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Identification of risk of malaria and selective post-transplant testing of deceased organ donors in the UK

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Background & Aim

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- In the UK, serological screening for HIV, HBV, HCV, HTLV, CMV, EBV, syphilis and toxoplasma infection is applied to all potential organ donors, pre-donation
- Demographics and epidemiological information is gathered to inform the risk of geographically restricted, asymptomatic infections such as malaria
- When risks are identified, according to set criteria, post donation screening is performed
- Transmission of donor-derived malaria through organ transplantation has been well described and it can hold high morbidity and mortality, mainly due to late recognition
- It is an uncommon event in non-endemic countries, but recipient harm can be mitigated through awareness, early diagnosis and appropriate treatment

AIM of this work:

- Inform the basis for post-transplant selective testing of deceased donors, and raise awareness of existing processes, criteria for testing and relevance to the safety of organ donation and transplantation
- Summarise results obtained since introduction of discretionary post-donation malaria testing for deceased organ donors in the UK

Methods

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Summarised in table 1:

- Criteria applied for selective donor screening for asymptomatic infection
- Screening is done by Captia™ Total Malaria Antibody, followed by a validated confirmatory algorithm if sero-reactivity detected
- Two qualitative PCR assays are performed, one to detect *P. falciparum* and one combined assay to detect *P. ovale, P. vivax, P. malariae and P. knowlesi* DNA
- Pathway of communication of results to transplant centres

Table 1: Screening for asymptomatic malaria infection in deceased organ donors, UK

Identification of donor risk, testing and recipient management advice	
Risk exposure to Plasmodium spp	Residency in endemic areas at any point Travel to endemic areas in the last 12 months History of past malaria infection at any point
Action	Whole blood sample submitted to a centralised laboratory
	Screening for malaria antibodies and confirmation of sero-reactive samples post-donation
	Testing for Plasmodium DNA by Polymerase Chain Reaction (PCR)
Antibody positive/PCR negative	Transplant centres advised to include malaria in the diagnostic differential of any compatible illness in the 4-6 months post - transplantation
Antibody positive/ PCR positive	Species- specific PCR performed
	Assessment for treatment according to current guidelines, under specialist advice

Results

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Table 2: Selective screening of deceased organ donors for risk of Plasmodium spp transmission (UK, July 2014 - 2023)

YEAR	DONORS CHARACTERISED (n)	MALARIA RISK IDENTIFIED						
		DONORS TESTED		MALARIA RESULTS				
				ANTIBODY POSITIVE			DNA POSITIVE	★Residency★ risk in malaria antibody positive donors (%)
		Numbers	%	Number of donors	% of tested	% of donors characterised	Number of donors	
(July- Dec) 2014	980	28	2.86	5	17.86	0.51	0	100%
2015	1956	104	5.32	8	7.69	0.41	0	100%
2016	2055	98	4.77	8	8.16	0.39	0	75%
2017	2163	125	5.78	12	9.60	0.55	0	75%
2018	2296	131	5.71	11	8.40	0.48	0	73%
2019	2374	171	7.20	18	10.53	0.76	0	94%
2020	1772	86	4.85	14	16.28	0.79	0	86%
2021	1861	113	6.07	16	14.16	0.86	0	81%
2022	1860	140	7.53	16	11.43	0.86	0	100%
2023	2008	178	8.86	10	5.62	0.50	0	100%
TOTAL	**19325**	**1174**	**6.1**	**118**	**10.1**	**0.6**	**0**	**70%**

Potential risk identified in 6.1% of donors

10% of donors tested have detectable antibodies

No parasitaemia detected

Discussion & Conclusion

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- In the UK, as a non-endemic area for many geographically restricted infections of relevance, post-transplant testing offers the possibility of harm avoidance through selective recipient monitoring and treatment, without compromising organ acceptance
- Selective testing of donors for malaria is aimed at identification of asymptomatic parasitaemia, allowing appropriate monitoring and interventions for recipients
- History of residency in endemic areas is the best indicator of risk of malaria seropositivity
- The combined use of serology and NAT aim to address:
  - The possibility of semi-immunity to malaria with low levels of parasitaemia
  - Lack of sensitivity of antibody screening assays in early infection or infections by non-falciparum Plasmodium species
- To date, no cases of malaria transmission via solid organ transplantation have been described in the UK
- This strategy is monitored and given the current epidemiology, it is effective; if changes in epidemiology occur, the strategy may need modification to maintain donation safety