient using non-touch disconnection technique
xvi. Apply a new minicap to catheter using non-touch technique
xvii. Secure the catheter in place with micropore tape
xviii. Dwell PD fluid for further 2 hours (making it a total of 4 hours dwell time).

5. On the 4th hour of dwell, drain out all PD effluent and collect sample using aseptic technique ensuring all the key parts/sites are protected:
    a. Wear PPE
    b. Perform hand hygiene
    c. Don sterile gloves
    d. Connect patient to a PD fluid (Freeline solo) bag. Use PD fluid strength as per patient’s regular PD regimen
    e. Record start time of drain on PET form
    f. Drain out all PD effluent and record weight of drain bag on PD form
    g. Record end time of drain on PET form
    h. Shake drain bag thoroughly
    i. Alcohol swab the rubber bung on drain bag
    j. Attach 21 G needle to 20 ml syringe;
    k. Push needle into the centre of the bung on drain bag;
    l. Aspirate 20 ml PD effluent and transfer to patient labelled specimen jar marked as “4 hour PD fluid”
    m. Run PD fluid into the patient as required (for CAPD patients or APD patients with day dwell)
    n. When fill is complete, twist close the catheter valve until it clicks
    o. Open a new minicap
    p. Perform hand hygiene
    q. Don sterile gloves
    r. Disconnect patient using non-touch disconnection technique
    s. Apply a new minicap to catheter using non-touch technique
    t. Secure the catheter in place with micropore tape

6. Send all 4 x patient labelled specimen jars containing varying times of PD effluent sample (marked as: overnight, 0 hour, 2 hour and 4 hour PD fluid) with a patient labelled pathology request form for urea, creatinine and glucose tests.
7. The day after PET, record blood and PD fluid test results on PET form
8. Enter results into the PD ADEQUEST program to calculate the PET result i.e. peritoneal membrane transport rate of the patient
9. Document PET result on patient notes and RISC
10. Analyse PET result
11. Inform Nephrologist of PET result and determine the optimal PD regimen for patient
12. Educate and inform patient of PET result and PD regimen recommendation or update

3. Network file	Renal, Peritoneal Dialysis
4. External references / further reading	Blake, P. G., Bargman, J. M., Brimble, K. S., Davison, S. N., Hirsch, D., McCormick, B. B.,Tonelli, M. (2011). Clinical Practice Guidelines and Recommendations on Peritoneal Dialysis Adequacy 2011. *Peritoneal Dialysis International, 31*(2), 218-239. doi: 10.3747/pdi.2011.00026 Dombros, N., Dratwa, M., Feriani, M., Gokal, R., Heimburger, O., Krediet, R., Verger, C. (2005). European best practice guidelines for peritoneal dialysis. 7 Adequacy of peritoneal dialysis. *Nephrology, Dialysis and Transplantation, 20 Suppl 9*, ix24-ix27. doi: 10.1093/ndt/gfi1121 Gokal, R., & Chan, C. K. (2004). Adequacy targets in peritoneal dialysis. *Journal of Nephrology, 17 Suppl 8*, S55-67 K/DOQI Clinical practice guidelines for peritoneal adequacy, update 2006. (2006). *American Journal of Kidney Disease*, 48 Suppl 1, S91-97. doi: 10.1053/j.ajkd.2006.05.016 Johnson, D., Brown, F., Lammi, H., & Walker, R. (2005). The CARI guidelines. Dialysis adequacy (PD) guidelines. *Nephrology (Carlton), 10 Suppl 4*, S81-107. doi: 10.1111/j.1440-1797.2005.00465_1.x Lo, W. K., Bargman, J. M., Burkart, J., Krediet, R. T., Pollock, C., Kawanishi, H., & Blake, P. G. (2006). Guideline on targets for solute and fluid removal in adult patients on chronic peritoneal dialysis. *Peritoneal Dialysis International*, 26(5), 520-522 Misra, M., & Khanna, R. (2014). The Clinical Interpretation of Peritoneal Equilibration Test. *Seminars in Dialysis, 27*(6), 598-602. doi: 10.1111/sdi.12285 Ponferrada, L. P., & Van Stone, J. C. (1995). Peritoneal dialysis kinetics. *Advances in Renal Replacement Therapy, 2*(4), 341-348 Struijk, D. G. and Krediet, R. T. (2003). European best practice guidelines: adequacy in peritoneal dialysis. *Contrib Nephrol*(140), 170-175 Tang, Y., Zhong, H., Diao, Y., Qin, M., & Zhou, X. (2014). Peritoneal transport rate, systemic inflammation, and residual renal function determine peritoneal protein clearance in continuous ambulatory peritoneal dialysis patients. *International Urology and Nephrology*. doi: 10.1007/s11255-014-0744-8 Twardowski, Z. j., Nolph, K. O., Khanna, R., Prowant, B. F., Ryan, L. P.,

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5. Specialty/department committee approval	Peritoneal Dialysis Committee, Dr Franziska Pettit, Staff Specialist Date: Feb 2017
6. Department head approval	Prof Mark Brown, Dept Head Renal Services Date: Feb 2017
7. Executive sponsor approval – NCD or CGM	Ms Christine Day, Nurse Manager Medicine Date: Feb 2017

Revision and Approval History

Date published	Revision number	Author (Position)	Date revision due
February 2017	0	Anna Claire Cuesta (PD CNC)	February 2020

Appendix A

Peritoneal Equilibration Test (PET)			
Patient's Addressograph		Date	
		Weight	
OVERNIGHT EXCHANGE			
% DEXTROSE USED		DWELL TIME	
VOLUME INFUSED		DIALYSATE UREA	
VOLUME DRAINED		DIALYSATE CREATININE	
4 HOUR PET			
% DEXTROSE USED			
VOLUME INFUSED		FILL TIME	
VOLUME DRAINED		DRAIN TIME	
RESULTS			
	UREA	**CREATININE**	**GLUCOSE**
SERUM 120 min			
PDF 0 MIN			
PDF 120 MIN			
PDF 240 MIN			
PERITONEAL MEMBRANE TYPE		D/P CREATININE at 4 HOURS	

Appendix B

PATIENT NAME_____

MRN_____

DATE_____

or affix Patient Identification Label here

PATIENT INFORMATION SHEET

PERITONEAL EQUILIBRATION TEST (PET)

for APD Patients

PET (Peritoneal Equilibration Test) is used to determine the peritoneal membrane function. PET result will indicate the transport rate of fluid and solutes through the peritoneal membrane. It will guide the nephrologist and PD nurses to recommend the type of PD regime that is best suited to you.

PET is generally performed within the first 3 months of starting your maintenance dialysis. PET may be repeated to monitor changes in the peritoneal membrane i.e. when maintenance dialysis is not removing fluid or solutes as well as before. You will be advised by the nephrologist or PD nurse when a repeat PET is needed.

How to prepare for the test?

1. The night before the test:
   a. Start dialysis at 5 pm using 2.5% PD fluid (green bags);
   b. Dialyse with the PET APD program by using PET procard provided by the PD nurse:
      i. Turn off the PD machine;
      ii. Remove your usual procard from the PD machine slot;
      iii. Insert the PET procard;
      iv. Turn on the PD machine;
      v. The PD machine will ask you to "Confirm Card"
      vi. Confirm the PET procard by pressing the blue enter button (blue circle with a curved arrow button)

2. After dialysis and disconnection:
   a. Turn off the PD machine
   b. Remove the PET procard from the PD machine
   c. Insert your usual procard
   d. Turn on the PD machine;
   e. The PD machine will ask you to "Confirm Card"
   f. Confirm the PET procard by pressing the blue enter button (blue circle with a curved arrow button)
   g. Turn off the PD machine

3. On the day of the test:
   a. Return the PET procard and present yourself to the PD unit – 9 South St Kogarah, at 8 a.m.
   b. PD nurse will collect 4 samples of peritoneal dialysis fluid and 1 blood sample at different times.
   c. The test will take approximately 5 hours to complete.

PET result will be forwarded to the Nephrologist. You will be informed of the result. You will also be informed if and when your PD regime must be changed to improve your dialysis.

 Peritoneal Dialysis Unit 2016

Appendix C

PATIENT NAME_____

MRN_____

DATE_____

or affix Patient Identification Label here

PATIENT INFORMATION SHEET

PERITONEAL EQUILIBRATION TEST (PET)

for CAPD Patients

PET (Peritoneal Equilibration Test) is used to determine the peritoneal membrane function. The PET result will indicate the transport rate of fluid and solutes through the peritoneal membrane. It will guide the nephrologist and PD nurses to recommend the type of PD regime that is best suited to you.

PET is generally performed within the first 3 months of starting your maintenance dialysis. PET may be repeated to monitor changes in the peritoneal membrane i.e. when maintenance dialysis is not removing solutes or fluid as well as before. You will be advised by the nephrologist or PD nurse when a repeat PET is needed.

How to prepare for the test?

1. The night before the test, complete your last CAPD exchange at 12 midnight using 2.5% PD fluid (green bag).
2. On the day of the test:
    a. Skip the first CAPD exchange
    b. Present yourself to the PD unit – 9 South St Kogarah, at 8 a.m.
    c. PD nurse will attend to the first CAPD exchange using 2.5 % PD fluid (green bag)
    d. PD nurse will collect 4 samples of peritoneal dialysis fluid and 1 blood sample at different times.
    e. The test will take approximately 5 hours to complete.

PET result will be forwarded to the Nephrologist. You will be informed of the result. You will also be informed if and when your PD regime must be changed to improve your dialysis.

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