4TH GCC KIDNEY TRANSPLANTATION & NEPHROLOGY CONGRESS

Follow-up Of Kidney Transplant Recipients In 2025: Towards An Individualized Approach

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- Chair of the African Association of Nephrology (AFRAN) Transplant Committee

January 24, 2025


Hosted by
AFRAN 2025
CONGRESS
Tunis, Tunisia - April 15 - 18, 2025
Raddison Blu Hotel & Convention Center
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CONGRESS OF THE AFRICAN ASSOCIATION OF NEPHROLOGY (AFRAN)
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https://www.afran2025.com

INTRODUCTION

INTRODUCTION

- **Post-Kidney Transplant Follow-up :**
  - ✓ Long, complex and costly process
  - ✓ Key to good graft and patient survival
  - ✓ Must be extremely rigorous
  - ✓ Enables prevention and early management of complications
  - ✓ Well codified, depends on the post-transplant period : short (first weeks), medium (3 to 12 months) and long term (> 1year)
  - ✓ Facilitated by new communication technologies

OBJECTIVES

A- In The Short Term :

1- Prevent acute rejection

2- Optimize graft function

3- Prevent infections

B- In The Medium And Long Term :

1- Preserve good graft function

2- Ensure good therapeutic adherence

3- Prevent the consequences of immunosuppression : metabolic, infectious, neoplastic, cardiovascular, etc.

RECOMMANDATIONS (I)

HAUTE AUTORITÉ DE SANTÉ

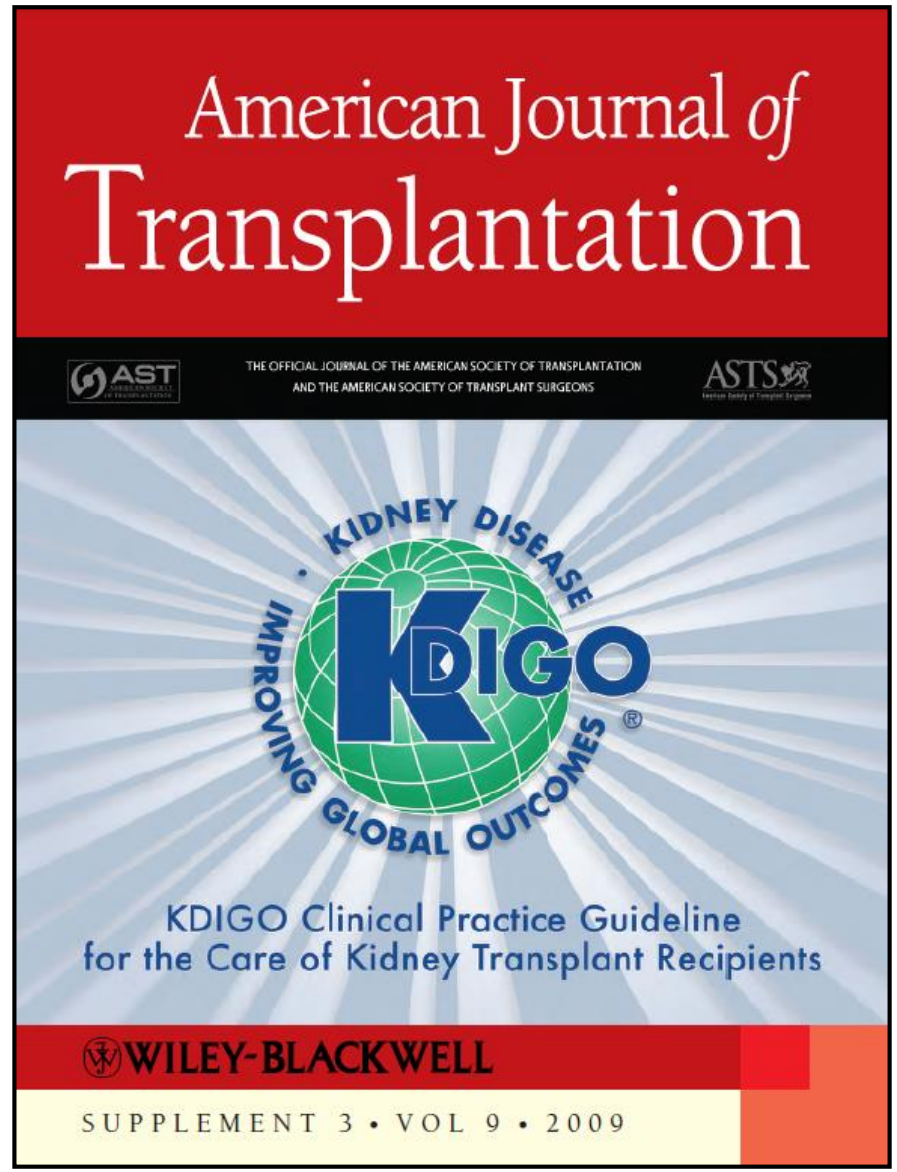
SYNTHESE DES RECOMMANDATIONS PROFESSIONNELLES

Suivi ambulatoire de l'adulte transplanté rénal au-delà de 3 mois après transplantation

Novembre 2007

https://www.has-sante.fr/

RECOMMANDATIONS (2)



https://kdigo.org/guidelines/transplant-recipient/

RECOMMANDATIONS (3)

ARAB JOURNAL OF UROLOGY
2021, VOL. 19, NO. 2, 105–122
https://doi.org/10.1080/2090598X.2020.1868657

Taylor & Francis
Taylor & Francis Group

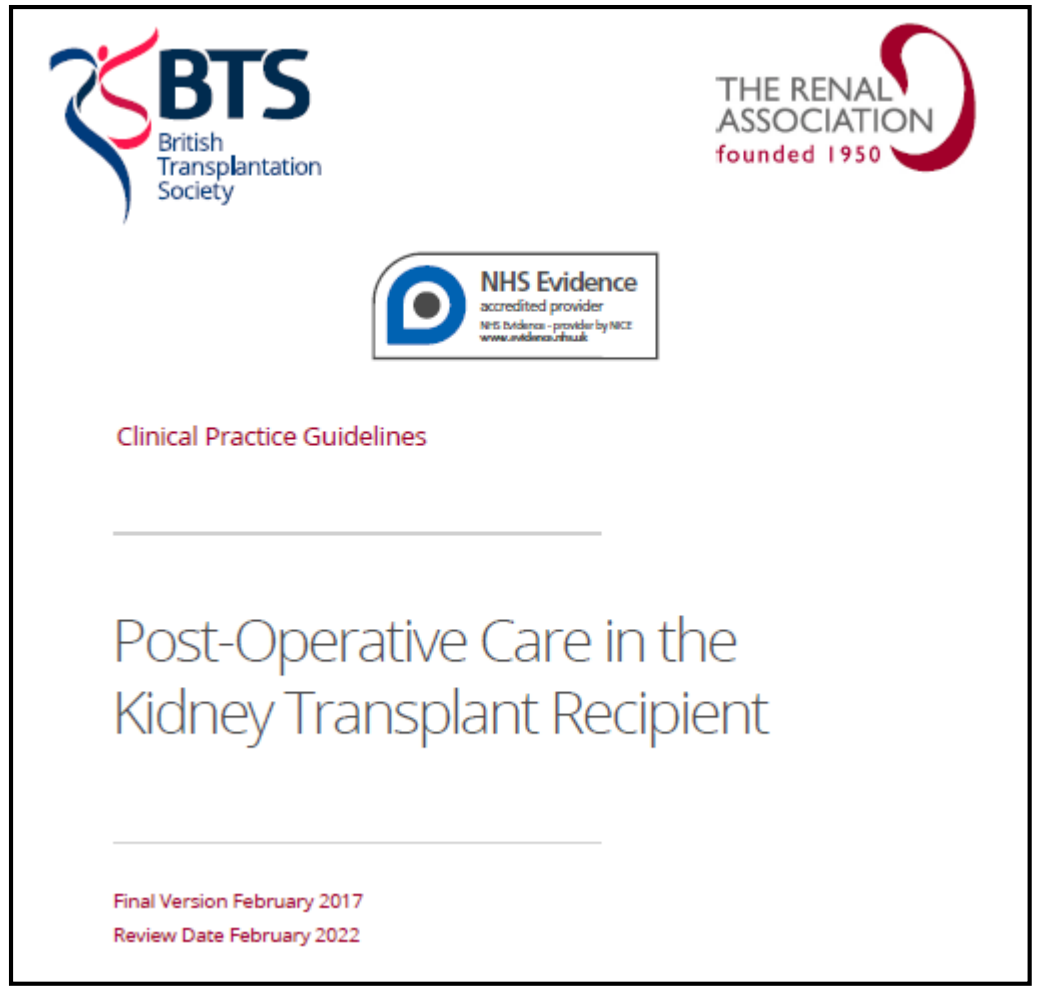
RENAL TRANSPLANTATION: REVIEW ARTICLE

OPEN ACCESS Check for updates

Egyptian clinical practice guideline for kidney transplantation

Shokeir A. Arab J Urol 2021;19(2)2:105-22.

RECOMMANDATIONS (4)



https://ukkidney.org/sites/renal.org/files/FINAL-Post-Operative-Care-Guideline-1.pdf

RECOMMANDATIONS (5)

Wettestein D. Langenbecks Arch Surg 2014;399(4):415-20.

Mamode N. Transplant Int 2022;35:10511.

OUTLINE

I- GENERAL FOLLOW-UP ORGANIZATION

1- NECESSARY INFRASTRUCTURE
2- LOCATION AND ACTORS
3- RHYTHMICITY OF CONSULTATIONS
4- CALENDAR
5- DATA TO BE TRANSMITTED BY THE TRANSPLANT CENTER
6- CONTACT AND/OR PATIENT TRANSFER TO THE TRANSPLANT CENTER
7- TELE-CONSULTATION SOLUTION

II- KIDNEY ALLOGRAFT FOLLOW-UP

1- RENAL FUNCTION MONITORING
   A- GFR ESTIMATE
   B- GFR MEASURE
2- ANATOMICAL MONITORING
3- HISTOLOGICAL MONITORING
4- BIOMARKERS

III- IMMUNOLOGICAL MONITORING

IV- MONITORING OF IMMUNOSUPPRESSION AND ITS COMPLICATIONS

1- PHARMACOLOGICAL MONITORING

2- THERAPEUTIC ADHERENCE MONITORING

3- PREVENTION AND SCREENING OF COMPLICATIONS

- A- METABOLIC : NODAT
- B- INFECTIOUS : BK VIRUS NEPHROPATHY
- C- NEOPLASTIC : CANCERS AND PTLD

I- GENERAL FOLLOW-UP ORGANIZATION

1- NECESSARY INFRASTRUCTURE

NECESSARY INFRASTRUCTURE

THE RENAL ASSOCIATION
founded 1950

Guideline 1.1 – KTR: Clinic infrastructure

We suggest that the following infrastructure should be in place for KTR follow up (2D):

- A consultant-level health care professional should be available for every transplant clinic
- KTRs should be reviewed in a dedicated outpatient area
- The results of blood tests (including drug levels if possible) should be available within 24 hours
- A formal mechanism should exist for results review by health care professionals within 24 hours of a clinic appointment
- There should be access to a multidisciplinary renal team including pharmacist, dietician, social worker and psychologist
- Patient care should be planned along principles set out in the National Service Framework and "Kidney Health Delivering Excellence"

2- LOCATION AND ACTORS

LOCATION AND ACTORS

- **Follow-up Location :**

  ✓ **First months :**

  In the transplant center

  ✓ **Subsequent monitoring (beyond three months) :**

  Organized by the transplant center

- **Actors : Shared (alternating) monitoring between :**

  ✓ Transplant center physicians

  ✓ Physicians likely to be involved in subsequent outpatient follow-up (Referring Nephrologist, Cardiologist, General Practitioner, etc.)

3- RHYTHMICITY OF CONSULTATIONS

RHYTHMICITY OF CONSULTATIONS

THE RENAL ASSOCIATION
founded 1950

Guideline 1.2 – KTR: Clinic frequency

We suggest that uncomplicated patients may be reviewed progressively less frequently (2C)

- 2-3 times weekly for the first month after transplantation
- 1-2 times weekly for months 2-3
- Every 2-4 weeks for months 4-6
- Every 4-6 weeks for months 6-12
- 3-6 monthly thereafter

Box 29: Annual review

- We suggest that every transplant centre establishes a multispecialty annual review clinic for the appraisal of its KTRs at their KT anniversaries

4- CALENDAR

CALENDAR

Suivi	4 à 6 mois	7 à 12 mois	Au-delà de 1 an
Examen clinique / Anamnèse	1 x / 2 semaines		
Ionogramme sanguin : Na, K, Cl, HCO_3^-, protides	1 x / 2 semaines		
Bilan hépatique : ALAT, ASAT, gamma-GT	1 x / 2 semaines		
Surveillance de la fonction rénale et du transplant			
- Créatinémie et estimation du débit de filtration glomérulaire	1 x / 2 semaines		
- Protéinurie des 24 heures ou rapport protéinurie/créatininurie	1 x / 2 semaines		
- Bandelette urinaire, et ECBU si bandelette positive	1 x / 2 semaines		
- Ponction-biopsie rénale	En cas d'altérati d'apparition		
Suivi immunologique			
- Recherche d'anticorps anti-HLA (classes I et II)	1 x / an et l'immunosupp		
Surveillance des immunosuppresseurs			
- Effets indésirables des immunosuppresseurs	1 x / 2 semaines		
- Suivi pharmacologique :			
- Immunosuppresseurs à index thérapeutique étroit (ciclosporine, tacrolimus, sirolimus, évérolimus) : concentration sanguine	1 x / 2 semaines		
- Pour tout immunosuppresseur : concentration sanguine ou plasmatique	En ca ou de risq		
- Observance thérapeutique	1 x / 2 semaines		
Prévention du risque cardio-vasculaire			
- Pression artérielle	1 x / 2 semaines		
- Anomalies glucidiques : glycémie (à jeun)	1 x / 2 semaines		
- Anomalies lipidiques : bilan lipidique			
- Obésité : indice de masse corporelle (IMC)	1 x / 2 semaines		
- Suivi cardiologique (ECG, échocardiographie)			
- *Homocystéinémie*	D		
- Fistule artério-veineuse : surveillance de la fonction ventriculaire par échocardiographie	1 x / an en cas d		
Suivi de la polyglobulie ou de l'anémie			
- Hémogramme	1 x / 2 semaines		
Autres suivis biologiques			
- Uricémie			
- Magnésémie	En cas de sympt		
Suivi carcinologique			
- Lymphomes :			
- Chez les patients à risque : signes cliniques	Au moins		
- Chez les patients EBV séronégatifs receveurs d'un transplant EBV séropositif : réplication virale par PCR	Au moins 1 x / 3 signes		
- Cancers cutanés : examen cutanéo-muqueux complet :			
- Chez tous les patients	Avant la transplantation, sinon dans les 6 mois après		

Suivi	4 à 6 mois	7 à 12 mois	Au-delà de 1 an
- En cas d'antécédent de carcinome spinocellulaire ou de kératoacanthome		1 x / 3 mois	
- En présence d'autres lésions prémalignes ou malignes			
- Biopsie de lésion verruqueuse cutanée ou muqueuse	En		
- Cancers urologiques :			
- Tumeur rénale ou urothéliale : échographie du haut et bas appareil urinaire, tomodensitométrie, cystoscopie si examens précédents négatifs	En		
- Tumeur rénale : échographie des reins natifs			
- Cancers des autres organes solides (prostate, côlon, seins, col de l'utérus)	Mêm		
Suivi osseux			
- Ostéopénie et ostéoporose :			
- Mesure de la taille			
- Interrogatoire : recherche des facteurs de risque de fracture			
- Calcémie et phosphatémie		1 x / 2 sem	
- Dosage sérique de vitamine 25(OH)D3 et parathormone		À 3 mo	
- Examen densitométrique osseux		Avant la t normal, l'ex sinon, ou	
- Ostéonécrose : IRM du bassin			
Suivi infectieux			
- Infection et maladie à cytomégalovirus (CMV) :			
- Réplication virale		En cas d d'organe,	
- Statut sérologique du patient et réplication virale		En fonction	
- *Infection à parvovirus B19*			
- Infection à papillomavirus : examen cutanéo-muqueux			
- Infection à herpes virus humain 8 (HHV8) : examen cutanéo-muqueux à la recherche d'une maladie de Kaposi chez les patients transplantés HHV8 séropositif			
- Infections à virus Herpes simplex (HSV) et virus varicelle zona (VZV) : traitement et prophylaxie idem population générale, sauf :			
- En cas de lésion extensive ou de localisation méningée d'une infection à HSV ou VZV		Trait	
- Pour les patients transplantés séronégatifs pour le VZV et potentiellement à risque d'un contage		Prop	
- Pneumocystose : prophylaxie		Prophylaxi aéroso	
- Toxoplasmose		Diagnostic sympt	
- Infection à BK virus (BKV) : recherche dans le sang ; si test positif : à confirmer dans les 4 semaines et/ou suivi d'un test quantitatif dans le sang		- Dépistage années pos - En cas de lésions évocatrices sur biopsie rénale	

Suivi	4 à 6 mois	7 à 12 mois	Au-delà de 1 an
- Hépatite B (VHB) :			
- Dosage plasmatique des anticorps anti-HBs	1 x / 12 mois (rappel ou revaccination si Ac-anti-HBs < 10 mUI/ml)		
- Recherche des marqueurs de cirrhose ou de carcinome hépatocellulaire	En cas d'hépatite chronique liée au VHB		
- Hépatite C (VHC) : recherche d'une évolution vers une cirrhose ou un cancer, ainsi que les signes d'atteinte rénale et systémique liée au VHC	1 x / 12 mois		
- Infection par le VIH :			
- Recherche d'infection ano-génitale à papillomavirus	1 x / 6 mois		
- Tuberculose :			
- Radiographie du thorax			
- Test tuberculinique cutané, ou intradermoréaction à la tuberculine (IDR)	Post-transplantation si non fait avant la transplantation : - Test positif si lésion > 5 mm à la 48-72e heure - Si test négatif, refaire 2 semaines après		
- Bilan hépatique	En cas de prophylaxie par isoniazide (traitement de 6 ou 9 mois) : au moins 1 x / 2 semaines pendant les 2 premiers mois, puis 1 x / mois		
- Infections à pneumocoque	Vaccination antipneumococcique tous les 3 ans		
- Vaccinations	- Vaccins vivants atténués (polio oral, BCG, varicelle) contre-indiqués - Vaccins inactivés autorisés		
Suivi urologique et chirurgical			
- Bandelette urinaire, et ECBU si bandelette positive	1 x / 2 semaines	1 x / mois	1 x / 1 à 4 mois
- Recherche d'un obstacle de la voie urinaire ou d'une tumeur du transplant : échographie du transplant	1 x / an		
- Recherche d'une sténose de l'artère rénale ou d'une obstruction de la voie urinaire : échographie Doppler du transplant	En cas de dégradation de la fonction rénale ou d'apparition d'une hypertension artérielle		
- Recherche d'un reflux vésico-urétéral	En présence de pyélonéphrites aiguës récidivantes		
Suivi de la fonction sexuelle			
- Évaluation et prise en charge adaptées	À la demande du patient		
Contraception et grossesse			
- Contraception :			
- Contraception progestative	La plus souvent proposée		
- Contraception œstroprogestative	Peut être utilisée (mais rechercher systématiquement les facteurs de risque thromboembolique artériel et veineux)		
- Dispositifs intra-utérins	Généralement contre-indiqués		
- Grossesse : information et prise en charge adaptée	Suivi obstétrical effectué en collaboration avec le médecin en charge du suivi de la transplantation		
Suivi de la qualité de vie	Éducation thérapeutique avec suivi multidisciplinaire		

(Les examens surlignés sont pratiqués lors de chaque consultation du suivi systématique)

5- DATA TO BE TRANSMITTED BY THE TRANSPLANT CENTER

DATA TO BE TRANSMITTED (I)

Critère n°1. Transmission des données en vue du suivi partagé

Recommandation source

Au début du suivi partagé, il est recommandé que le centre de transplantation transmette au médecin correspondant (néphrologue, médecin traitant, etc.) les éléments détaillés dans le tableau 1 [des recommandations] :

- les antécédents du patient, en particulier néphrologiques ;
- les caractéristiques de la transplantation ;
- les données du suivi des 3 premiers mois ;
- les éléments cliniques et biologiques post-transplantation au moment du début du suivi partagé ;
- les modalités de suivi du patient, les traitements en cours, et avant tout le type et les modalités d'immunosuppression ;
- les coordonnées des personnes à contacter dans le centre de transplantation.

DATA TO BE TRANSMITTED (2)

Patient medical history, particularly nephrological	- Initial nephropathy - Dialysis duration and type - Previous transplantation
Characteristics of transplantation	- Donor type: living; brain dead - Donor's age - HLA incompatibility and prior immunization - Donor and recipient serological status (HBV, HCV, CMV and EBV) - Cold and warm ischemia times
Three-month post-transplant follow-up data	- Surgical report - Initial hospitalization report - Reports of any rehospitalizations - Follow-up reports from the 1st to the 3rd post-KT months
Patient's post-transplant clinical and biological data at the start of shared follow-up	- Last creatinine level and its lowest value - Last eGFR - Last uroculture, proteinuria assay and proteinuria/creatinuria ratio - Last lipid profile (total cholesterol, HDL, LDL, TG) - Last US of the transplant - Pre- and post-transplant bone densitometry if available

DATA TO BE TRANSMITTED (3)

Type and modalities of immunosuppression and other ongoing treatments	- Immunosuppression protocol and therapeutic ranges - Associated treatments - Expected changes in immunosuppression and other treatments (dosages envisaged and planned dates)
Follow-up modalities	- Dates of any scheduled interventions - Consultation dates scheduled in the transplant center - Therapeutic education program
Contact details at the transplant center	- Contact details of referring physicians - Emergency contact details

OUR STANDARD REPORT

E. P. S. CHARLES NICOLLE-TUNIS
SERVICE DE MEDECINE INTERNE A
Pr Adel KHEDER

UNITE

Compte Rendu d'Ho

Nom	:	
Prénom	:	
Date de naissance	:	01/01/1954
Nationalité	:	Sénégalaise
Statut social	:	Marié, 5 enfants
Dossier N°	:	48114
Hospitalisation	:	Du 14/03/2012 a
Motif d'hospitalisation	:	Transplantation
Couverture sociale	:	Payant
Profession	:	Commerçant

HISTOIRE DE LA M

Patient hypertendu connu depuis 2000 avec une
l'association de plusieurs antihypertenseurs.
Une insuffisance rénale chronique, secondaire très
vasculaire hypertensive, a été diagnostiquée en 2
Le stade terminal a été retenu en Août 2011.

EPURATION EXTRA

Un traitement de suppléance par hémodialyse pér
à Dakar (Sénégal) à l'Association ASSOFAL, à ra
semaine.
Son abord vasculaire est un cathéter jugulaire dr
artério-veineuse radiale gauche a été confection
rapidement thrombosée.
Son poids sec est de 75 kg, sa prise de poids
diurèse résiduelle est d'environ 250 ml/jour.
Au cours de la période de dialyse, Monsieur MAMA

- Une hyperparathyroïdie secondaire, non
  Janvier 2012, était à 1111,2 pg/ml.
- Une anémie nécessitant un traitement p
  érythropoïétine (HEMAX® à la dose de 400
  été transfusé. Son Hb était à 12,9 g/dl en p

BILAN PRE-GR

- **Groupe sanguin** : O (+) Positif.
  Phénotype : C Négatif, C Positif, E Négatif, e Positif, Kell N
- **Typage HLA**: A_2-A_{34} ; B_{35}-B_{50} ; DR_{03}-DR_{07}
- **Recherche d'anticorps cytotoxiques** : néga

- **Echographie abdomino-pelvienne** : reins diminués de
kyste polaire inférieur du rein droit de 3,3 cm de diamètre
prostate homogène augmentée de taille de poids estimé à 37
- **Urétro-cystographie rétrograde** : surélévation de la
vésical. Rétrécissement régulier de l'urètre prostatique (évo
prostatique). Absence de reflux vésico-urétéral actif ou pa
vésical post-mictionnel.
- **L'examen urologique**, réalisé par le Pr Chebil au serv
Charles Nicolle de Tunis, note une prostate de consistance no
20 gr. Au vu de cet examen, des données biologiques (PSA
des données de l'imagerie, il n'y avait pas de contre-indica
rénale et le patient sera mis sous alpha bloqueur prostatique
- **Echographie cardiaque trans-thoracique** : cardiom
concentrique avec fonction systolique globale et segment
d'éjection du ventricule gauche à 62%), insuffisance aortique
- **Echo-doppler des troncs vasculaires supra-aortiq**
infiltrées avec présence de plaques bilatérales non sténosant
- **Echographie doppler des membres inférieurs** : sans
- **Fibroscopie oeso-gastro-duodénale** : normale.
- **Examen ophtalmologique** : acuité visuelle à 10/10 (av
rétinopathie hypertensive chronique stade 3, de chor
chronique et de neuropathie ischémique hypertensive gau
antiagrégant plaquettaire est souhaitable afin de prévenir
rétinienne.
- **Examen Oto-Rhino-Laryngologique** : rhinite purule
favorable après antibiothérapie.
- **Examen stomatologique** : plusieurs caries dentaires. In
tartre.
- **Examen parasitologique des selles** : présence
Histolytica et de Blastocystis Hominis. Un traitement par M
été instauré avec un contrôle parasitologique des selles néga
- **Coproculture** : négative.
- **Sérologies** :

HVC	HIV	CMV	EBV	HSV	
Négative	Négative	IgG = 32 IgM négative	IgG positive IgM négative	IgG = 64 IgM négative	N

- **HVB** : **Ag HBs** positif, **Ac anti-HBe** positif, **Ac anti-H**
  Ac anti-HBc de type IgM négatif.
  La recherche d'ADN du virus de l'hépatite
  quantitative, était négative.
- **La sérologie de la leishmaniose** est négative.

RENSEIGNEMENTS CONCERNANT L
(DOSSIER N° : 48115)

Monsieur âgé de 31 ans, est le fils du
antécédent un asthme au jeune âge.

- **A l'examen physique** : sa pression artérielle est de 120
de 29,3 kg/m² et l'examen des urines à la bandelette réactive
- **A la biologie** : sa créatininémie est à 110 µmol/l, sa gly
et la microalbuminurie est à 166 mg/l.
- **L'échographie rénale** montre 2 reins de taille norma
l'angio-scanner rénal objective 1 artère à droite et 2 artèr
- **Groupe sanguin** : O (+) Positif.
- **Typage HLA** : A_{28}-A_{blanc} ; B_{35}-B_{63} ; DR_{01}-DR_{10}
- **Cross Match** : négatif.
- **Sérologies** :

Ag Hbs	HVC	HIV	CMV	EBV	HSV
négatif	Négative	négative	IgG positive IgM négative	IgG positive IgM négative	IgG positiv IgM négati

INTERVENTION

La transplantation rénale a été réalisée le 15/03/2012 par le
d'Urologie de l'hôpital Charles Nicolle de Tunis. Le rein préle
une artère et une veine. Il a été transplanté dans la fosse ili
vasculaire termino-latérale sur les vaisseaux iliaques extern
derrière l'artère iliaque externe. A noter que la veine iliaqu
une paroi cartonnée, difficile à disséquer et qu'elle présente
paroi dédoublée faisant craindre une dissection post-opérat
au déclampage. L'ischémie chaude était de 51 minutes. Ana
selon Lich Grégoire sur une sonde JJ.

EVOLUTION

- **Le traitement immunosuppresseur** d'induction a
(Méthylprednisolone) à la dose de 1 mg/kg/j, de l'ATG®
lymphocytaire) à la dose de 100 mg/j pendant 7 jours et d
Mofétil) à la dose de 2 grammes/j.
L'Equoral® (Cyclosporine) a été introduit à J1 à la dose de 4
- **L'évolution en post greffe** a été marquée par :
  - Une reprise immédiate de la diurèse avec une b
    créatininémie jusqu'à 116 µmol/l à J26 post-greffe.
  - Ablation de la sonde JJ le 06/04/2012 sans incident.
  - Des troubles mictionnels importants à type de d
    pollakiurie (au catalogue mictionnel : plus de 40 mict
    un volume par miction variable de 50 à 110 ml au
    entre 2 mictions consécutives variable de 13 à 75 min
    L'examen cytobactériologique des urines était négatif
    prostatique a montré une dilatation modérée des
    mesurant 15 mm, un pyélon avec une paroi épaissie,
    estimé à 87 ml en plus de l'hypertrophie prostatique.
    L'évolution des signes urinaires était progressivemen
    l'introduction d'un alpha bloqueur prostatique (Mécir®
  - Un souffle à l'auscultation du greffon rénal, avec
    normale sans traitement. L'échographie doppler a
    normalement coloré, des résistances artérielles intr

une franche accélération artérielle péri-anastomotique. La décision était l'abstention thérapeutique avec une surveillance clinique et échographique régulière.

- N té le service le 17/04/2012. Il était apyrétique, sa pression artérielle était de 120/80 mm Hg, sa diurèse à 4,5 l/j et son poids à 73,5 kg.
A la biologie, il avait une créatininémie à 134 µmol/l, une hémoglobine à 11,3 g/dl et une uroculture négative. La recherche de protéinurie était négative.
- **Son traitement de sortie associait :**
  - Cortancyl® (Prednisone) 5 mg : 3 comprimés par jour (avec dégression progressive jusqu'à 2 comprimés par jour).
  - MMF® (Mycophénolate Mofétil) 500 mg : 2 comprimés, 2 fois par jour.
  - Equoral® (Cyclosporine) : 125 mg, 2 fois par jour.
  - Bactrim® (Triméthoprime-Sulfaméthoxazole) 400 mg : 1 comprimé par jour.
  - Mécir® (Tamsulosine Chlorhydrate) LP 0,4 mg : 1 comprimé par jour.
  - Ipproton® (Oméprazole) 20 mg : 1 gélule par jour.
  - Fumafer® (Fer) : 1 comprimé par jour.
  - Vitamine C® 500 mg : 1 comprimé par jour.
- Il sera suivi à la consultation du Professeur Taïeb BEN ABDALLAH.

AU TOTAL

Première transplantation rénale à partir d'un donneur vivant avec 5 mismatches HLA chez un homme âgé de 58 ans, Ag HBs positif, traité par hémodialyse depuis Août 2011 en raison d'une insuffisance rénale chronique terminale secondaire très probablement à une néphropathie vasculaire.
L'évolution post-greffe était favorable à part une dilatation modérée des cavités pyélo-calicielles et une franche accélération artérielle péri-anastomotique du greffon objectivées à l'échographie doppler. A surveiller.

Hanène EL KATEB
Résidente du Service

Dr Mohamed Mongi BACHA
Assistant Hospitalo-Universitaire
en Néphrologie

4

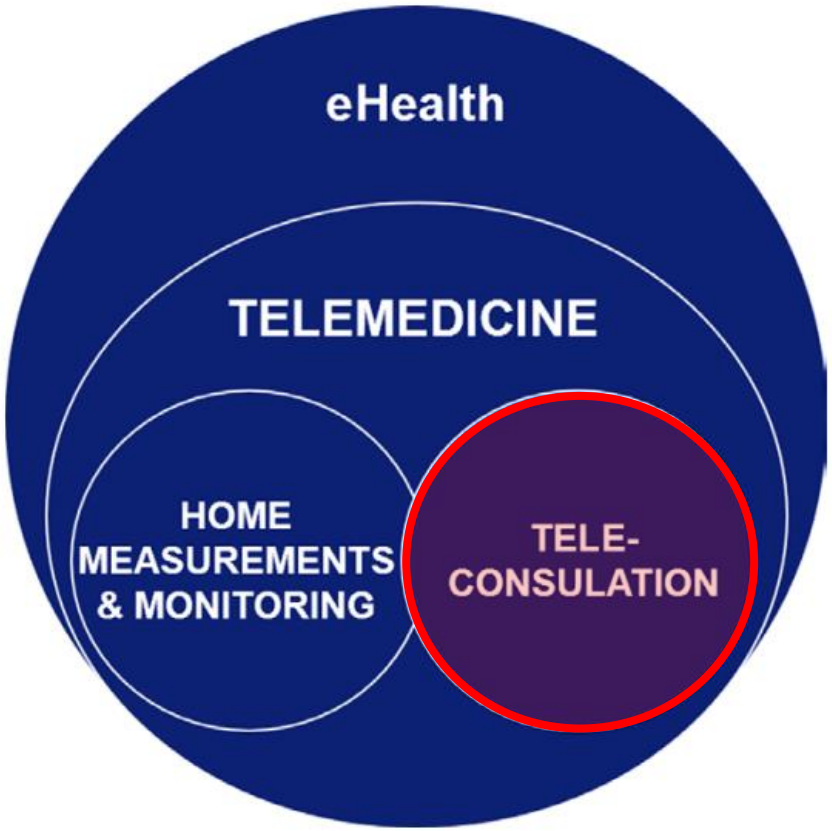
6- CONTACT AND/OR PATIENT TRANSFER TO THE TRANSPLANT CENTER

CONTACT AND/OR PATIENT TRANSFER TO THE TRANSPLANT CENTER

Signes cliniques	• Fièvre non expliquée par une pathologie infectieuse banale ou non rapidement résolutive (48-72 h) • Tension ou douleur du transplant • Hématurie macroscopique • Oligurie, anurie
Signes biologiques	• Élévation de la créatininémie ≥ 20 % par rapport à sa valeur la plus basse après transplantation • Anémie, leucopénie ou thrombopénie significatives • Augmentation significative de la protéinurie
Changements thérapeutiques	• Événement justifiant une modification majeure du traitement immunosuppresseur (vomissements empêchant la prise, suspicion d'événement indésirable grave…) • Reprise d'un traitement par épuration extrarénale ou proposition de réinscription en liste d'attente • Inclusion du patient dans un essai thérapeutique
Autres circonstances	• Patient non observant (traitement, consultations) • Indication d'une ponction-biopsie rénale • Hospitalisation quelle qu'en soit la cause • Projet de grossesse ou grossesse • Diabète • Toute pathologie sévère, notamment cancéreuse • Décès du patient

7- TELE-CONSULTATION SOLUTION

TELE-CONSULTATION



A healthcare service platform using **a live video consultation** that enables **real-time communication** between the patient and the provider **at a remote location**.

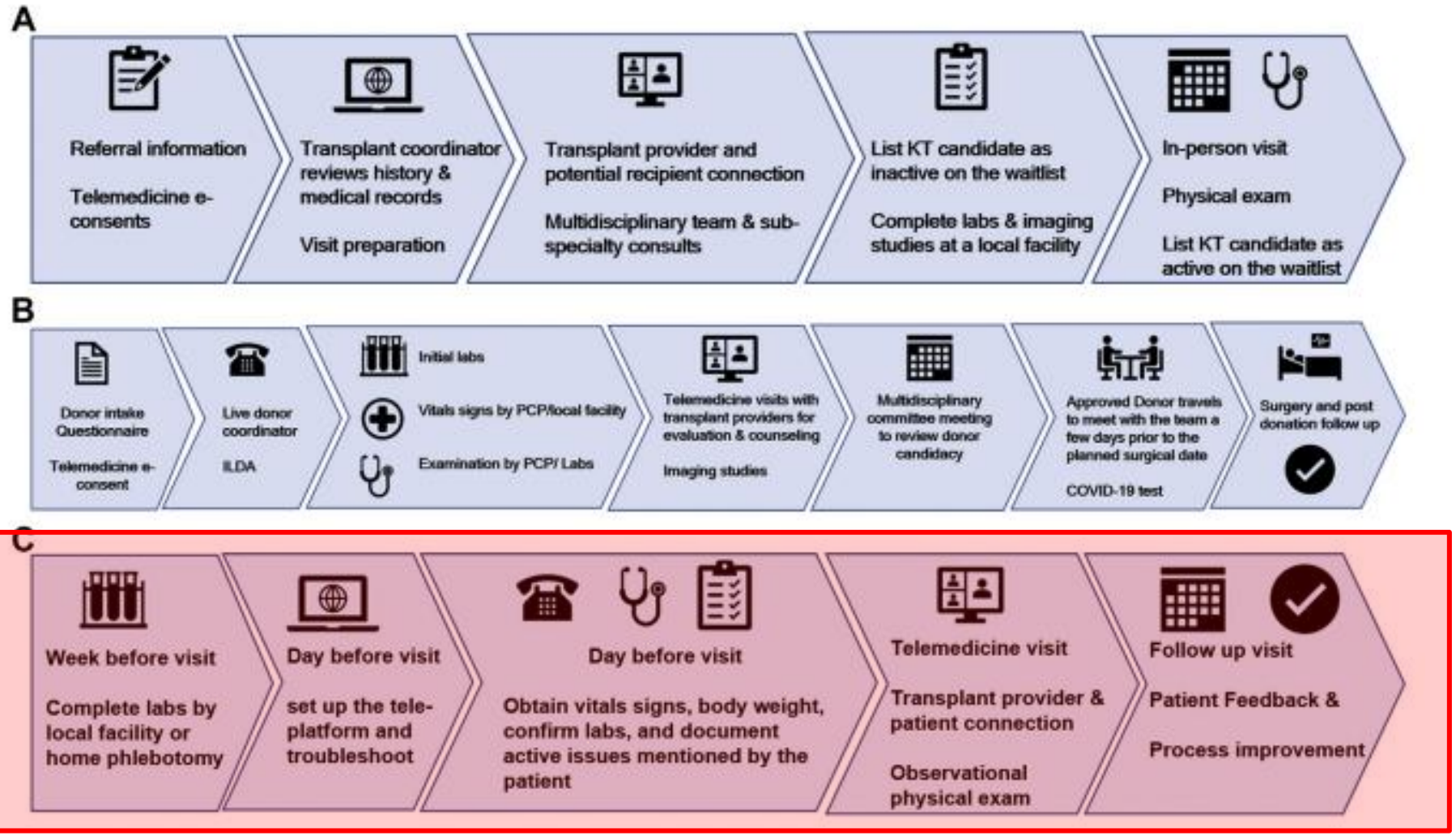
Hezer B. Transplant 2024;108:409-20.

TELE-CONSULTATION AND KT : BENEFITS

Benefit	Patient	Clinician	Hospital
Simplified logistics (reduced traveling)	✓		
Minimized risk of infection	✓	✓	✓
Quality of life	✓		
Potential reduction of the Clinician's burden and time optimization		✓	✓
Continuity of patient monitoring	✓	✓	✓
Efficient management of visit's processes (delegation, automation)		✓	
Use of innovative solutions for the optimal management and optimization of patient care			✓
Increased activity volumes (with the same resources)			✓
Formalization of informal clinician-patient interactions through GDPR compliant channels		✓	
Direct and indirect cost reductions (social costs)	✓		✓

Biancone L. J Nephrol 2022;35(3):725-33.

TELE-CONSULTATION AND KT : INDICATIONS

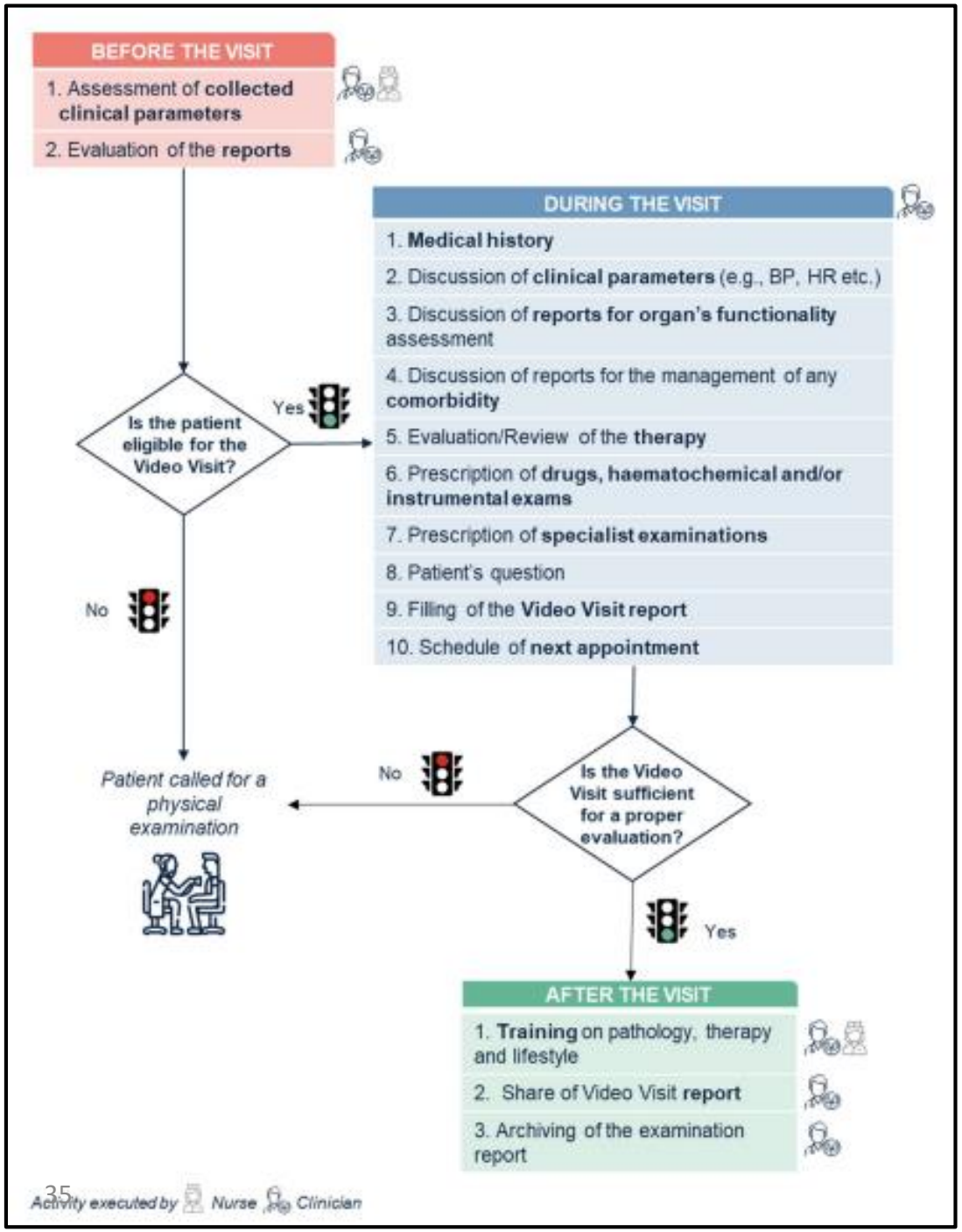


Al Ammary F. Adv Chronic Kidney Dis 2021;28(6):542-7.

TELE-CONSULTATION AND KT : ELIGIBILITY CRITERIA

Patient characteristics and clinical status	• 18–70 years old • Stable kidney function • Established immunosuppressive therapy • Low risk of comorbidities • In the follow-up program for ≥ 12 months
Technical requirements	• Access to computer and/or mobile devices • Webcam • Audio and microphone • Absence of firewalls impeding the download and access to teleconference platforms • Good and stable Internet connection • Basic skills in the use of computer/mobile devices and apps for video calling • Presence of a caregiver for assistance if the above skills cannot be ensured

Biancone L. J Nephrol 2022;35(3):725-33.



TELE-CONSULTATION AND KT : ORGANIZATION AND PROCEDURE

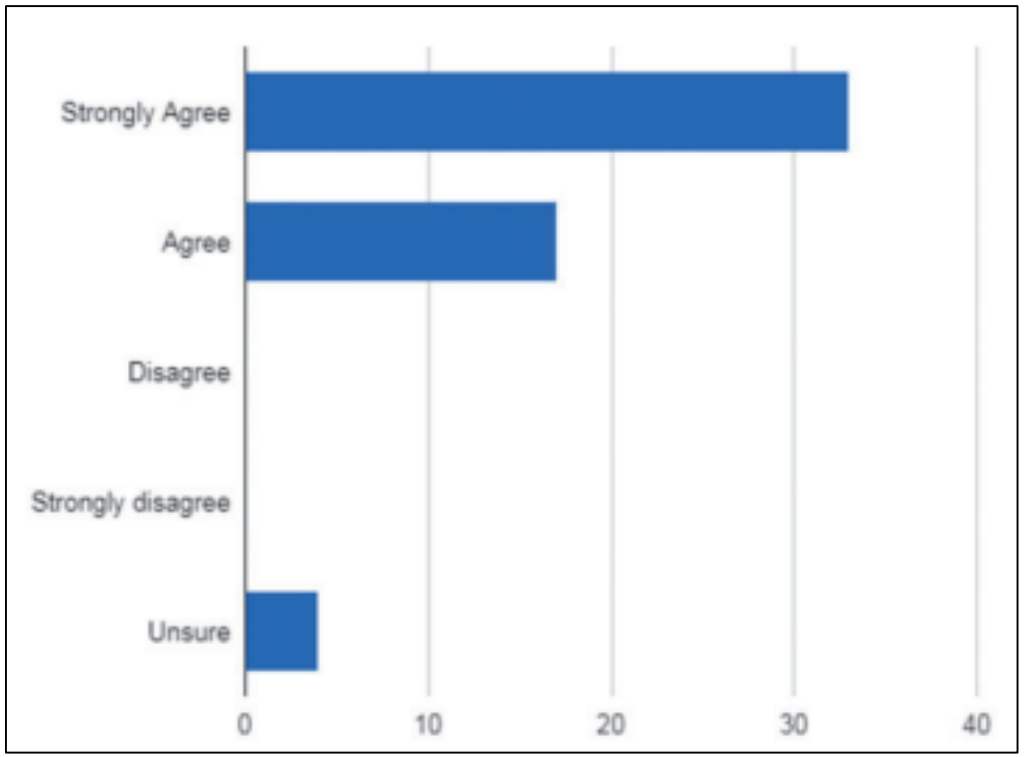
Biancone L. J Nephrol 2022;35(3):725-33.

TELE-CONSULTATION AND KT :
WHAT CANNOT BE DONE !

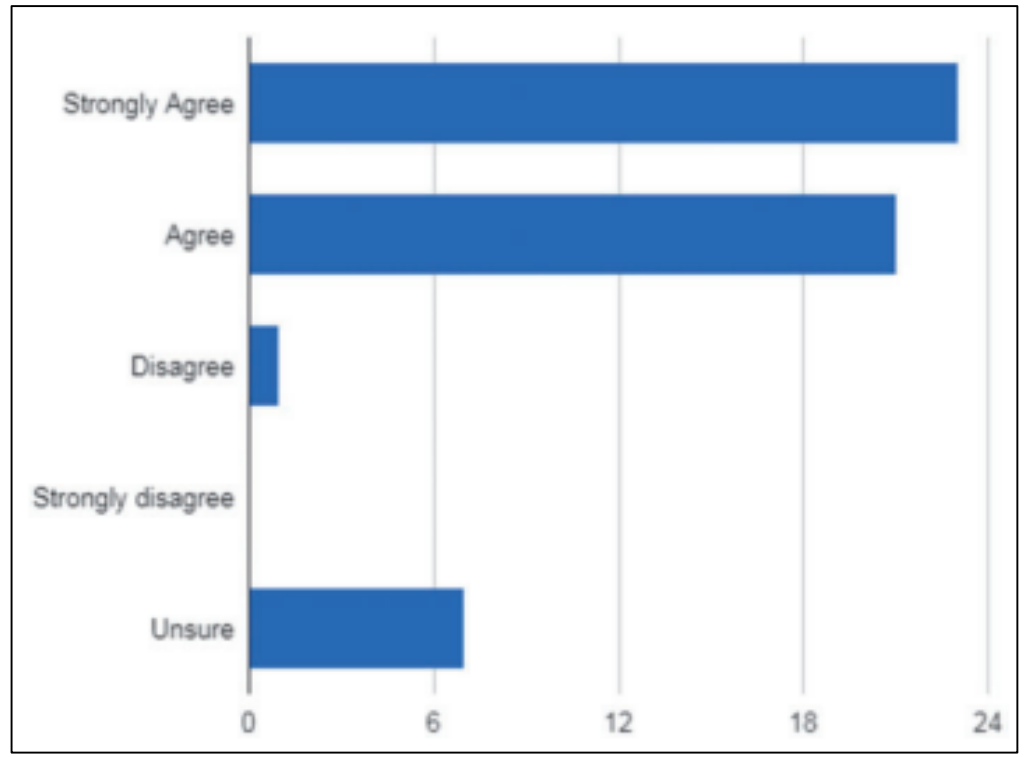
	Traditional visit	Video visit
Medical history	✓	✓
Assessment of clinical parameters:		
Weight	✓	✓
Blood pressure (BP)	✓	✓
Heart rate (HR)	✓	✓
Drug intake compliance	✓	✓
Other comorbidity parameters (e.g., glucose levels through glucometer for diabetic patients)	✓	✓
Physical examination	✓	×
Evaluation of hematochemical exams	✓	✓
Drug dosage evaluation	✓	✓
Evaluation of instrumental examinations organ's functionality assessment:		
Kidney US	✓	×
Ecocolordoppler (to be carried out at the TC)	✓	×
MRI	✓	×
Kidney biopsy (to be carried out at the TC)	✓	×
Evaluations of comorbidities:		
Instrumental examinations:	✓	✓
CT scan, MRI, X-ray, US	✓	✓
DXA	✓	✓
ECG	✓	✓
Infectious surveillance	✓	✓
Oncological surveillance	✓	✓
Evaluation/review of the therapy	✓	✓
Drug prescription, hematochemical and/or instrumental exams	✓	✓
Prescription of specialist examinations	✓	✓
Training on pathology, therapy and lifestyle	✓	✓
Scheduling future appointments	✓	✓
Archiving the examination report	✓	✓

Biancone L. J Nephrol 2022;35(3):725-33.

TELE-CONSULTATION AND KT : PATIENT SATISFACTION



"I felt I received same standard of care as I would have from a face-to-face appointment"



"The telehealth appointment helped me better understand my healthcare condition"

Andrew N. J Telemed Telecare 2020;26(4):232-8.

II- KIDNEY GRAFT FOLLOW-UP

1- RENAL FUNCTION MONITORING

KIDNEY ALLOGRAFT FUNCTION MONITORING

8: MONITORING KIDNEY ALLOGRAFT FUNCTION

8.1: We suggest measuring urine volume (*2C*):
- every 1–2 h for at least 24 h after transplantation (*2D*);
- daily until graft function is stable. (*2D*)

8.2: We suggest measuring urine protein excretion, *(2C)* at least:
- once in the first month to determine a baseline *(2D)*;
- every 3 months during the first year *(2D)*;
- annually, thereafter. *(2D)*

8.3: We recommend measuring serum creatinine, (*1B*) at least:
- daily for 7 days or until hospital discharge, whichever occurs sooner *(2C)*;
- 2–3 times per week for weeks 2–4 *(2C)*;
- weekly for months 2 and 3 *(2C)*;
- every 2 weeks for months 4–6 *(2C)*;
- monthly for months 7–12 *(2C)*;
- every 2–3 months, thereafter. *(2C)*

8.3.1: We suggest estimating GFR whenever serum creatinine is measured, (*2D*) using:
- one of several formulas validated for adults *(2C)*; or
- the Schwartz formula for children and adolescents. *(2C)*

KIDNEY ALLOGRAFT FUNCTION MONITORING

BOX 16: Post-KT monitoring of graft function

- We suggest monitoring graft function by measuring the urine volume, urinary protein excretion, serum creatinine (and eGFR), and performing US examination at a decremented frequency with progression of post-KT duration (Table 7).

Table 7. Suggested schedule for monitoring of graft function.

	First 24 h	Hospital stay	Month 1	Months 2–3	Months 4–6	Annual	Recommendation
Urine volume (2 C)	Every 1–2 h	daily	As necessary for the management of complications				1D
Urinary protein:creatinine ratio (2 C)			@month 1	@month 3	@month 6	@month 6	2D
Serum creatinine (1B) eGFR (2D)	Twice	daily	2–3/week	weekly	/2 weeks	/1–3 months	2 C
Ultrasonography (2 C)	Once		Once		Once	Once	2D

A- GFR ESTIMATE

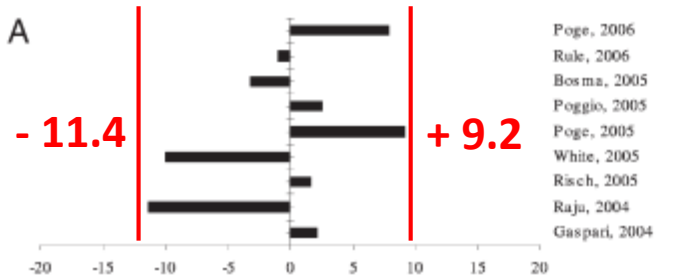
GFR ESTIMATE

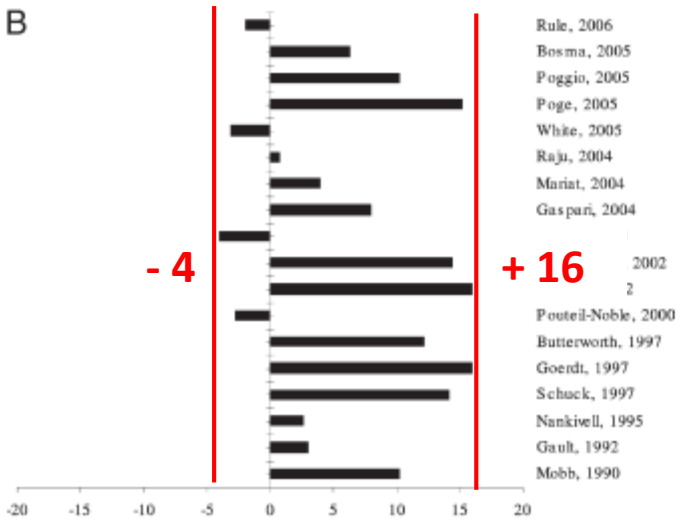
Table 1 GFR equations

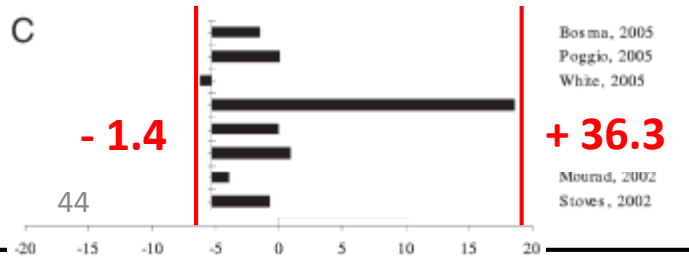
Years	Authors	GFR equations (ml/min/1.73 m^2)
1971	Jelliffe	GFR = 98 − [0.8 × (age − 20)/serum creat. × (body mass/1.73) × [0.9 if a woman]
1974	Kampmann	GFR = urine creatinine (mg/kg/min) × weight (kg) × 100/serum creatinine (mg/100 ml)
1976	Rowe	GFR = 133 − 0.64 × age
1976	Cockcroft	GFR = (140 − age) × weight (×0.85 if a woman)/(serum creat × 72)
1987	Keller	GFR = 130 – age
1993	Walser	GFR = 7.57 × (Serum Cre mmol/L)$^{-1}$ −0.103 × age + 0.096 × weight$^{-6.66}$
1995	Nankivell	GFR = 6.7/Serum Cre (mmol/L) + 0.25 × weight − 0.5 × urea − 0.01 × height^2 + 35 (25 if a woman)
1997	Baracskay	GFR = 1/2 [100/Serum Cre] + 88 − age
1999	MDRD	GFR = 170 × [Serum Cre]$^{-0.999}$ × [age]$^{-0.175}$ × [0.762 if a woman] × [1180 if an african american] × [BUN]$^{-0.170}$ × [Alb]$^{+0.318}$
2007	MDRD-6	GFR = 170 × (creatinine/88.4)$^{-0.999}$ × (age)$^{-0.176}$ × (urea × 2.8)$^{-0.170}$ × (albumin/10)$^{0.318}$ × (0.762 if a woman) × (1180 if African American)
2007	Lund-Malmö	eX − 0.00705 × age + 0. 0110 × LBM X: 4.93 − 0.0108 × serum creat (if serum creat < 150 µmol/L) X: 7.78 − 0.0005 × serum creat − 0.902 × ln (serum creat) (if serum creat ≥ 150 µmol/L)
2009	CKD-EPI	GFR = 141 × min(Scr/κ, 1)$^{\alpha}$ × max(Scr/κ, 1)$^{-1.209}$ × 0.993^{edad} × 1.018 [if a woman] where Scr is serum creatinine, *k* is 0.7 for women and 0.9 for men, α − 0.329 for women and −0.411 for men
2010	DAF	GFR = 80/serum creat. (70 if a woman)
2011	Gregori–Macías	GFR = 480.7902/serum creatinine$^{0.513288}$ × 1.008072^{age} × weight$^{0.298963}$
2012	BIS1	GFR = 3736 × creatinine$^{-0.87}$ × age$^{-0.95}$ × 0.82 (if female)

Musso CG. Int Urol Nephrol 2016;48(7);1105-10.

eGFR EQUATIONS AFTER KT : BIASES AND ACCURACY



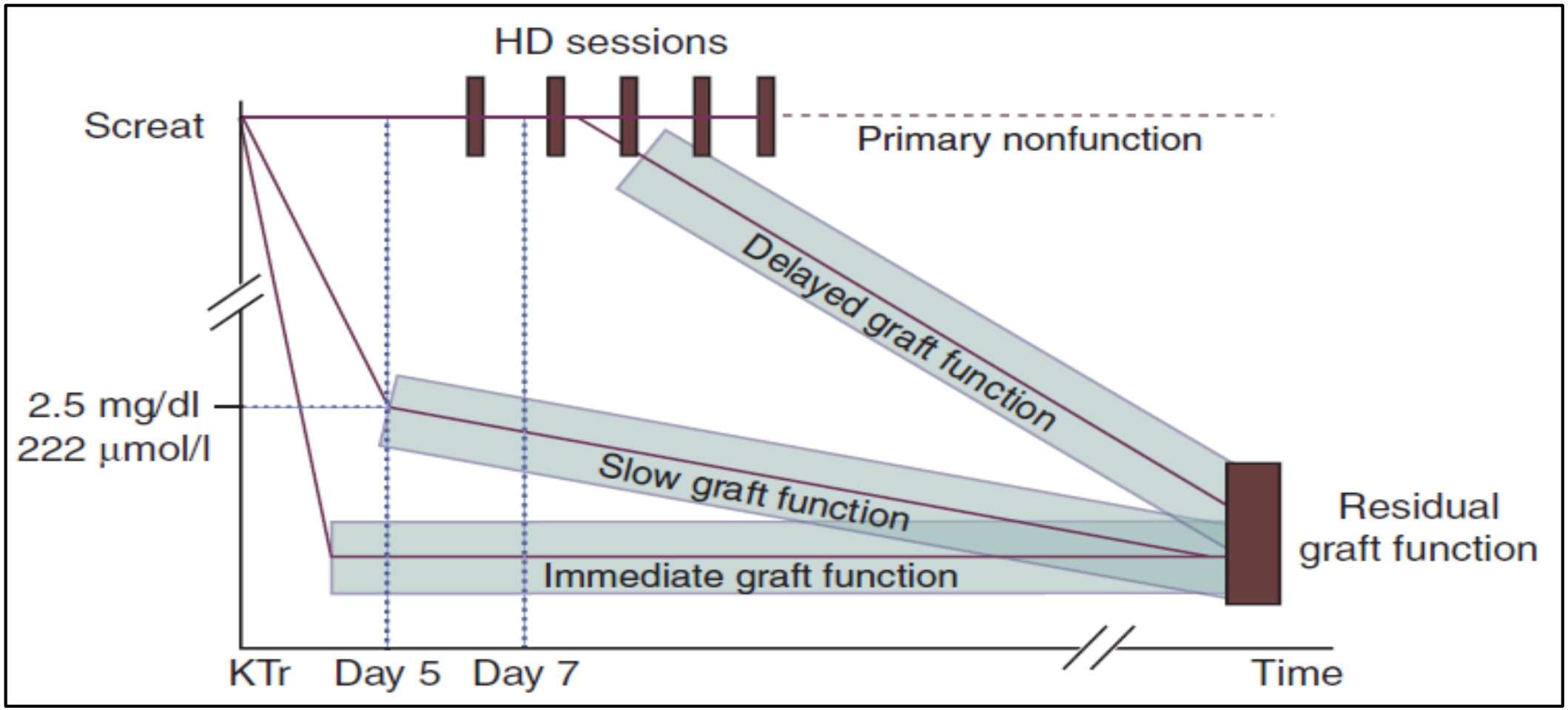




Equations and Studies	Percent of Estimates Within 10%	20%	30%
4-Variable MDRD Study equation			
Pooled estimate (95% CI)			
All studies	35 (32-38)	59 (54-65)	76 (74-78)
High quality*	34 (32-37)	53 (46-60)	77 (75-79)
Cockcroft-Gault equation			
Pooled estimate (95% CI)			
All studies	30 (28-32)	45 (41-48)	73 (71-75)
High quality*	32 (30-35)	37 (31-44)	73 (71-76)
Nankivell equation			
Pooled estimate (95% CI)			
All studies	31 (28-33)	42 (39-46)	68 (65-70)
High quality*	38 (32-45)	35 (32-38)	76 (74-79)

White CA. AJKD 2008;51(6);1005-15.

RENAL FUNCTION RECOVERY AFTER KIDNEY TRANSPLANTATION



Schröppel B. Kidney Int 2014;86(2):251-8.

eGFR TRAJECTORIES AND GRAFT/PATIENT SURVIVAL PREDICTION

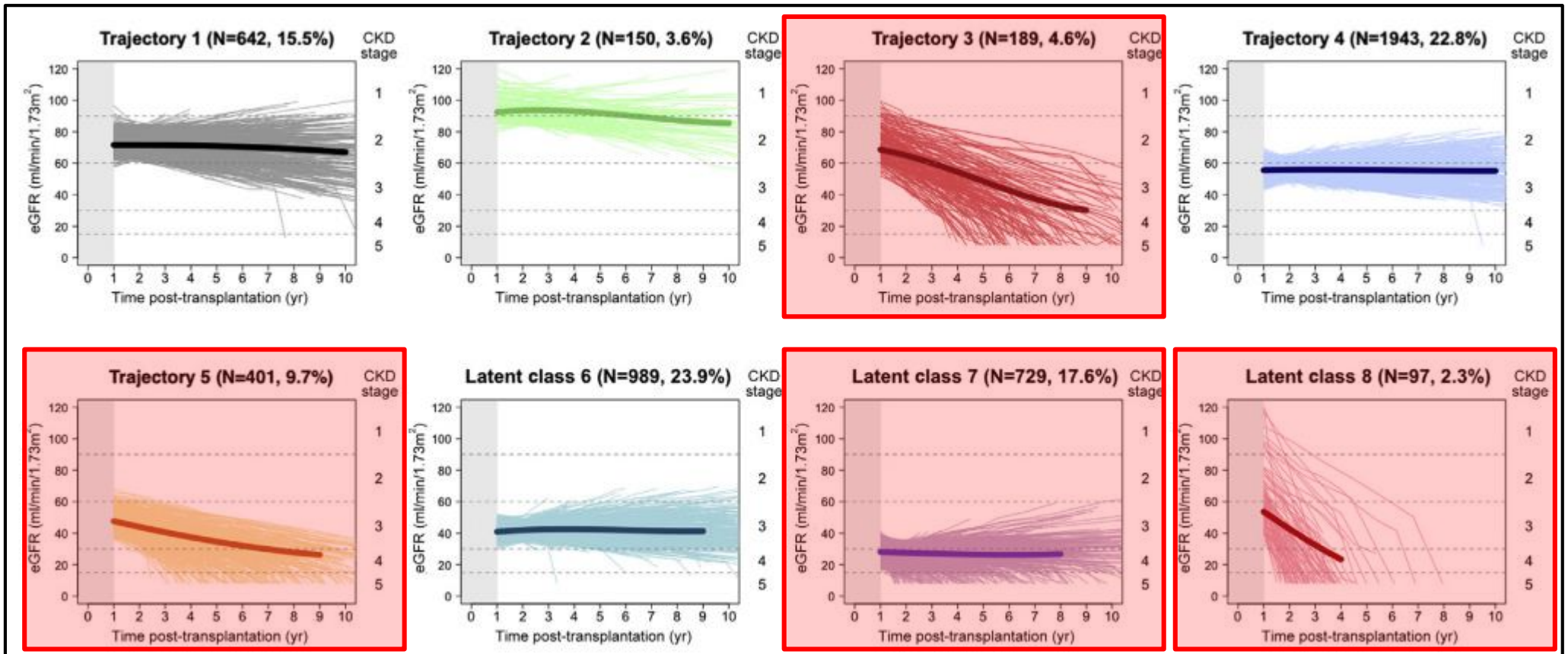


Figure 1 | (a) Estimated glomerular filtration rate (eGFR) profiles and their individual trajectories in kidney recipients in the derivation cohort.

Raynaud M. Kidney Int 2021;99(1):186-97.

B- GFR MEASURE

KIDNEY ALLOGRAFT GFR MEASUREMENT

- **Exogenous substances used :**
  - ✓ **Inulin :** the 1st substance used, *gold standard*
  - ✓ **Radio-pharmaceutical substances :**
    - ➢ Diethylene-triamino-penta-acetate labeled with Technetium (**^{99m}TcDTPA**)
    - ➢ Iothalamate marked with Iodine (**^{125}I-iothalamate**)
    - ➢ Ethylene-diamine-tetra-acetic acid labeled with Chromium 51 (**^{51}CrEDTA**)
  - ✓ **Iodine contrast agents : Iohexol**

White CA. AJKD 2008;51(6);1005-15.

Lacour B. Rev Francoph Lab. 2013;2013(451):25-37.

2- ANATOMICAL MONITORING

KIDNEY ALLOGRAFT ANATOMICAL MONITORING

8: MONITORING KIDNEY ALLOGRAFT FUNCTION

8.4: We suggest including a kidney allograft ultrasound examination as part of the assessment of kidney allograft dysfunction. *(2C)*

KIDNEY ALLOGRAFT ANATOMICAL MONITORING : DOPPLER ULTRASOUND

Figure 1. Morphologie, taille et différenciation parenchymo-sinusale du greffon normal – Echographie standard.

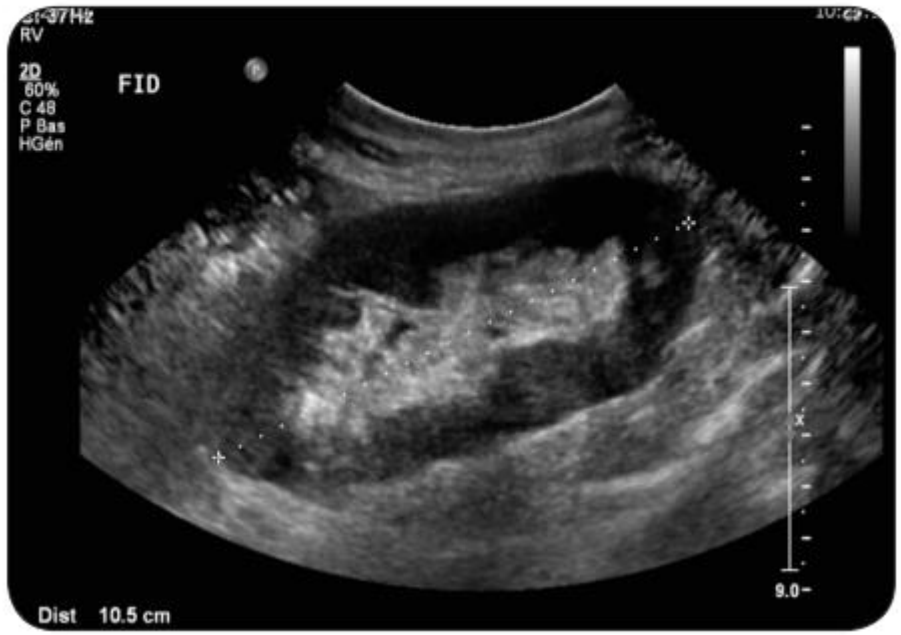
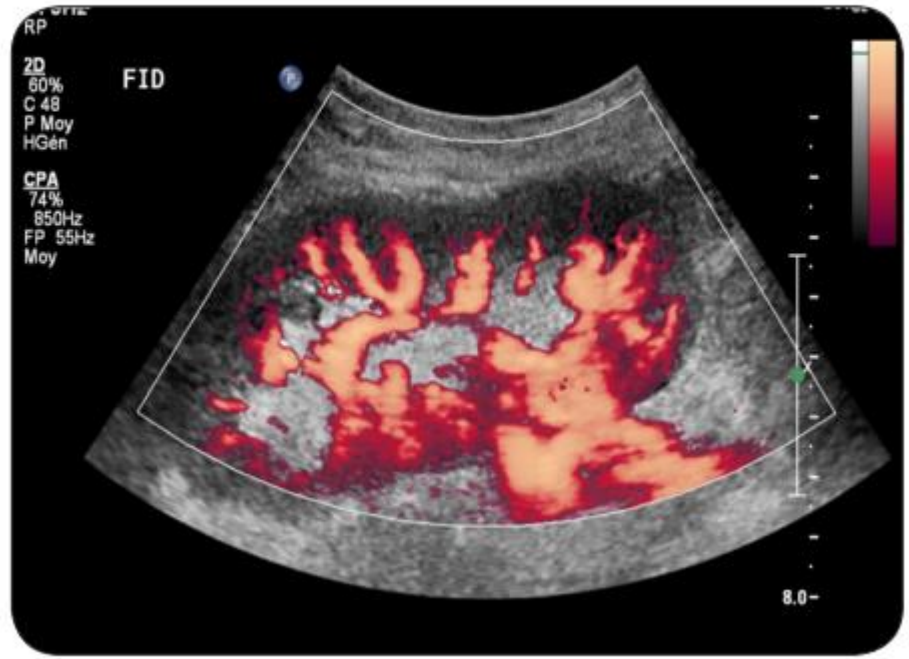


Figure 2. Perfusion normale du parenchyme du rein greffé en doppler puissance.



Gillard R. Rev Med Liege 2019;74(9):484-7.

KIDNEY ALLOGRAFT ANATOMICAL MONITORING : DOPPLER ULTRASOUND

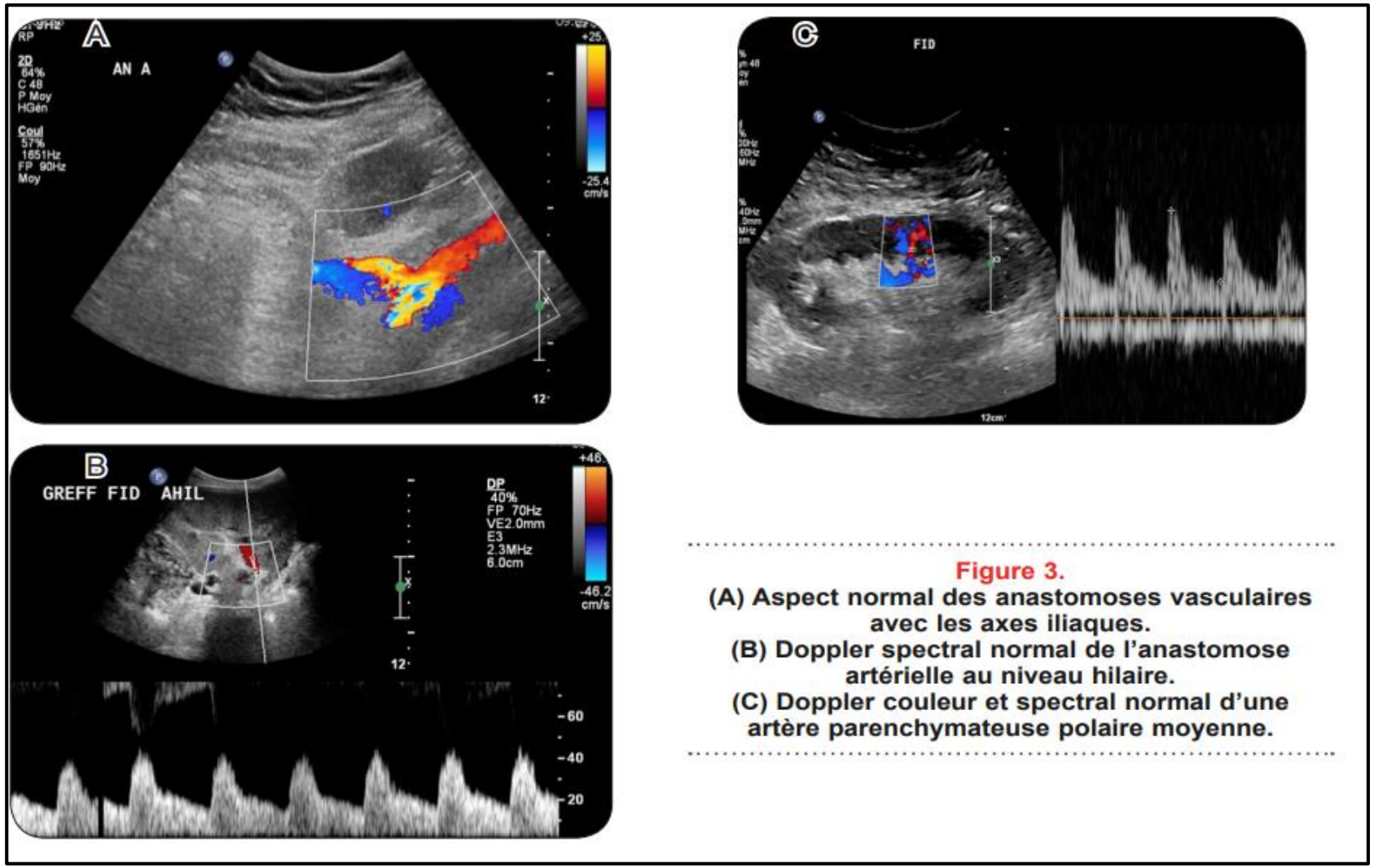


Figure 3.
(A) Aspect normal des anastomoses vasculaires avec les axes iliaques.
(B) Doppler spectral normal de l'anastomose artérielle au niveau hilaire.
(C) Doppler couleur et spectral normal d'une artère parenchymateuse polaire moyenne.

Gillard R. Rev Med Liege 2019;74(9):484-7.

KIDNEY ALLOGRAFT ANATOMICAL MONITORING : FIBROSCAN

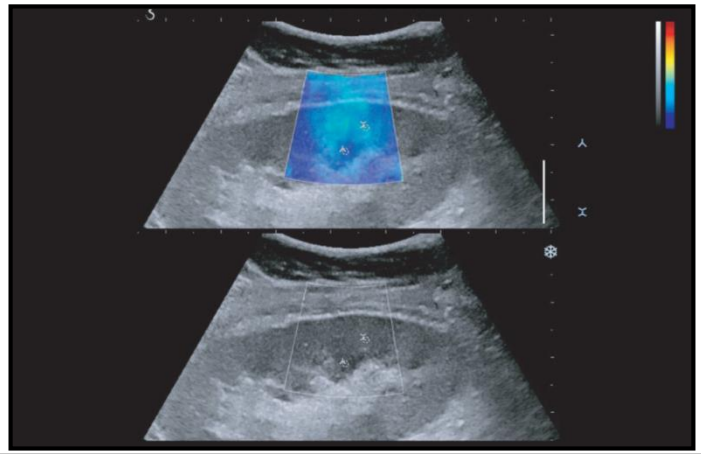


Fig. 1 SWE of a graft kidney. The upper panel is the color-coded elasticity map scaled from 0 to 60 kPa. The lower panel is the simultaneous grayscale ultrasound image. The regions of interest are placed in the cortex (X) and the medulla (Λ).

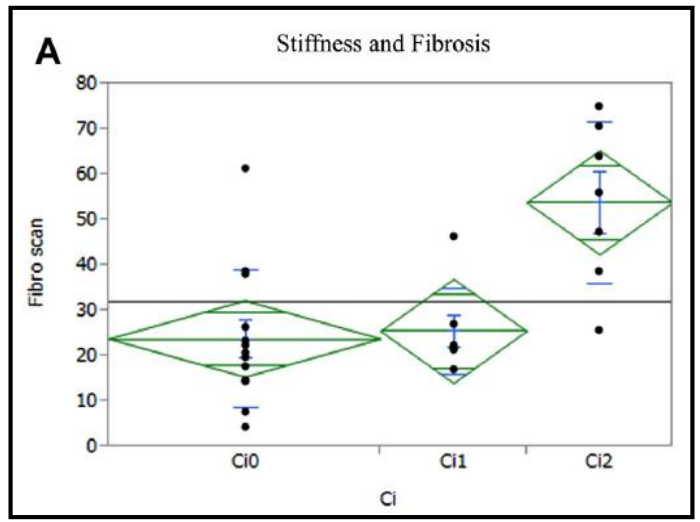
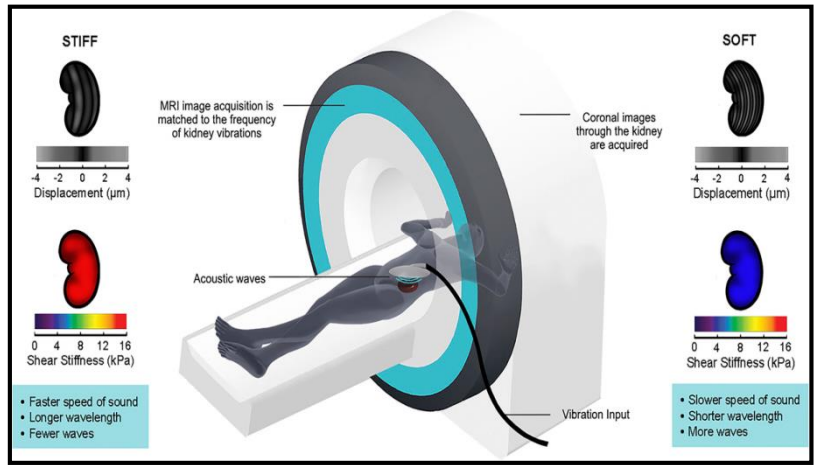


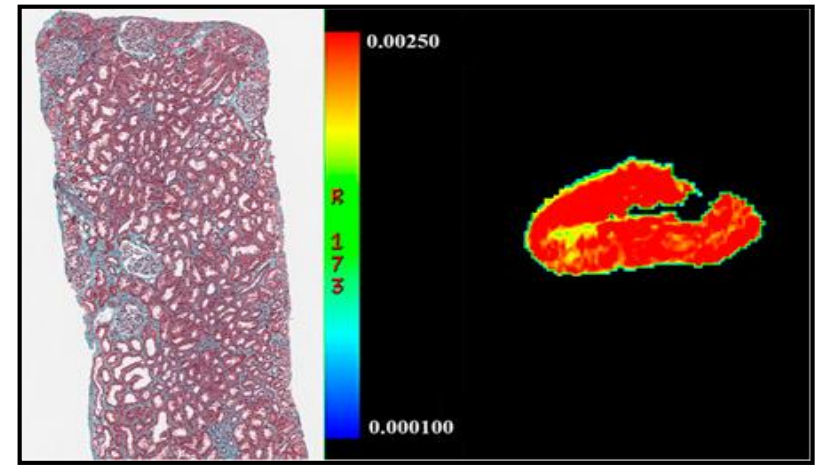
Fig. 2. (A) Comparison of stiffness values and chronic allograft injury Banff chronic changes in the interstitium grades.

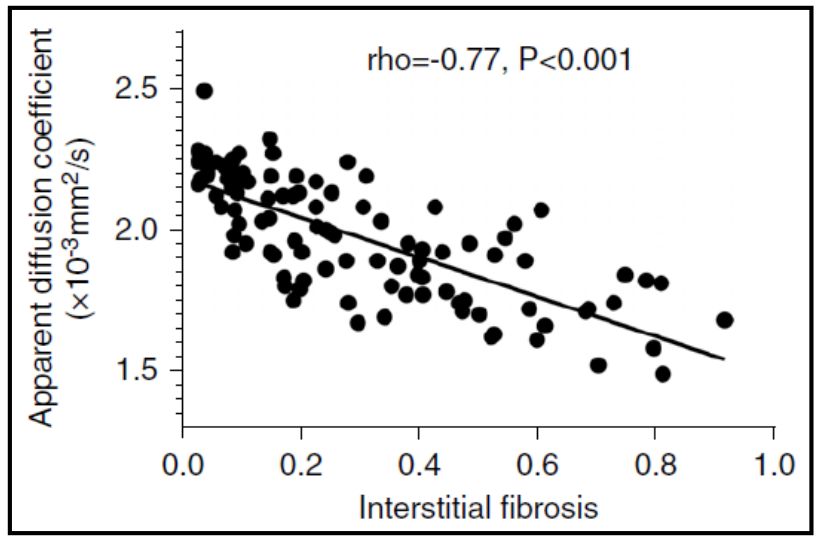
Fig 1. The transient elastography machine (Fibro Scan), which measures organ stiffness. The cylinder is 10 mm wide and 25 to 30 mm long.

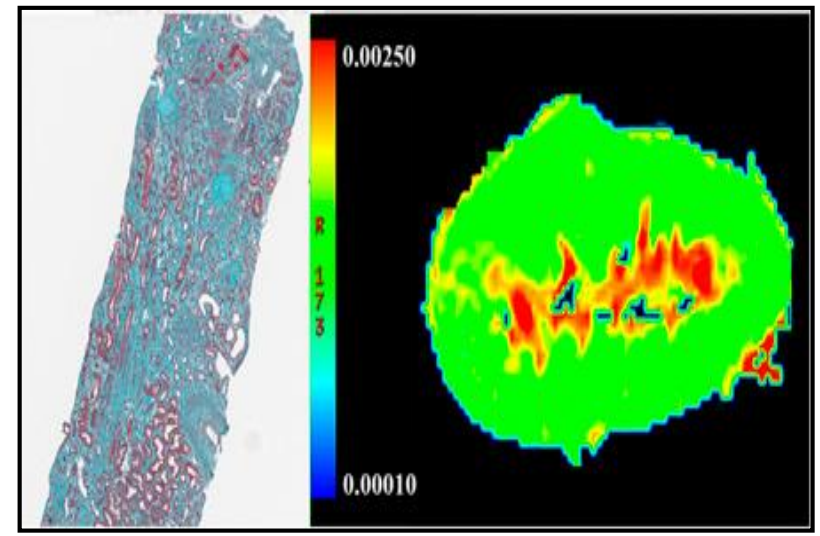
Nakao T. Transplant Proc 2015;47, 640-3.
Ma MKM. Int J Urol 2018;25(5), 450-5.

KIDNEY ALLOGRAFT ANATOMICAL MONITORING :
MRI ELASTOGRAPHY





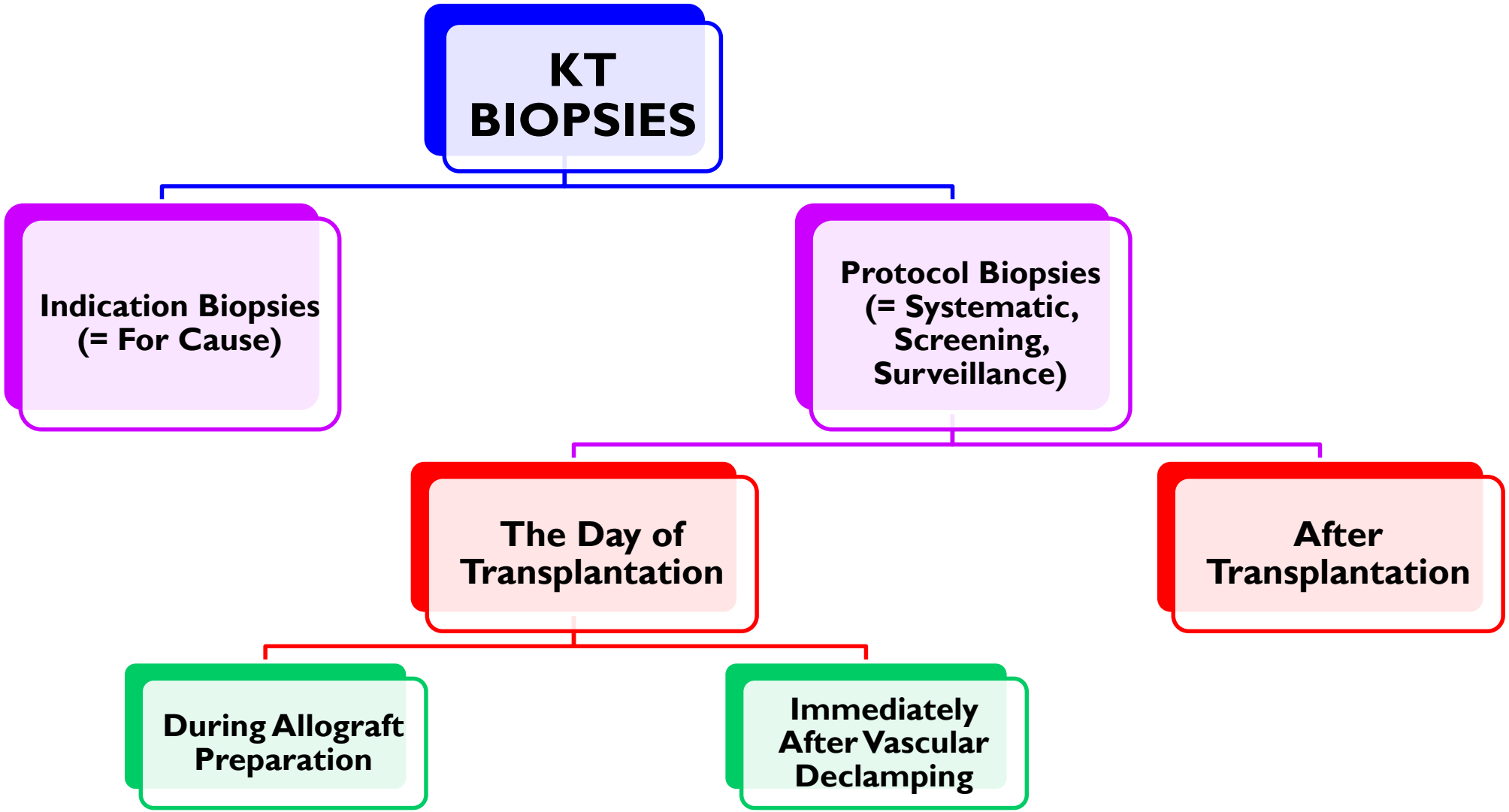




Wang W. CJASN 2019;14:1372–80.
Kirpalani A. Clin J Am Soc Nephrol 2017;12:1671–9.

3- HISTOLOGICAL MONITORING

KIDNEY TRANSPLANT BIOPSIES



INDICATION BIOPSIES

THE RENAL ASSOCIATION
founded 1950

Guideline 5.7 – KTR: Renal biopsy in chronic allograft injury

We suggest that a renal transplant biopsy is indicated:

- If there is a persistent unexplained elevation of creatinine or failure to return to baseline after an episode of biopsy proven acute rejection (BPAR) (1C)
- Every 7-10 days during delayed graft function (DGF) (2C)
- If expected renal function is not achieved within 4-8 weeks (2D)
- If sustained new onset proteinuria develops (PCR >50 mg/mmol or ACR >35 mg/mmol) (2C)

PROTOCOL BIOPSIES

BOX 18: Protocol/surveillance biopsy

- We suggest that all very-high- and high-risk KTRs undergo a scheduled graft biopsy (with staining for C4d) at 3–6 months post-KT and 1–3 times thereafter for the first 2 years (NG).
- We suggest at least one graft biopsy (with staining for C4d) in intermediate-risk KTRs during the first year [59] (NG).
- We suggest that any KTR with detected *de novo* DSA, or with one biopsy confirmed ABMR episode or evidence of non-adherence to undergo at least one protocol biopsy (NG).
- We suggest that a protocol biopsy be obtained prior to a shift in the maintenance immunosuppression protocol and at 3 months thereafter (NG).
- We suggest that a protocol biopsy to be obtained in KTRs with a high risk of recurrence of their original disease (NG).

BENEFITS OF PROTOCOL BIOPSIES

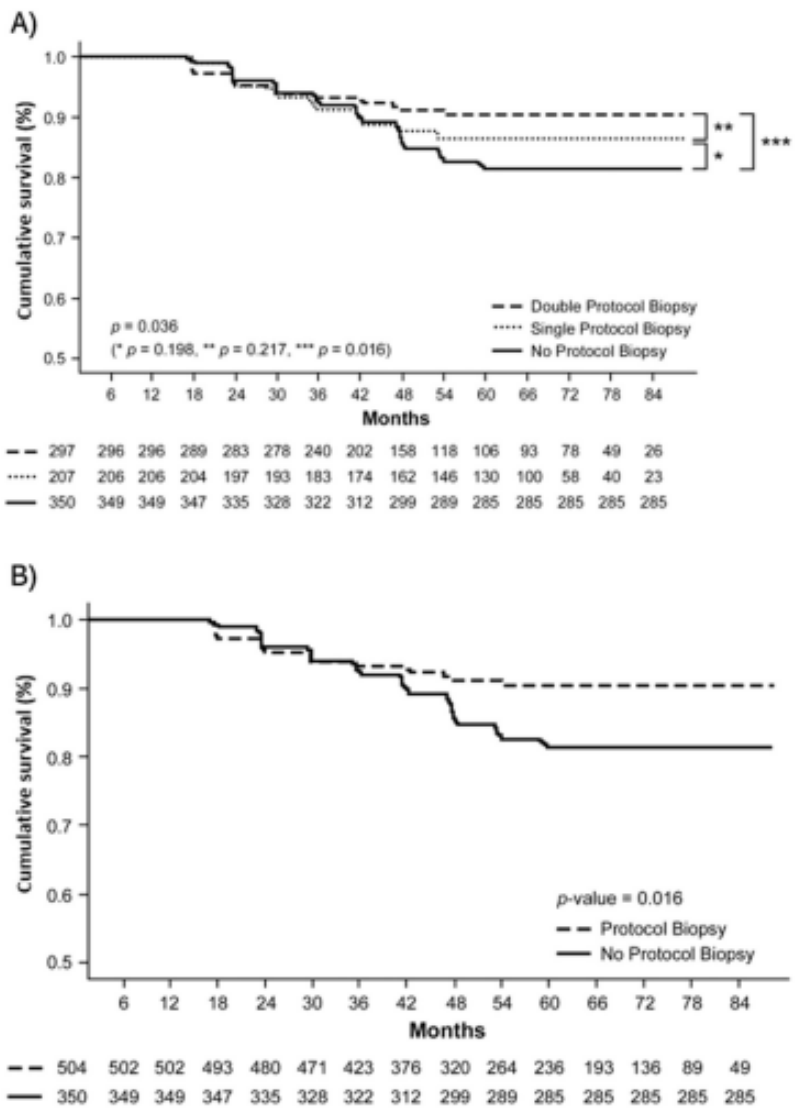


Fig 3. Kaplan-Meier curve for CKD progression analysis between 3 groups **(A)** and 2 groups **(B)**.

Table 5. Cox Regression Hazard Model for Risk Factor Analysis of Graft Survival

Characteristics	Multivariable HR (95% CI)	*P* Value
Recipient		
Age		
Sex (male)	1.257 (0.828-1.910)	.283
Diabetes (+)	1.803 (1.162-2.797)	**.009**
Hypertension (+)		
Donor		
Age	1.007 (0.990-1.025)	.411
Sex (male)		
Diabetes (+)	1.076 (0.536-2.161)	.837
Hypertension (+)	1.149 (0.651-2.025)	.632
Creatinine		
High HLA I mismatch (≥3)		
High HLA II mismatch (≥2)		
Donor specific antigen		
ABO-incompatible KT		
Induction (rATG)	1.320 (0.844-2.067)	.224
DDKT	1.181 (0.738-1.891)	.489
Rejection episode	2.757 (1.815-4.188)	**<.001**
Post-KT GN	4.048 (2.685-6.101)	**<.001**
Protocol biopsy		
Single biopsy	1.106 (0.628-1.947)	.728
Double biopsy	0.451 (0.229-0.888)	**.021**
CMV (≥50/400,000)	1.278 (0.734-2.225)	.385
BKV nephritis		

Lee O. Transplant Proc. 2023;55(4):756-68.

COMPLICATIONS OF KT BIOPSIES

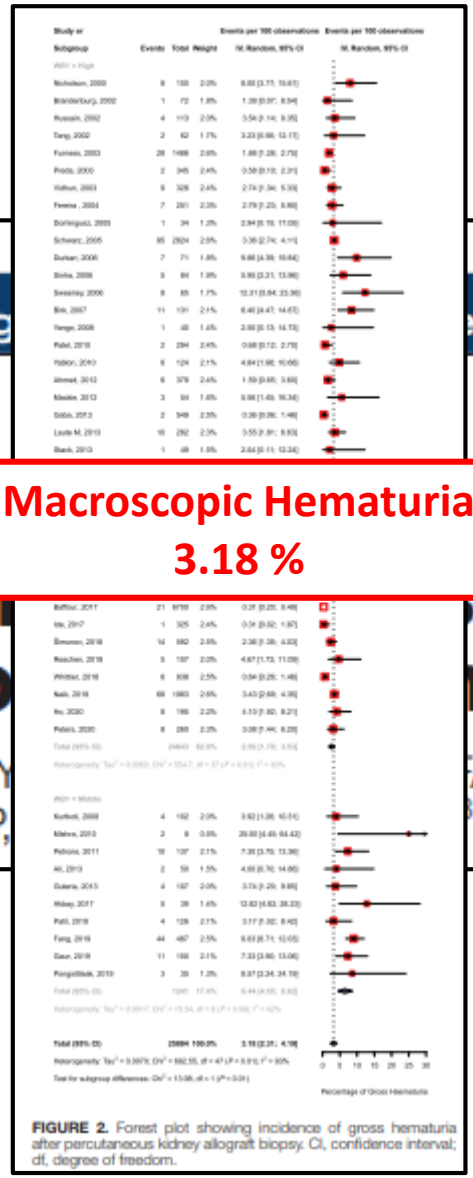


FIGURE 2. Forest plot showing incidence of gross hematuria after percutaneous kidney allograft biopsy. CI, confidence interval; df, degree of freedom.

Macroscopic Hematuria
3.18 %

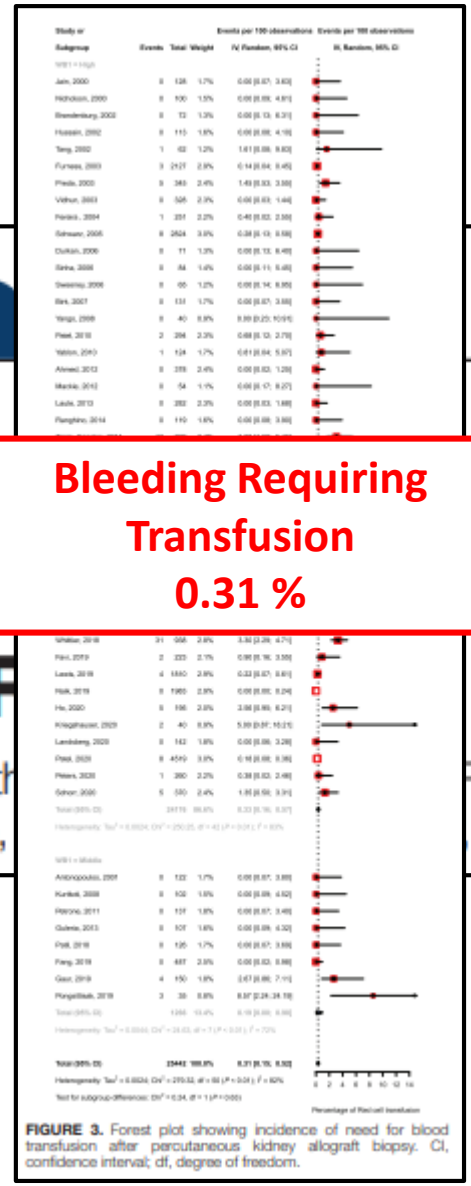


FIGURE 3. Forest plot showing incidence of need for blood transfusion after percutaneous kidney allograft biopsy. CI, confidence interval; df, degree of freedom.

Bleeding Requiring Transfusion
0.31 %

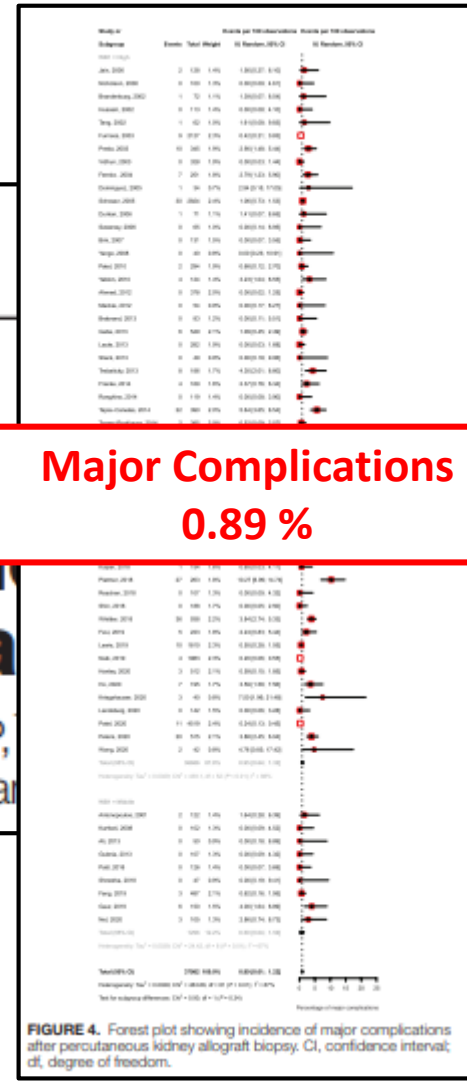


FIGURE 4. Forest plot showing incidence of major complications after percutaneous kidney allograft biopsy. CI, confidence interval; df, degree of freedom.

Major Complications
0.89 %

Ho QY. Transplantation 2022;106(7):1497-506.

4- BIOMARKERS

CLINICAL UTILITY OF BIOMARKERS

TABLE 3 Selected biomarkers and their clinical utility in kidney transplantation

Biomakers	Potential clinical use
IFN-γ	Predicts rejection risk For risk stratification and selection of immunosuppression
IL-2	Predicts rejection risk For risk stratification and selection of immunosuppression
Serum soluble CD30	Predicts long-term allograft outcome
T cells CD26 and CD28 surface antigens	Associated with acute rejection and/or malignancy after transplantation
Regulatory T cells	Predicts acute rejection risk
Target enzyme activity: IMPDH	May predict acute rejection risk or MPA-associated side effects Better guide MPA therapy
Target enzyme activity: mTOR	Better guide mTOR inhibitor therapy
NFAT-regulated gene expression	May identify those at higher risk of acute rejection, opportunistic infections, cancers and cardiovascular risk Complements CNI pharmacokinetics to better guide CNI therapy
CXCs	Urinary CXCL-9 and CXCL-10 proteins as markers for kidney graft inflammation and alloimmune response Urinary CCL-2 as marker for inflammation and interstitial fibrosis in renal allografts
dd-cfDNA	Early detection of graft injury due to rejection, specific infections, or ischemia Serial dd-cfDNA determinations help to guide changes in immunosuppression, and to monitor minimization
CYP3A5	May help to determine the optimal starting tacrolimus dose

Abbreviations: CNI, calcineurin inhibitor; CXC, chemoattractant cytokines or chemokines; CYP, cytochrome P450; Donor-derived cell-free DNA, dd-cfDNA; IFN, interferon; IL, interleukin; IMPDH, inosine-monophosphate-dehydrogenase; MPA, mycophenolic acid; NFAT, Nuclear Factor of Activated T-Cell; mTOR, mammalian target of rapamycin.

Cheung CY. Nephrology 2022;27:475-83.

BIOMARKERS OF ACUTE REJECTION : IL-23 AND IL-17

DOI: 10.1002/JLB.5AB0318-148R

J Leukoc Biol. 2018;104:1229–1239.

JLB JOURNAL OF LEUKOCYTE BIOLOGY

BRIEF CONCLUSIVE REPORT

The role of IL-23/IL-17 axis in human kidney allograft rejection

Youssra Haouami[1] | Tarak Dhaouadi[1] | Imen Sfar[1] | Mongi Bacha[1,2] | Tahar Gargah[1,3] | Rafika Bardi[1] | Ezzeddine Abderrahim[1,2] | Rym Goucha[1,2] | Taïeb Ben Abdallah[1,2] | Yousr Gorgi[1]

BIOMARKERS OF ACUTE REJECTION : IL-23 AND IL-17

TABLE 3 Cytokine plasma levels in patients (GI) and controls (GII)

	D-1			D7		
Cytokine	GI	GII	*P*-value	GI	GII	*P*-value
IL-17A (pg/ml)	79.407	31	0.00022[a]	157.455	31.1	$<10^{-14}<10^{-14}$[b]
IL-17F (pg/ml)	38.041	28.87	0.323	47.86	22.99	0.015[c]
IL-23 (pg/ml)	35.752	37.204	0.197	33.82	18.811	$<10^{-17}<10^{-17}$[d]
Cytokines' evolution in GI		D-1		D7		*P*-value
IL-17A (pg/ml)		79.407		157.455		$<10^{-4}$[e]
IL-17F (pg/ml)		38.041		47.86		0.323
IL-23 (pg/ml)		35.752		33.82		0.163

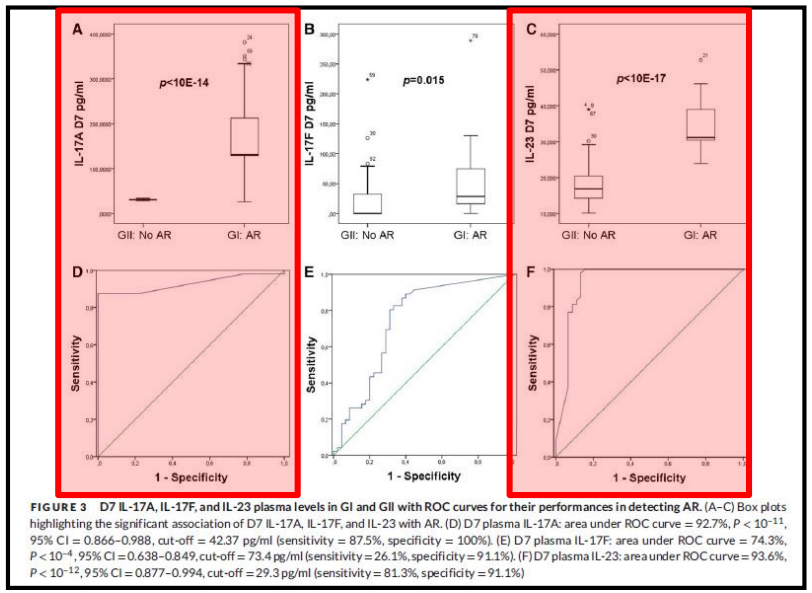


FIGURE 3 D7 IL-17A, IL-17F, and IL-23 plasma levels in GI and GII with ROC curves for their performances in detecting AR. (A–C) Box plots highlighting the significant association of D7 IL-17A, IL-17F, and IL-23 with AR. (D) D7 plasma IL-17A: area under ROC curve = 92.7%, $P < 10^{-11}$, 95% CI = 0.866–0.988, cut-off = 42.37 pg/ml (sensitivity = 87.5%, specificity = 100%). (E) D7 plasma IL-17F: area under ROC curve = 74.3%, $P < 10^{-4}$, 95% CI = 0.638–0.849, cut-off = 73.4 pg/ml (sensitivity = 26.1%, specificity = 91.1%). (F) D7 plasma IL-23: area under ROC curve = 93.6%, $P < 10^{-12}$, 95% CI = 0.877–0.994, cut-off = 29.3 pg/ml (sensitivity = 81.3%, specificity = 91.1%)

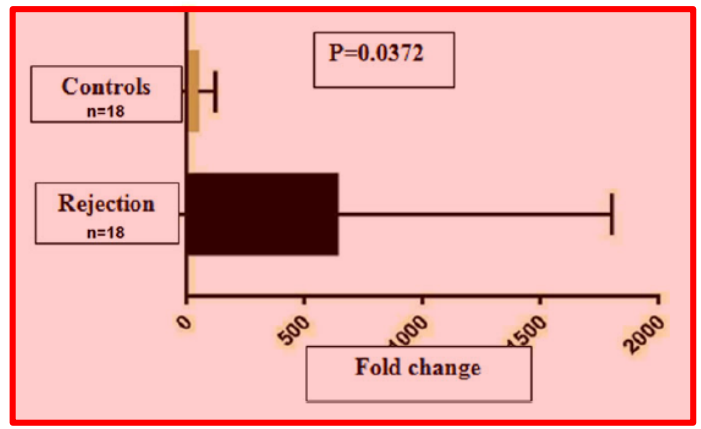


FIGURE 5 Box plot (median [1st–3rd quartile]) for IL-17A mRNA relative expression in KTR with AR and in patients with ATN. Significant increase of intragraft IL-17A expression in acute rejection, $P = 0.0372$

Haouami Y. J Leukoc Biol 2018;104(6):1229-39.

BIOMARKERS OF EMT/ALLOGRAFT FIBROSIS : VIMENTIN, CD45, UROPLAKIN

médecine/sciences 2015 ; 31 : 68-74

DOI : 10.1051/medsci/20153101015

La transition épithélio-mésenchymateuse et la fibrose du transplant rénal

Imen Mezni[1,2], Pierre Galichon[1,3], Mohamed Mongi Bacha[2,5], Imen Sfar[2], Alexandre Hertig[1,3], Rim Goucha[2,5], Yi-Chun Xu-Dubois[1], Ezzedine Abderrahim[5], Yousr Gorgi[2], Eric Rondeau[1,3], Taieb Ben Abdallah[2,5]

› La transition épithélio-mésenchymateuse (TEM) est un processus par lequel les cellules épithéliales différenciées subissent une conversion phénotypique et acquièrent un phénotype de cellules mésenchymateuses. Outre la morphologie allongée, s'y associent une

Néphrologie & Thérapeutique 14 (2018) 153–161

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Original article

Urinary mRNA analysis of biomarkers to epithelial mesenchymal transition of renal allograft

Imen Mezni [a,b,d,*], Pierre Galichon [a,b,c], Mohammed Mongi Bacha [d,g], Yi-Chun Xu-Dubois [b,e], Imen Sfar [d], David Buob [a,b,f], Sabrina Benbouzid [h], Rim Goucha [d,g], Yousr Gorgi [d], Ezzedine Abderrahim [g], Mondher Ounissi [g], Karine Dahan [i], Nacera Ouali [c], Alexandre Hertig [a,b,c], Isabelle Brocheriou [a,b,f], Aly Raies [j], Taieb Ben Abdallah [d,g], Éric Rondeau [a,b,c]

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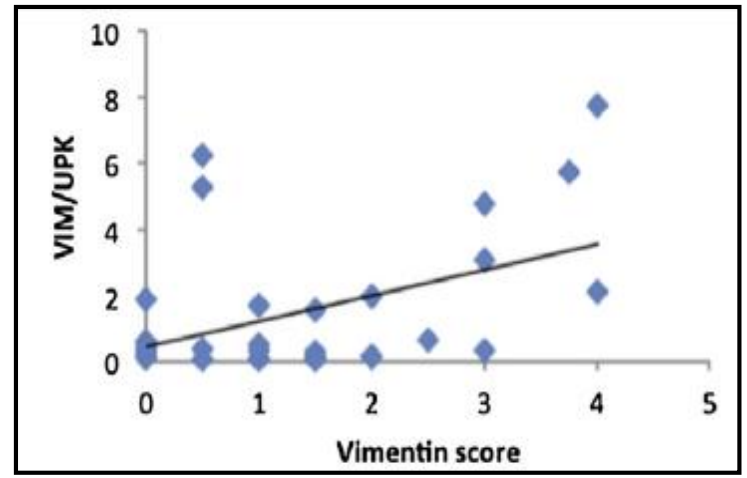
[i] Service de néphrologie et dialyses, hôpital Tenon, 4, rue de la Chine, 75020 Paris, France
[j] Laboratoire des microorganismes et biomolécules actives, faculté des sciences de Tunis, université de Tunis El-Manar, 20, rue de Tolède, 2092 Tunis, Tunisia

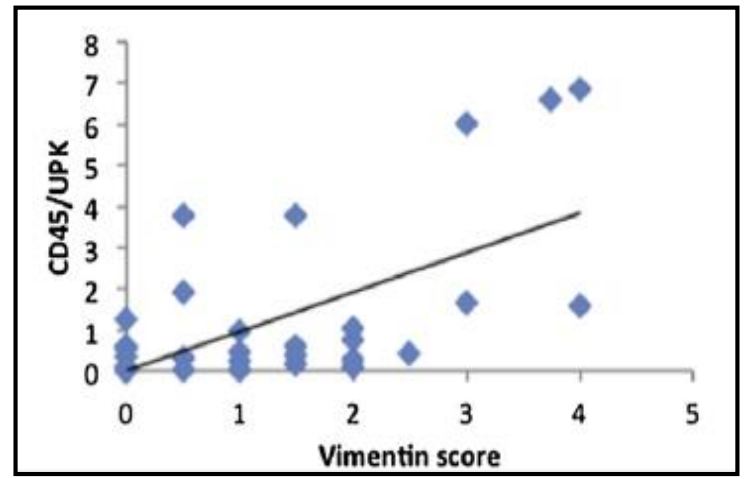
BIOMARKERS OF EMT/ALLOGRAFT FIBROSIS : VIMENTIN, CD45, UROPLAKIN

- Prospective, multicenter study
- Charles Nicolle Hospital, Tunis + Tenon Hospital, Paris
- 2008 - 2013
- 75 KT patients (23 living and 52 deceased donors)
- At 3 months post-KT:

  1. Vimentin and β-Catenin expression in the surveillance biopsy (immunohistochemistry)

  2. Urinary measured mRNA encoding Vimentin, CD45, GAPDH and UPK1a (quantitative PCR)





Mezni I. Med Sci. 2015;31(1):68-74.

III- IMMUNOLOGICAL MONITORING

IMMUNOLOGICAL RISK STRATIFICATION

Table 3. Proposed categorisation of recipient's immunological risk.

CAT A	Highest risk – *KT is contraindicated*: Positive CDC-XM; Positive FCM-XM MCS >250; Positive DSA RIS ≥17
CAT B	Very High risk – *requires desensitisation* Positive FCM-XM MCS ≤250; Positive DSA RIS <17; Historic positive DSA
CAT C	High risk – *Possible desensitisation; induction mandatory; modified immunosuppression and follow-up protocol* Previous graft failure due to rejection during first post-KT year, re-transplant, full HLA mismatches; CPRA >80% positive non-DSA anti-HLA Abs
CAT D	Intermediate risk – *Induction, modified immunosuppression and follow-up* Re-transplant; >3/6 HLA mismatches, CPRA 20–80%, *positive non DSA anti-HLA Abs*
CAT E	Low risk – Lacking all of the above factors, proportionate to HLA matching and without anti HLA Abs

CDC: complement-dependent cytotoxicity; DSA: donor-specific Abs; FCM: flow-cytometric; MCS: mean channel shift; CPRA: Calculated Panel Reactive Antibodies; RIS: Relative Mean Fluorescence Intensity (MIF) Score (10 points for each MFI ≥10 000 + 5 points for each MFI 5000–9999 + 2 points for each MFI 2000–4999); XM: Cross-match.

IMMUNOLOGICAL RISK STRATIFICATION

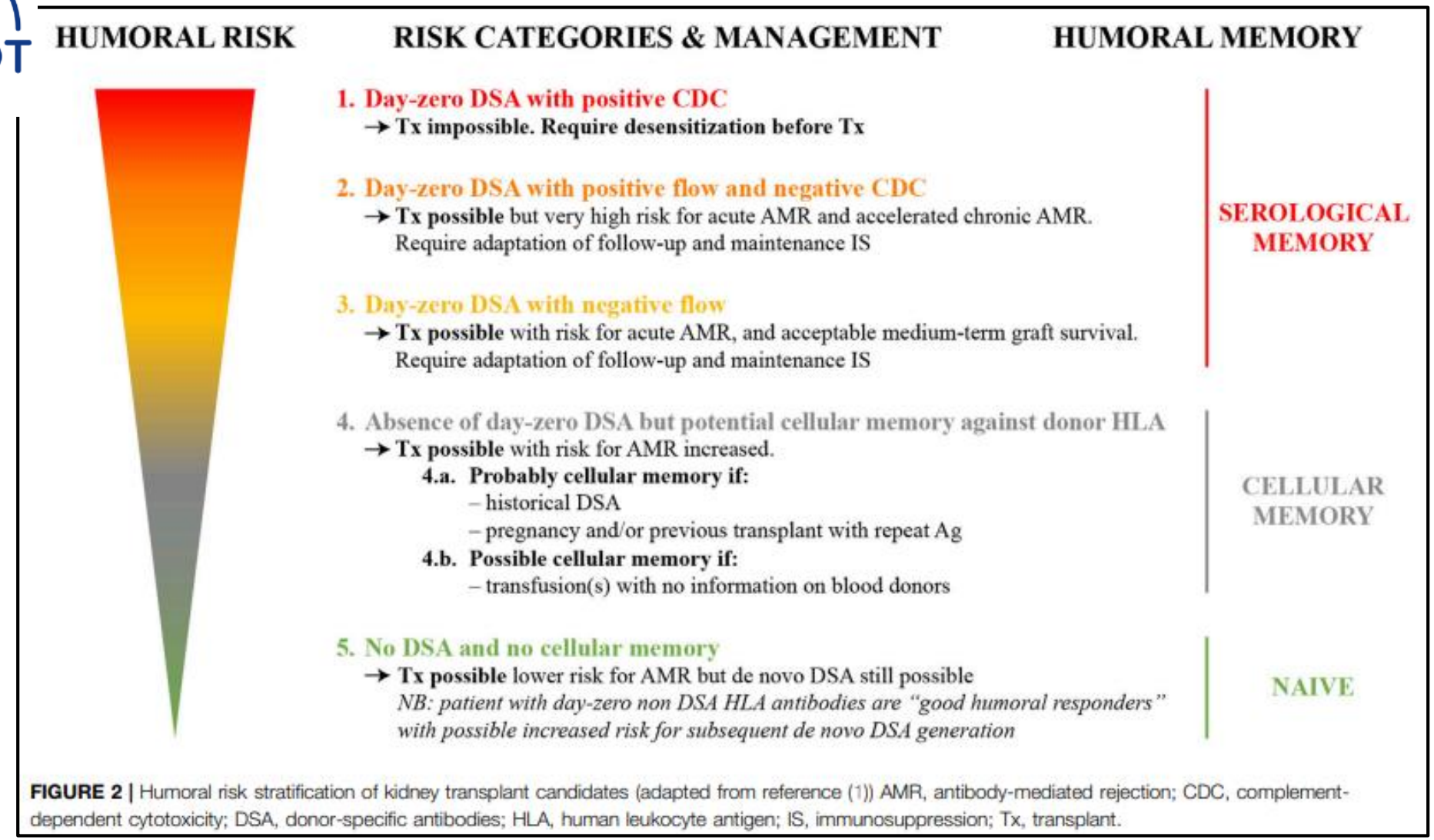
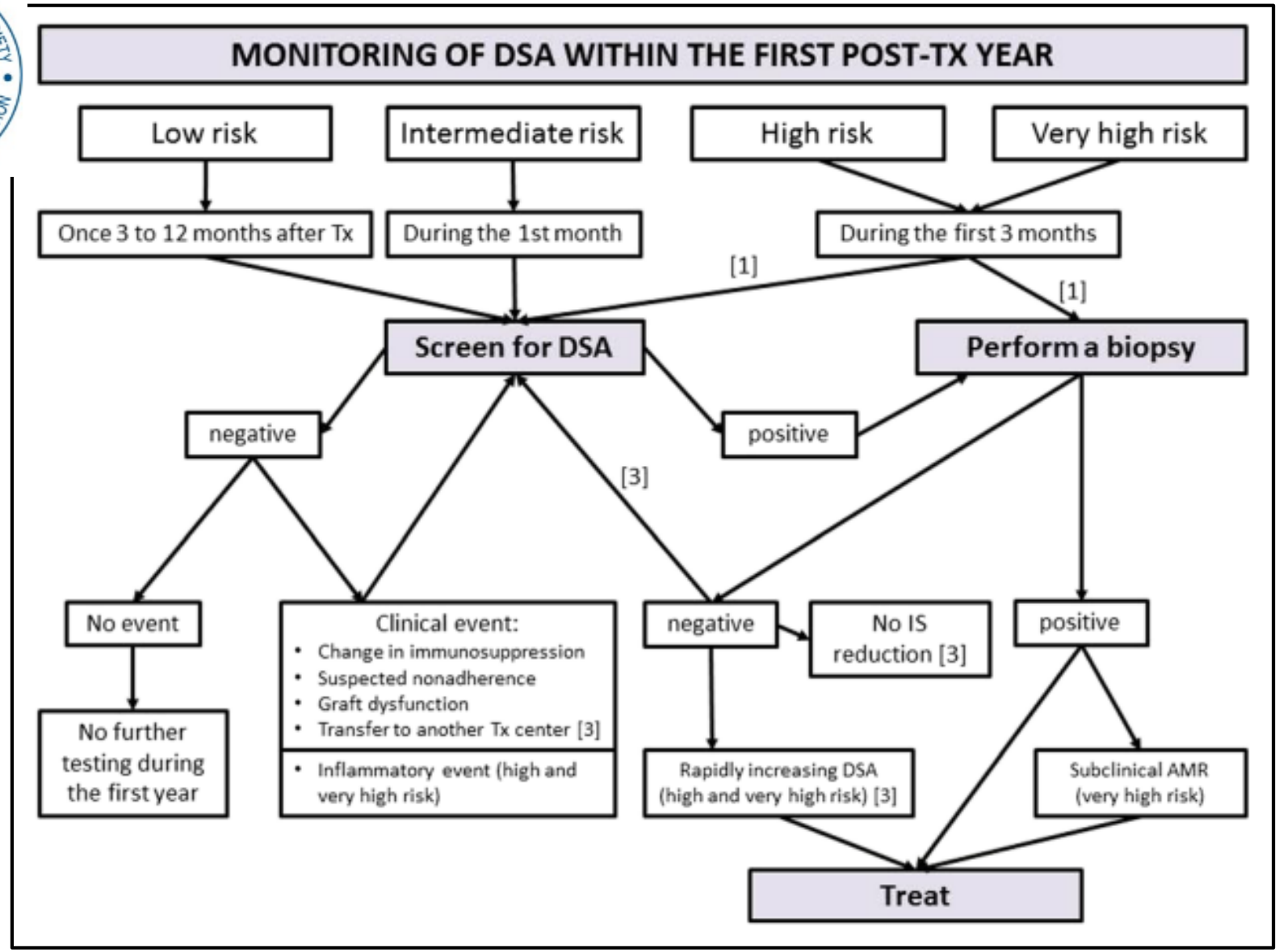


FIGURE 2 | Humoral risk stratification of kidney transplant candidates (adapted from reference (1)) AMR, antibody-mediated rejection; CDC, complement-dependent cytotoxicity; DSA, donor-specific antibodies; HLA, human leukocyte antigen; IS, immunosuppression; Tx, transplant.

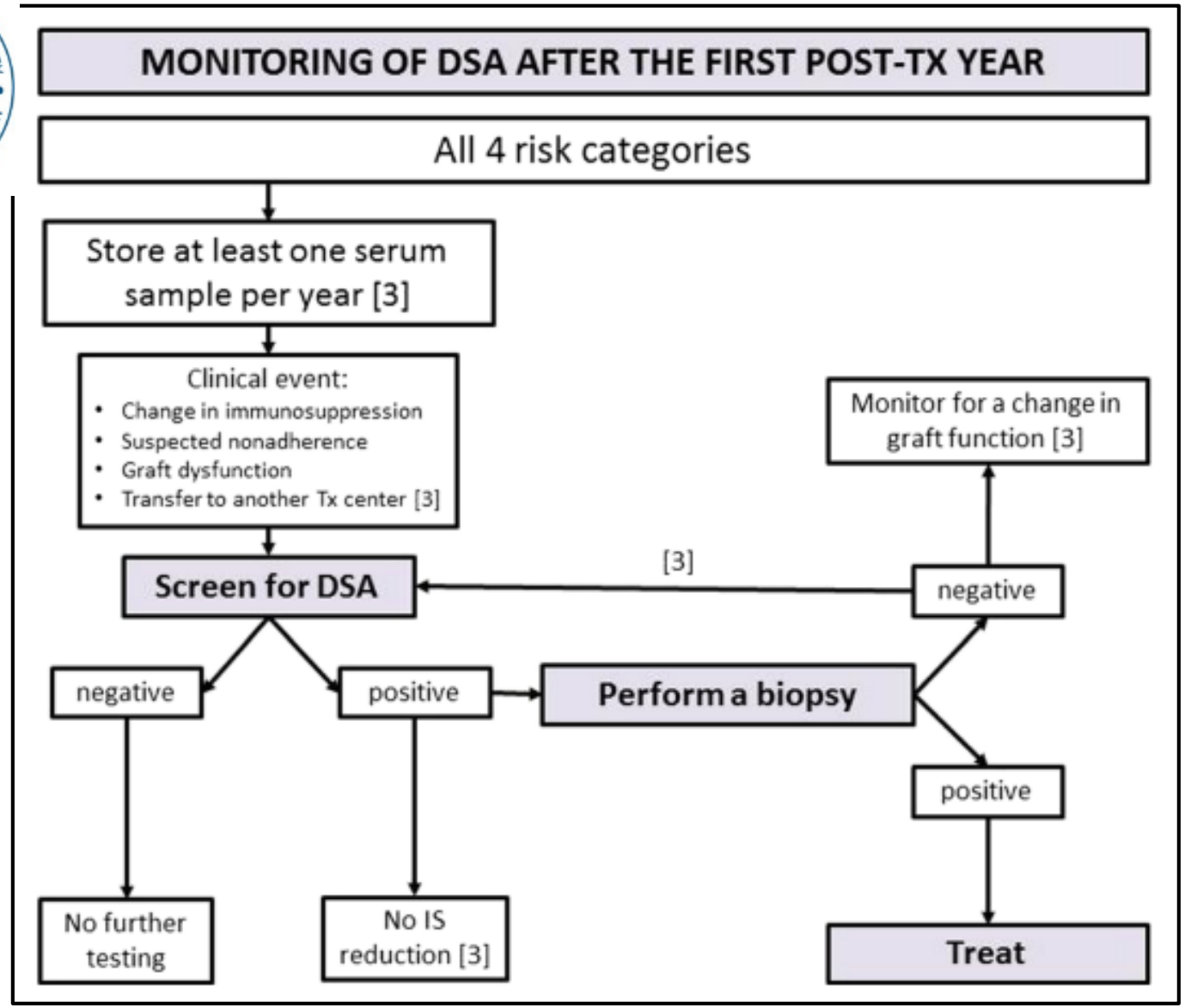
Mamode N. Transplant Int 2022;35:10511.

DSA MONITORING : DURING THE 1st YEAR



Wettestein D. Langenbecks Arch Surg 2014;399(4):415-20.

DSA MONITORING : AFTER THE 1st YEAR



Wettestein D. Langenbecks Arch Surg 2014;399(4):415-20.

IV- MONITORING OF IMMUNOSUPPRESSION AND ITS COMPLICATIONS

1- PHARMACOLOGICAL MONITORING

IMMUNOSUPRESSION :
NARROW THERAPEUTIC WINDOW REQUIRING STRICT MONITORING

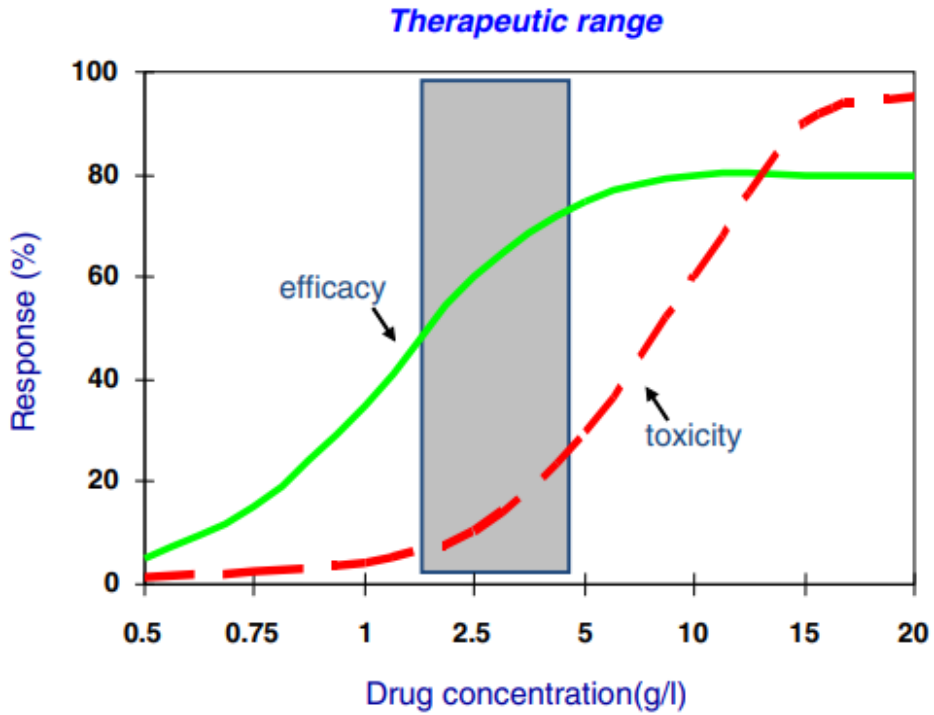


Fig. 1 Balance between efficacy and toxicity showing the narrow therapeutic range. [Courtesy (and in honor of) V.W. Armstrong (†), Göttingen, Germany]

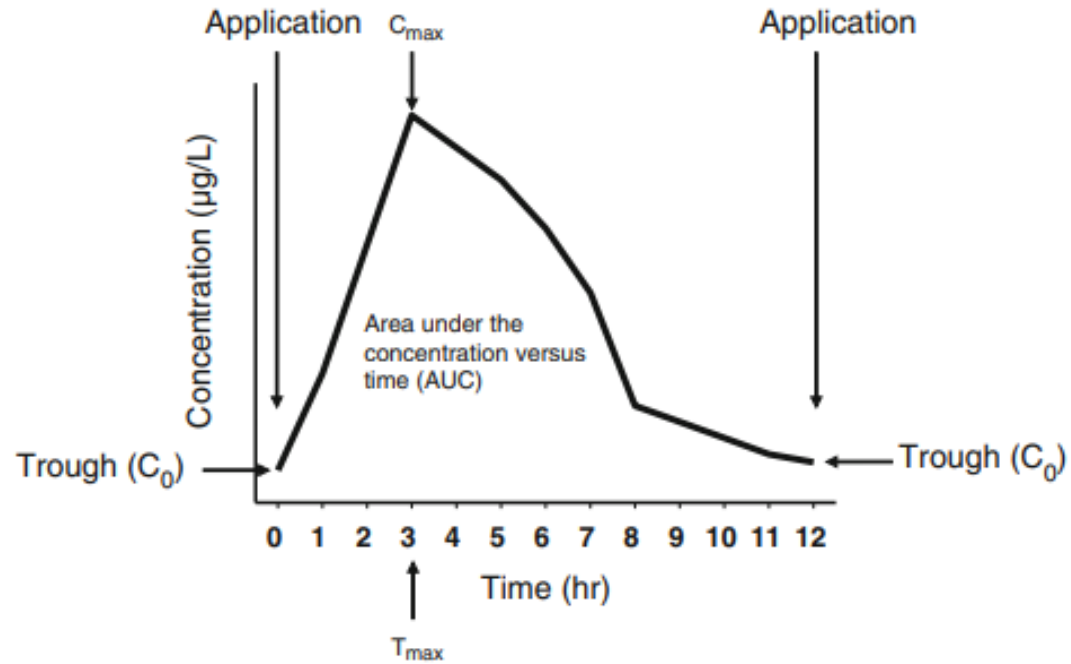


Fig. 2 Pharmacokinetic parameters during a dosing interval. C_{max} Maximum concentration, T_{max} time to maximum drug concentration, C_0 predose concentration

Weber LT. Pediatr Nephrol 2015;30(2)2:253-65.

PHARMACOKINETIC MONITORING

Guideline 3.13 – KTR: Monitoring of immunosuppression

We suggest that long-term monitoring of immunosuppression levels is required as follows:

- Tacrolimus and ciclosporin levels should be monitored. The initial frequency should be three times a week. Levels should also be checked when any medication with possible interactions is prescribed, the dosage is changed, the formulation is changed, or when there is unexplained graft dysfunction (2C)
- Tacrolimus should be monitored by the trough (C_0) level, while ciclosporin can be monitored by either C_0 or 2-hour post dose (C_2) level (2C)
- Tacrolimus and ciclosporin levels should be available within 24 hours of taking blood samples in the first three months after transplantation (2D)
- The utility of monitoring mycophenolic acid (MPA) C_0 levels is uncertain (2D)
- Sirolimus should be monitored by the C_0 trough level (2C)

Guideline 3.17 – KTR: Prescribing and the use of generic agents

We suggest that KTRs should be closely monitored after switching between generic preparations until a new steady state is established (2D)

PHARMACOKINETIC MONITORING : CALCINEURIN INHIBITORS

Table 4. Recommended therapeutic blood levels of the calcineurin inhibitors (CNIs).

CNI		First 3 months	4–6 months	6–12 months	After 1-year rejection free	Recommendation
Tacrolimus, ng/mL	C0	8–12	5–8	5–8	5–6	2D
Cyclosprine A, ng/mL	C0	300–350	150–250	100–150	75–125	2D
	C2	1300	800–900	500–700	450–500	

C0: trough level; C2: blood level 2 h after the dose

PHARMACOKINETIC MONITORING : ANTI-METABOLITES, mTOR INHIBITORS

Table 3 (continued)

Agent	Parameter	Target range after RTx	Proposed timing of TDM In general: • After dose alteration • In case of potential drug–drug interaction • In case of suspected toxicity • In case of rejection	Specific characteristics/limited sampling strategies	Reference
Mycophenolatemofetil (MMF)	MPA predose level (C_0)	1.0–3.5 mg/L (HPLC) 1.3–4.5 mg/L (EMIT)	• Three times per week within the first 3 weeks after RTx • Once per week in weeks 4–8 after RTx • Once per month >8 weeks after RTx • At any outpatient visit in the long-term run	Reduce daily dose by 50 % in case of leukocytopenia<4,000/μL or neutropenia of <1,600/μL Interrupt therapy in case of leukocytopenia <2,000/μL or neutropenia<1,300/μL In case of distinct diarrhea for >3 days without different cause give daily dose t.i.d. to q.i.d. and/or reduce daily dose by 50 %	[42, 70, 71]
	MPA AUC_{0-12}	30–45–60 mg h/L (HPLC/MS) 35–52–70 mg h/L (EMIT)	• Day 3–7, days 10–14 and 3–9 months after RTx • In case of clinical change (e.g. loss of renal function, hypalbuminemia) • If necessary: TDM of free MPA in case of suspected toxicity	Calculated MPA AUC=18.6+4.3 × C_0+0.54 × $C_{0.5}$+2.15 × C_2 (+ CsA) Calculated MPA AUC=10.0+3.95 × C_0+3.24 × $C_{0.5}$+1.01 × C_2 (+ Tac or without CNI)	[39, 72, 73, 74]
Everolimus (EVR)	EVR trough level (C_0)	3–8 μg/L 2–5 μg/L in follow-up	Adapted to trough level monitoring of the added CNI	Dose modifications in 20 % steps after second deviation upward or downward	[4]
Sirolimus (SIR)	SIR trough level (C_0)	4–12 ng/mL (with CNI) 5–10 ng/mL (CNI-free regimen)	• Once per week during the first month • Every other month thereafter	Pay attention to dyslipidemia! Use not recommended in proteinuria.	[47]

RTx, Renal transplantation; TDM, therapeutic drug monitoring; C_{max}, maximum drug concentration, T_{max}, time to maximum concentration; C_0, predose concentration; C_{1-12}, concentration a 1–12 h after administration; AUC area under the concentration–time curve; CNI, calcineurin inhibitor; HPLC, high-performance liquid chromatography; MS, mass spectrometry

[a] EMIT assay, co-medication: Mycophenolatemofetil

Weber LT. Pediatr Nephrol 2015;30(2)2:253-65.

PHARMACOKINETIC MONITORING : CALCINEURIN INHIBITORS

LA TUNISIE MEDICALE-2023; Vol 101 (10): 738-744

ARTICLE ORIGINAL

The effects of the CYP3A5*3 variant on tacrolimus pharmacokinetics and outcomes in Tunisian kidney transplant recipients

Les effets du variant CYP3A5*3 sur la pharmacocinétique du tacrolimus et le pronostic de transplantés rénaux tunisiens

Rim Charfi[1], Mohamed Mongi Bacha[2], Myriam Ben Fadhla[3], Khouloud Ferchichi[1], Hanene El Jebari[1], Emna Gaies[1], Anis Klouz[1], Ezzeddine Abderrahim[2], Fathi Ben Hamida[2], Taieb Ben Abdallah[2], Sameh Trabelsi[1], Yosr Gorgi[3], Imen Sfar[3]

PHARMACOKINETIC MONITORING : CALCINEURIN INHIBITORS

Table 3. Pharmacokinetic parameters according to CYP3A5*3 variants (n=50).

	CYP3A5 *1/*1 and *1/*3	CYP3A5 *3/*3	p
Global results			
Genotypic frequencies	13 (26%) [c]	37 (74%) [c]	
D (mg/kg/day)	0.078 ± 0.029 [a]	0.08 ± 0.03 [a]	0.8
C_0* (ng.mL^{-1})	4 (3-6) [b]	7.5 (5.6-10.4) [b]	**0.000**
$AUC_{0\text{-}12h}$ ** (h.µg.L^{-1})	94 (57-148) [b]	151 (122-193) [b]	**0.003**
C_0/D	66 (40-90) [b]	98 (67-197) [b]	**0.013**
$AUC_{0\text{-}12h}$ /D	1136 (960-1689) [b]	2007 (1418-3558) [b]	**0.021**
Results according post-transplant phases			
Early phase			
D (mg/kg/day)	0.090 ± 0.029 [a]	0.10 ± 0.03 [a]	0.3
C_0 (ng.mL^{-1})	4.5 ± 3.8 [a]	7.2 ± 2.7 [a]	0.12
$AUC_{0\text{-}12h}$(h.µg.L^{-1})	112.5 ± 75.4 [a]	144.4 ± 57.5 [a]	0.3
C_0/D	57.7 ± 50.9 [a]	72.0 ± 45.8 [a]	0.4
$AUC_{0\text{-}12h}$/D	1354 ± 983 [a]	1581 ± 923 [a]	0.6
Late phase			
D (mg/kg/day)	0.075 ± 0.030 [a]	0.070 ± 0.050 [a]	0.2
C_0 (ng.mL^{-1})	4.40 ± 1.97 [a]	8.46 ± 4.14 [a]	**0.01**
$AUC_{0\text{-}12h}$ (h.µg.L^{-1})	95 ± 42 [a]	165 ± 82 [a]	**0.002**

$AUC_{0\text{-}12h}$: Area under the curve of tacrolimus, C_0: Blood trough concentration of tacrolimus, D: Daily normalized dose of tacrolimus (mg/kg/day). Data were [a] Means ± standard deviation; [b] Median [interquartile range], and [c] Number (percentage)

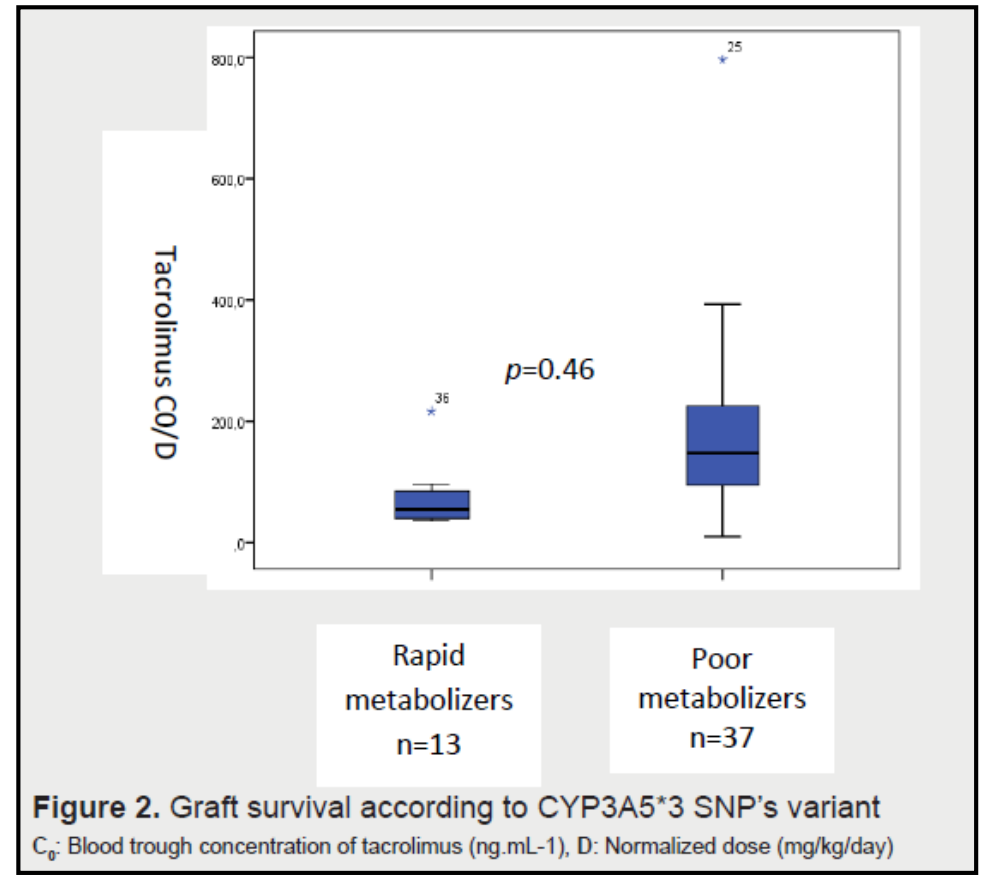


Figure 2. Graft survival according to CYP3A5*3 SNP's variant

C_0: Blood trough concentration of tacrolimus (ng.mL-1), D: Normalized dose (mg/kg/day)

Charfi R, Bacha MM. Tunis Med 2023;101(10):738-44.

2- THERAPEUTIC ADHERENCE MONITORING

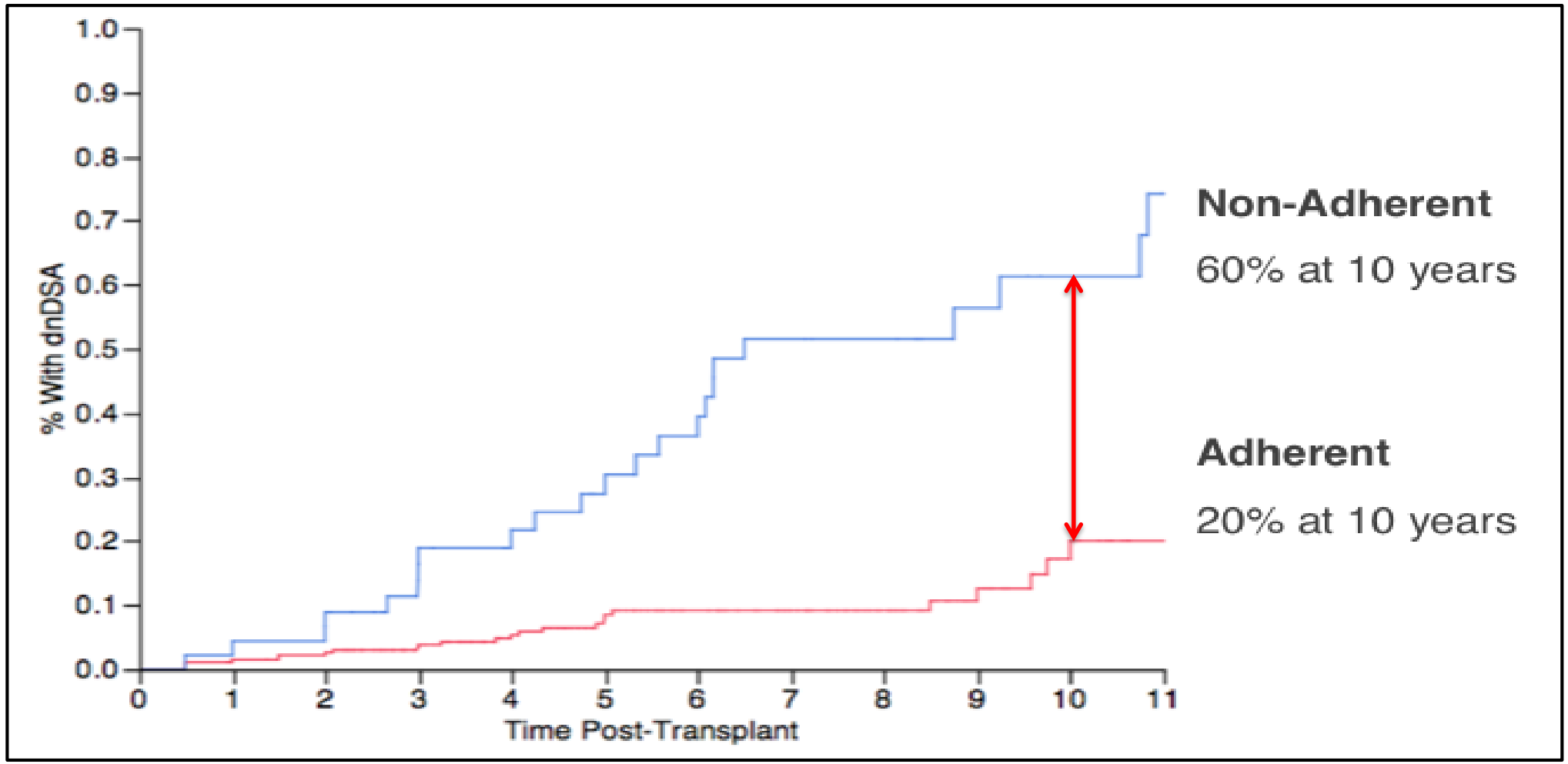
POOR THERAPEUTIC ADHERENCE : PREVALENCE

Table 2 Estimated prevalence of nonadherence in kidney transplant recipients

Study	Nonadherence measurement	Prevalence of nonadherence
Dew et al. [20]	Several methods	36 cases per 100 person-years
Germani et al. [21]	Questionnaire	18 %
Massey et al. [22]	Self-report	27 %
Schmid-Mohler et al. [23]	Self-report and collateral report	26.4 %
Denhaerynck et al. [24]	Electronic monitoring	13.2 % in Europe
		19.3 % in US
Griva et al. [25]		13.8 % intentional
		62.4 % unintentional
Weng et al. [26]	Self-report	>40 % non-adherent in some form
Butler et al. [27]	Electronic monitoring	26 % missed at least 10 % of a day's medication
		12 % missed at least 20 % of a day's medication
Weng et al. [28]	Electronic monitoring	26.6 % had ≤80 % of adherence
Kalil et al. [29]	Medical chart	2 %
Sketris et al. [30]	Self-report	65 %

Nerini E. J Nephrol 2016;29:627-36.

POOR THERAPEUTIC ADHERENCE : dnDSA DEVELOPMENT



Wiebe C. AJT 2012.12:1157-67.

POOR THERAPEUTIC ADHERENCE : GRAFT AND PATIENT SURVIVAL DECLINE

Table 3 Final models of Cox regression containing predictors of graft loss and mortality.

	Score					
	2Log likelihood			χ^2		
	B	SE	95% CI	Wald	HR	95% CI for HR
Model for graft loss (N = 13)		40·95			16·77**	
Age	−0·1*	0·05	(−0·18 to −0·1)	−4·34*	0·9	(0·82–0·99)
Sex						
Female (reference)						
Male	−3·76***	5·18	(−20·35 to −2·36)	5·07*	0·02	(0·001–6·2)
Excellent Adherence (reference)						
Good Adherence	ns					
Poor Adherence	3·88***	4·62	(1·79–15·14)	3·09	6·03	(0·46–78·55)
Model for mortality (N = 42)		197·47			12·1*	
Age	ns			ns		
Sex						
Female (reference)	ns			ns		
Male						
Excellent Adherence (reference)	ns			ns		
Good Adherence	ns			ns		
Poor Adherence	1·28*	1·35	(1·02–3·03)	3·98*	3·07	(1·02–9·25)

*$P \leq 0.05$; **$P \leq 0.05$; ***$P \leq 0.001$.

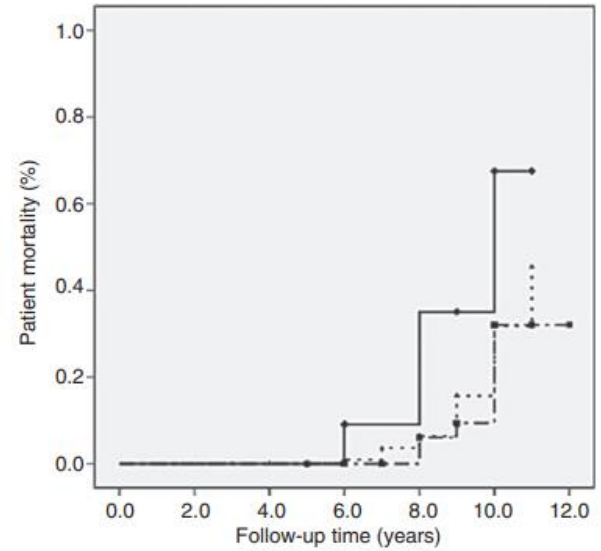


Figure 3 Kaplan–Meier Curve – Differences in patients' mortality according to patients' adherence groups. 1 – Excellent adherence group; 2 – Good adherence; 3 – Poor adherence; 1 – Censored; 2 – Censored; 3 – Censored.

Prihodova L. J Adv Nurs 2014;70(12):2871-83.

POOR THERAPEUTIC ADHERENCE : PREVENTION AND SCREENING

THE RENAL ASSOCIATION
founded 1950

Guideline 2.1 – KTR: Recognising non-adherence

We suggest that it is important to prevent and detect non-adherence in kidney transplant recipients. (2C)

- Factors associated with non-adherence should be identified
- An established interventional pathway should be in place for those at high risk of or with proven non-adherence
- Pathways should be in place for paediatric KTRs in transition and for adolescent KTRs

IMPROVING THERAPEUTIC ADHERENCE: STRATEGIES

Table 4 Interventions that may promote medication-taking behaviors

Interventions at the patient level	Intervention at social-economic and healthcare system level	Intervention at the therapy level
Education/cognitive interventions	Access to medication	Simplification of the regimen
Education in self-management	Assessment of social needs	Choose medication with less side effects
Education of illiterate patients	Social support	
Counseling/behavioral interventions	Nurse/pharmacist intervention protocols	
Counseling	Pharmacy-based management programs	
Follow-up and reminders		
Peer/community-based programs		
Electronic forum		
Other forms of intervention		
Reminders (e.g., short text messages)		
Electronic forums		
Electronic pill dispenser		
Medication event monitoring system		
Smartphone app		
Telecalling		

Nerini E. J Nephrol 2016;29:627-36.

IMPROVING THERAPEUTIC ADHERENCE : BROCHURE

IMPROVING THERAPEUTIC ADHERENCE : BROCHURE

1 - ما هو زرع الكلى؟

تتمثّل عمليّة زرع الكلى في نقل كلية لفائدة منتفع مريض بالقصور الكلوي المزمن بعد اخذها من متبرّع سليم أو في حالة موت دماغي.

2 - ما هو الفرق بين عملية زرع الكلى و غسيل الكلى؟

يمثّل زرع الكلى العلاج الأنسب لحالات القصور الكلوي المزمن لما له من مزايا مقارنة بالغسيل الكلوي.

زرع الكلى	الغسيل الكلوي
- يعيد لجسم المريض وظيفة كلويّة عاديّة و يجعله في صحّة جيّدة. - يمكّن المريض من استرجاع نشاطه العادي على المستوى المهني و الإجتماعي. - يقلّص من المصاريف المباشرة و غير المباشرة المرتبطة بالمرض وهو ما يوفّر مبالغ ماليّة هامّة بالنسبة للمجموعة الوطنيّة.	- يقوم ببعض وظائف الكلية كالتخلّص من نفايات الجسم و المحافظة على توازن الاملاح و السوائل في الجسم. - يمكّن من معالجة المضاعفات الحادّة للقصور الكلوي المزمن في الحالات الاستعجاليّة.
- يستوجب القيام بعملية جراحيّة. - يُلزم المريض المواظبة على استعمال الأدوية المثبطة للمناعة قصد الوقاية من رفض الجسم للكلية المزروعة. - يتطلّب مراقبة طبيّة دوريّة لاستقصاء و علاج المضاعفات الطّارئة في الآن بما في ذلك العوارض الجانبيّة التي قد تحدث جرّاء استعمال بعض الادوية.	- لا يعوّض الوظيفة الكلويّة العاديّة. - يؤثّر على الحالة العامّة للمريض أي الشعور بالتّعب و نقص في الشهيّة و الوزن و النّشاط. - يتسبّب على المدى المتوسّط في ظهور مضاعفات تمسّ العديد من الوظائف و الأعضاء و خصوصا القلب و الشّرايين. - يستوجب اتّباع حمية غذائيّة لتلافي العديد من المضاعفات التي قد تكون خطيرة. - يؤثّر سلبا على الإلتزامات العائليّة و المهنيّة للمريض لما يستوجبه من تقيّد بأوقات الحصص الدّورية. - يكلّف المريض و المجموعة الوطنيّة أموالا طائلة تزداد مع الوقت.

3 - من يمكنه التبرّع بالكلية؟

- التبرّع عمل نبيل يجب أن يتمّ دون أيّ ضغوطات.

- يشترط تطابق في الزّمرة الدّمويّة للمريض و المتبرّع.

المتلقّي \ المتبرّع	أ	ب	أب	o
أ	✓	✗	✗	✓
ب	✗	✓	✗	✓
أب	✓	✓	✓	✓
o	✗	✗	✗	✓

- هناك نوعان من المتبرّعين:

أ- المتبرّع الحيّ :

يشترط أن يكون المتبرّع الحيّ سليما و معافى من العديد من الأمراض و خاصّة منها الأمراض المعدية و الخبيثة، وأن يتمتّع بكامل مداركه العقلية.

و من المستحسن أن يكون المتبرّع من العائلة المقرّبة و ذلك لضمان التّطابق مع المنتفع :

- الأبّ و الأمّ
- الأبناء و الإخوة
- الزّوج و الزّوجة
- العمّ(ة) والخال(ة)
- الجدّ و الجدّة

ب- المتبرّع في حالة موت دماغي :

لا يمكن أخذ الأعضاء إلاّ بعد موافقة العائلة أو المريض نفسه قبل وفاته.

4 - ما هي فوائد زرع كلية من متبرّع حيّ مقارنة بالمتبرّع المتوفّى؟

تمكّن عمليّة زرع كلية من متبرّع حيّ من :

- تقليص فترة انتظار الزّرع و مدّة تصفية الدّم حيث أنّ الحصول على كلية من متبرّع متوفّى يوجب الإنتظار لمدّة طويلة، و يمكن أن يتسبّب هذا في حالة من الإحباط بفقدان الأمل في العلاج إضافة إلى إمكانيّة حدوث بعض المضاعفات.

- برمجة موعد زرع الكلية و هو ما يمكّن من التحضير الجيّد للعمليّة بعيدا عن سياق الطوارئ.

- استعادة سريعة لوظيفتها حيث أنّ زرع الكلية يتمّ مباشرة بعد أخذها من المتبرّع.

- منح المتبرّع اعتزازا بالنّفس و الفخر بالعمل النّبيل الّذي قام به و توطيد العلاقة بينه و بين المريض.

- تحسّن معدّل أمل الحياة عند المتبرّع وذلك لتمتّعه بمراقبة طبيّة دوريّة و متواصلة تمكّن من تقصّي الأمراض و تشخيصها و مداواتها مبكّرا.

3- PREVENTION AND SCREENING OF COMPLICATIONS

A- METABOLIC COMPLICATIONS : NODAT

NODAT :
SCREENING, DIAGNOSIS AND FOLLOW-UP

THE RENAL ASSOCIATION
founded 1950

Guideline 6.3 – KTR: Diabetes mellitus

We suggest that the detection and treatment of diabetes should consider:

- Screening for the development of post-transplant diabetes mellitus (PTDM) by dipstick urinalysis and measurement of blood sugar level at each clinic visit (2C)
- The diagnosis of PTDM is made based on WHO criteria for the diagnosis of diabetes mellitus based on fasting or random blood, serum glycated haemoglobin (HBA1c) or oral glucose tolerance testing (1C)
- KTR with diabetes (either prior to transplantation or PTDM) should undergo screening for diabetic complications (retinal screening, foot care, neuropathy) in line with guidelines for non KTR patients with diabetes (2D)

B- INFECTIOUS COMPLICATIONS : BK VIRUS NEPHROPATHY

BANFF 2019 :

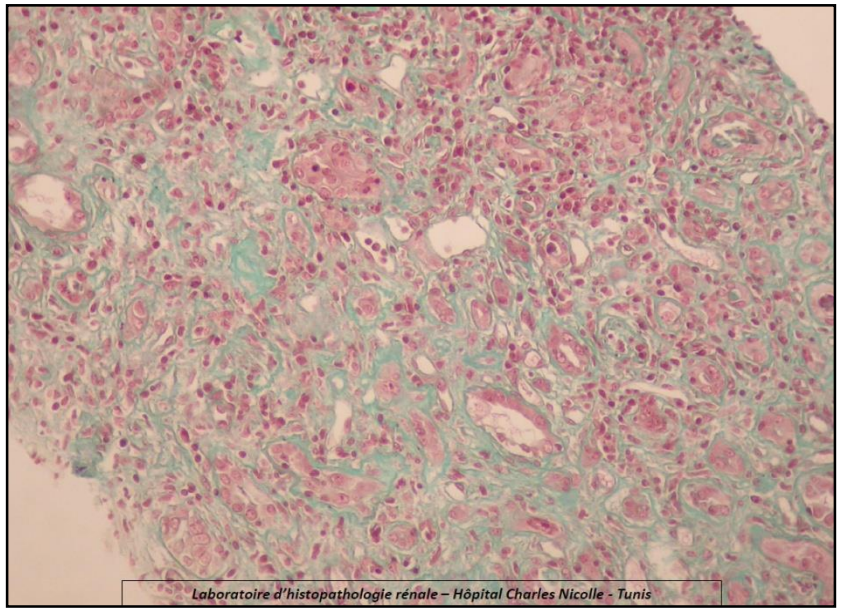
"IF/TA" ⟶ "PVN"

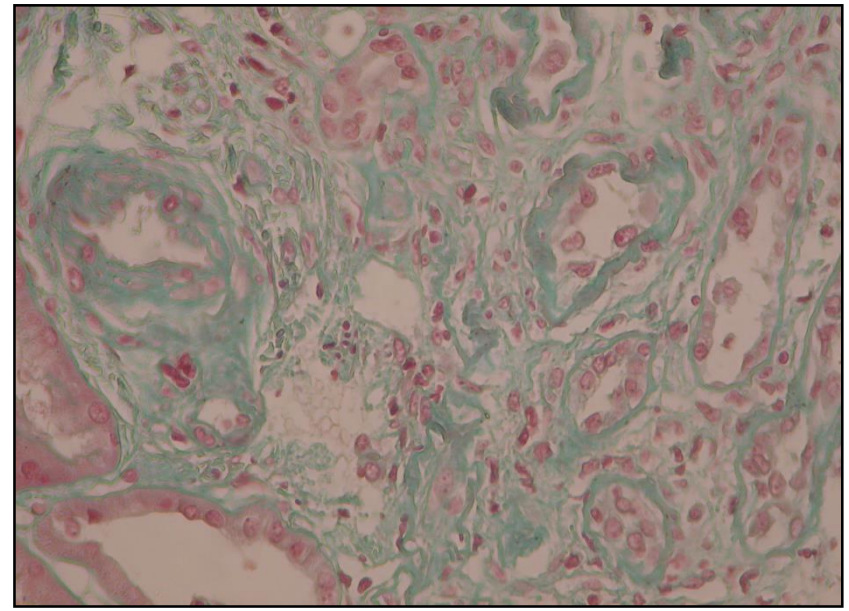
TABLE 4 Updates of 2019 Banff classification for ABMR, borderline changes, TCMR, and polyomavirus nephropathy. All updates in boldface type[a]

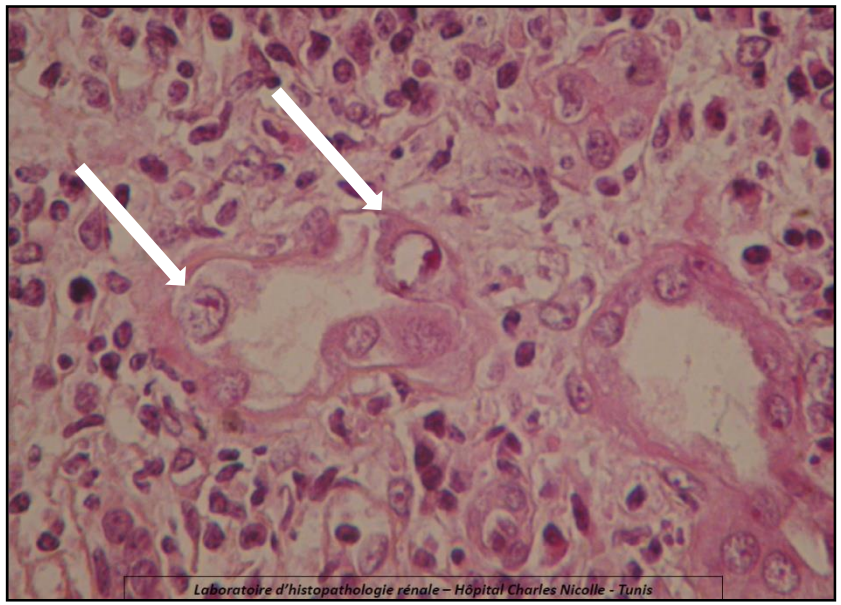
Category 1: Normal biopsy or nonspecific changes
Category 2: Antibody-mediated changes
Category 3: Borderline (Suspicious) for acute TCMR
Category 4: TCMR
Category 5: polyomavirus nephropathy[f]
PVN Class 1 pvl 1 and ci 0-1
PVN Class 2 pvl 1 and ci 2-3 OR pvl 2 and ci 0-3 OR pvl 3 and ci 0-1
PVN Class 3 pvl 3 and ci 2-3

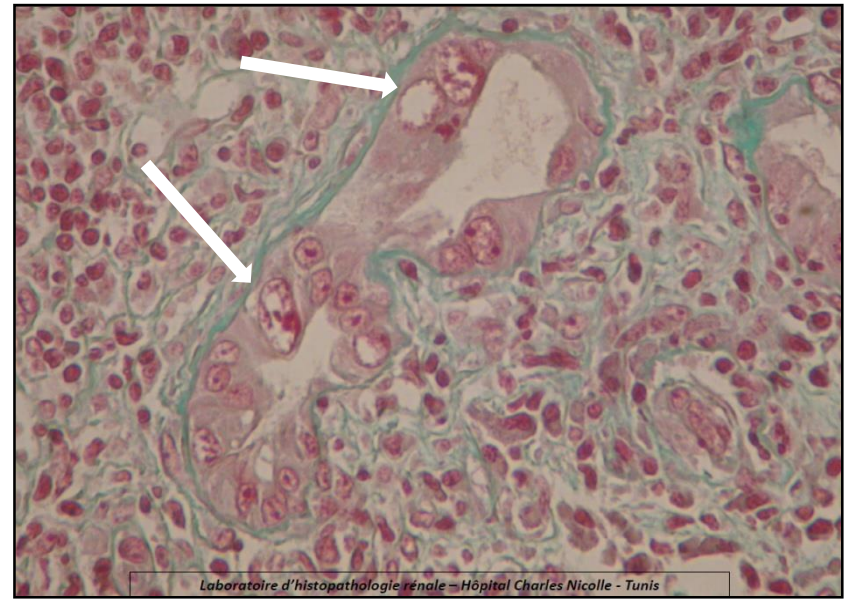
Loupy A. Am J Transplant 2020;20:2318–31.

BK VIRUS NEPHROPATHY









Sellami N. Anatomopathology Laboratory, Department of Internal Medicine A, Charles Nicolle Hospital, Tunis-Tunisia.

BK VIRUS NEPHROPATHY : SCREENING AND DIAGNOSIS

THE RENAL ASSOCIATION
founded 1950

Guideline 8.6.2 – KTR: BK nephropathy

We suggest:

- Screening should also be carried out when renal function deteriorates in an unexplained fashion (2D)
- KTRs should be screened for BKV viral load or by performing urine microscopy for decoy cells or by polymerase chain reaction (PCR) on urine or serum (2C)
- Suspected BK nephropathy should be confirmed by renal biopsy, which should be stained for SV40. Two cores containing medullary tissue should ideally be examined (2D)

BK VIRUS NEPHROPATHY : SCREENING AND DIAGNOSIS

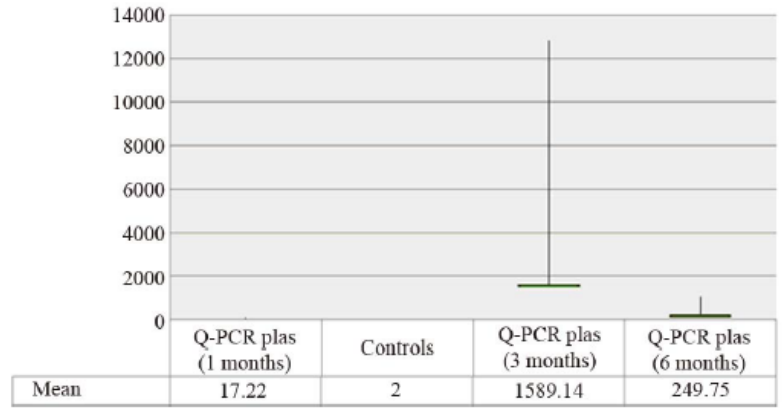
Open Journal of Organ Transplant Surgery, 2012, 2, 56-61
doi:10.4236/ojots.2012.24014 Published Online November 2012 (http://www.SciRP.org/journal/ojots)

Scientific Research

The Monitoring Interest of BK Virus Load in Renal Allograft Tunisian Recipients: Prospective Study

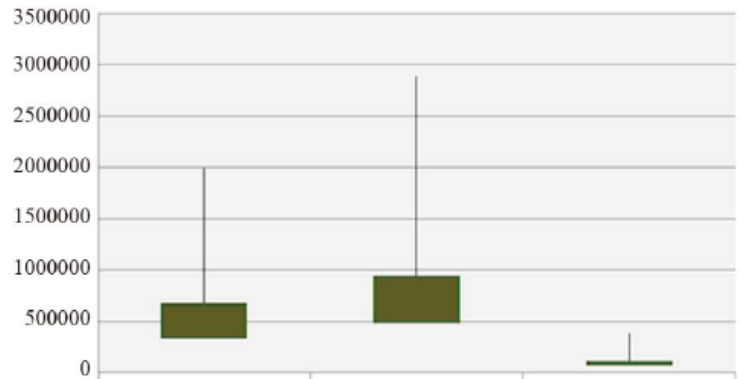
Yousr Gorgi[1], Mohamed M. Bacha[1,2], Imen Sfar[1], A. Ben Mohamed[1], Hajer Aounallah-Skhiri[3], Tarak Dhaouadi[1], Rafika Bardi[1], N. Skouri[1], Ezzeddine Abderrahim[2], M. Makhlouf[1], T. Ben Romdhane[1], S. Jendoubi-Ayed[1], K. Ayed[1], Taieb Ben Abdallah[1]

BK VIRUS NEPHROPATHY : SCREENING AND DIAGNOSIS



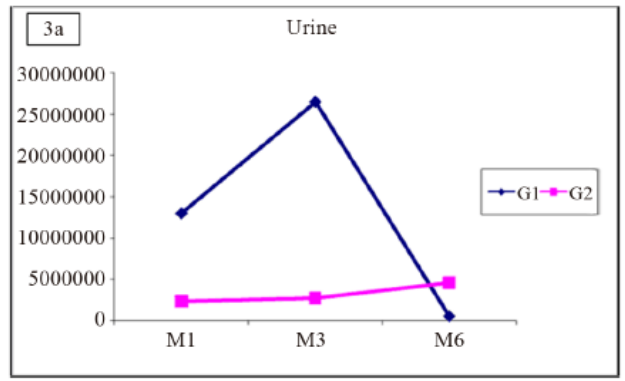
	Q-PCR plas (1 months)	Controls	Q-PCR plas (3 months)	Q-PCR plas (6 months)
Mean	17.22	2	1589.14	249.75

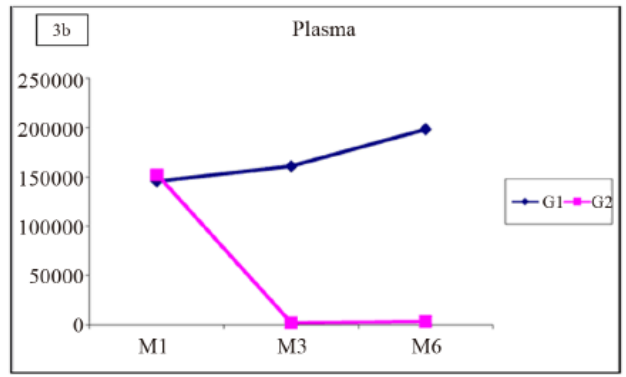
Figure 1. Distribution average values of viremia (copies/ml) in patients and controls.



	Q-PCR urin(1 months)	Q-PCR urin(3 months)	Q-PCR urin(6 months)
Mean	674122.34	940839.1	107005.33

Figure 2. Distribution average values of viruria (copies/ml) in patients.





		1st Month	3rd Month	6th Month
Urine	G1	12,975,019	26,477,091	532176.91
	G2	2,285,483	2,704,945	4,585,313
Plasma	G1	145744.37	161,115	198714.75
	G2	152,506	2314	3479

Figure 3. Distribution of mean values of viruria and viremia in G1 and G2.

Gorgi Y, Bacha MM. OJOTS 2012;2:56-61.

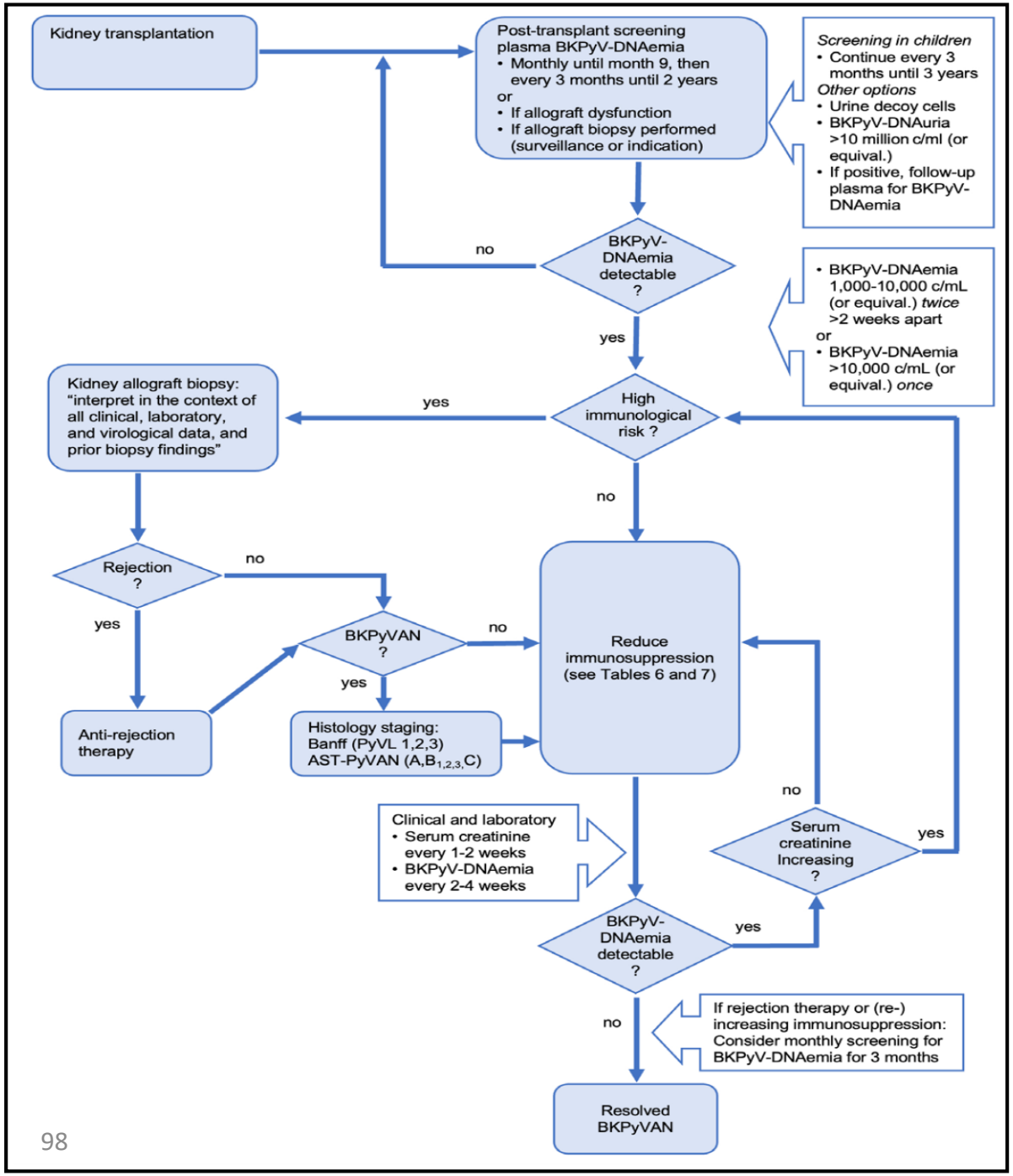
Reviews

OPEN

The Second International Consensus Guidelines on the Management of BK Polyomavirus in Kidney Transplantation

Camille N. Kotton, MD,[1] Nassim Kamar, MD, PhD,[2] David Wojciechowski, MD,[3] Michael Eder, MD,[4] Helmut Hopfer, MD,[5] Parmjeet Randhawa, MD,[6] Martina Sester, PhD,[7] Patrizia Comoli, MD,[8] Helio Tedesco Silva, MD, PhD,[9] Greg Knoll, MD,[10] Daniel C. Brennan, MD,[11] Jennifer Trofe-Clark, PharmD,[12,13] Lars Pape, MD, PhD,[14] David Axelrod, MD, MBA,[15] Bryce Kiberd, MD,[16] Germaine Wong, MBBS, MMed, PhD,[17,18,19] and Hans H. Hirsch, MD[20,21]; on behalf of The Transplantation Society International BK Polyomavirus Consensus Group*

Kotton CN. Transplantation 2024;108(9):1834-66.



BK VIRUS REPLICATION IN KT RECIPIENTS : SCREENING, DIAGNOSIS AND MANAGEMENT

Kotton CN. Transplantation 2024;108(9):1834-66.

C- NEOPLASTIC COMPLICATIONS : CANCERS AND PTLD

RISK OF MALIGNANCIES (PTLD AND KS) AFTER KT : TUNISIAN EXPERIENCE

Clin Transplant 2016: 30: 372–379 DOI: 10.1111/ctr.12694

Clinical Transplantation

Post kidney transplantation Kaposi's sarcoma: the experience of a Mediterranean North African center

Gorsane I, Bacha MM, Abderrahim E, Amri N, Hajri M, Ounissi M, Harzallah A, El Younsi F, Hedri H, Ben Abdallah T.

ELSEVIER MASSON

Disponible en ligne sur www.sciencedirect.com

ScienceDirect

La Revue de médecine interne 29 (2008) 535–540

la revue de médecine interne

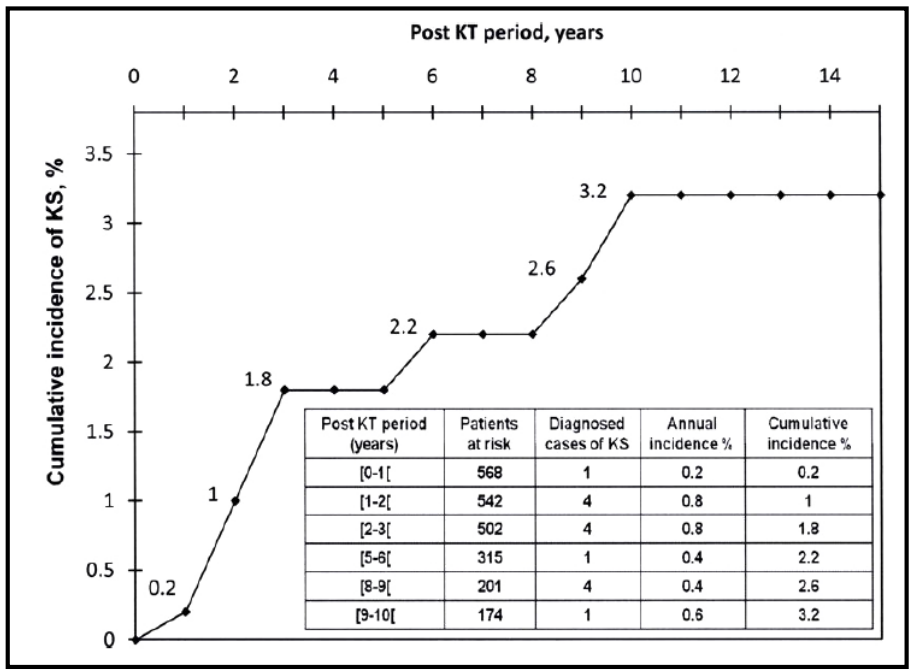
http://france.elsevier.com/direct/REVMED/

Article original

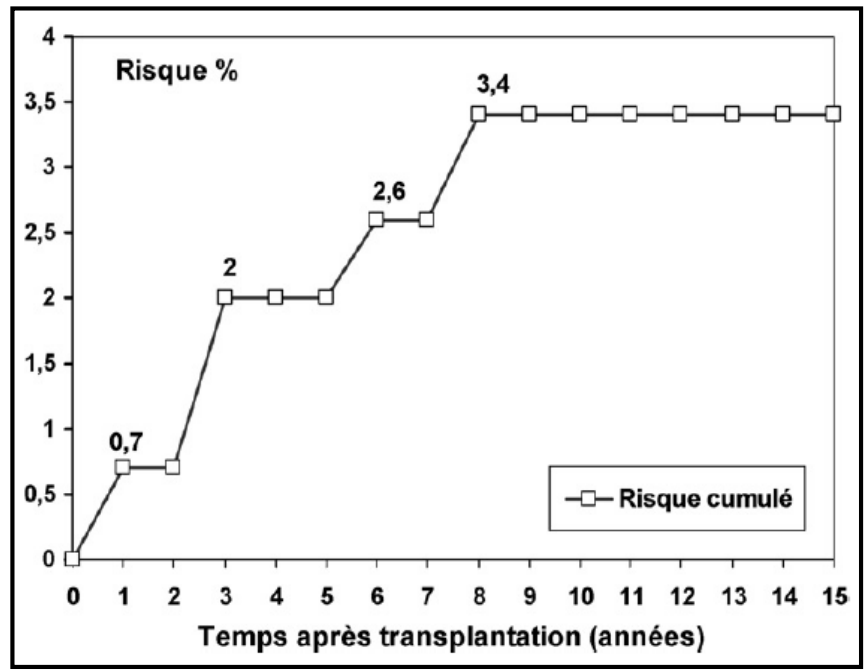
Syndromes lymphoprolifératifs après transplantation rénale : incidence et particularités cliniques et évolutives

Lymphoproliferative disorders in kidney transplant recipients: Incidence, clinical characteristics and outcome

E. Abderrahim[a,*], A. Harzallah[a], S. Barbouch[a], S. Turki[a], I. Helal[a], T. Ben Abdallah[a], H. Hedri[a], F. Ben Moussa[a], R. Bardi[b], K. Ayed[b], H. Ben Maïz[a], A. Kheder[a]



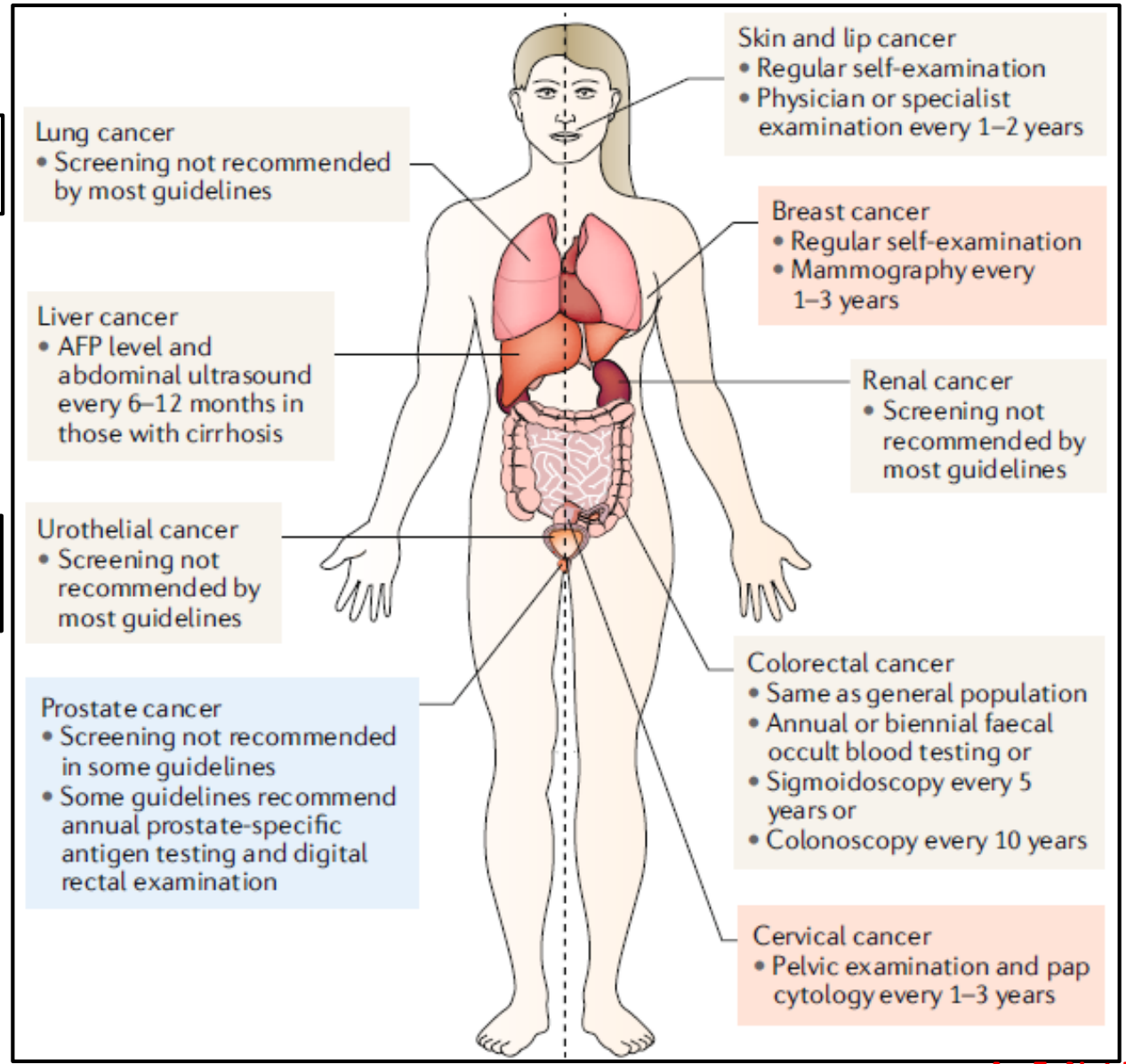
Post KT period (years)	Patients at risk	Diagnosed cases of KS	Annual incidence %	Cumulative incidence %
[0-1[	568	1	0.2	0.2
[1-2[	542	4	0.8	1
[2-3[	502	4	0.8	1.8
[5-6[	315	1	0.4	2.2
[8-9[	201	4	0.4	2.6
[9-10[	174	1	0.6	3.2



CANCER SCREENING AFTER KT : RECOMMENDATIONS

- We recommend chest CT for current or former tobacco users with a > 30 pack-year history, as per local guidelines, and chest radiograph for other KTRs (2 C).

- We strongly recommend screening for bladder carcinoma using urine cytology or cystoscopy for KTRs at increased risk, such as schistosomiasis, previous cyclophosphamide use or history of heavy smoking (>30 pack-year) (1D).



- We strongly recommend screening for RCC with US for KTRs at increased risk, such as a long time on dialysis, family history of renal cancer, acquired cystic disease, and analgesic nephropathy (1D).

Au E. Nat Rev Nephrol 2018;14(8):508-20.

4TH GCC
KIDNEY TRANSPLANTATION
& NEPHROLOGY CONGRESS

Follow-up Of Kidney Transplant Recipients In 2025: Towards An Individualized Approach

Mohamed Mongi BACHA

- Professor of Nephrology, Department of Internal Medicine "A", Charles Nicolle Hospital and Faculty of Medicine of Tunis
- Vice-President of the Tunisian Society of Nephrology, Dialysis and Kidney Transplantation (STNDT)
- Expert at the National Center for the Promotion of Organ Transplantation (CNPTO), Tunisia
- Organization Committee Chair of the 18th AFRAN Congress, April 15-18, 2025, Tunis, Tunisia
- Chair of the African Association of Nephrology (AFRAN) Transplant Committee

January 24, 2025