

Detection of third generation Hydroxyethyl Starch in renal tubules by Raman microspectroscopy

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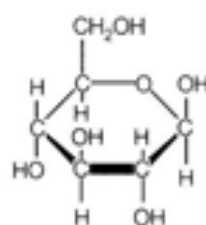
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Hydroxyethyl-starchs

- Polymer of glucose with hydroxyethyl-groups
- **Colloid** used for **volume expansion in intensive care unit**
- **Hydrolysis resistance is dependent on the molar substitution rate**
- **Renal clearance**
- Several kidneys of HES : HES X/Y Z%

X : molecular weight Y : molar substitution rate Z : degree of substitution

- α HES of 1st generation : HES 200/0.6 (1991) ex : Elohes[®]
- α HES de 2nd generation : HESS 200/0.5 (10%) ex : hypeHES[®]
- α HES de 3rd generation : HES 130/0.4 (6%) (2001) ex : Voluven[®] : **Renal toxicity is still debated**



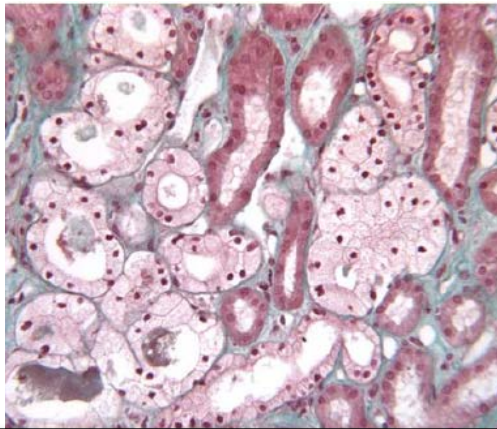
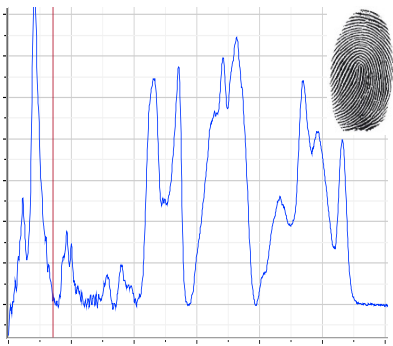
Is there an accumulation of HES
130/0.4 in renal tubules ?



**Detection of HES 130/0.4 by
Raman microspectroscopy on
renal biopsies with osmotic
nephrosis lesions**



Methods



	Case 1	Case 2	Case 3	Case 4
Age	74	62	78	36 (Donor: 38)
Sexe	M	M	M	M (Donor: F)
CI before AE	88	85	unknow	Donor : 80
Acute Event	Collapse	Collapse	Collapse	Transplantation
Time AE - biopsy	6 weeks	6 weeks	16 weeks	12 weeks
CI at biopsy	RRT	RRT	30	41
CI 6 mo. After AE	25	RRT	30	42

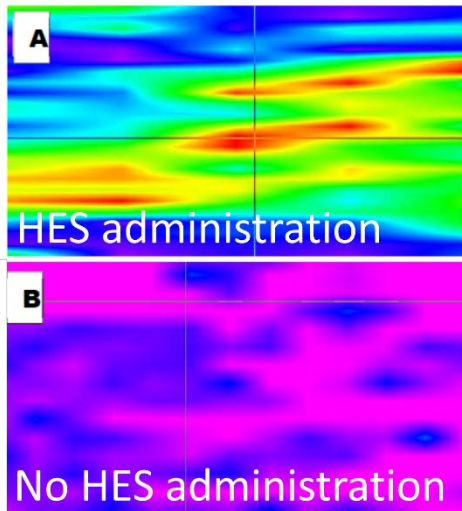
Determination of HES 130/0.4 reference spectrum

- Raman microspectroscopy is able to detect HES 130/0.4 in human kidney, in a label-free manner
- HES 130/0.4 accumulates in renal tubules and persists until 16 weeks after administration

(Voluven®). [NK = Native kidney; RB = Renal Failure; RRT = renal replacement therapy (MDRD); RB = Renal Failure; RRT : renal replacement therapy]

Result

Raman microimager of HES 130/0.4



	Case 1	Case 2	Case 3	Case 4
i > 0,7				
	3,44	6,00	2,00	1,00
Case 2		6,00	2,00	1,00
Case 3		65,00	16,67	8,33
Case 4		7,29	1,39	0,35
Average Cases ± SD	28.48 ± 28	7.04 ± 7.10	3.59 ± 3.69	2.36 ± 2.80
Average Negative Controls ± SD	0,87 ± 1,26	0,11 ± 0,20	0,02 ± 0,06	0 ± 0
Average Negative Controls ± 2SD	3,39	0,51	0,15	0,00
p	0,037	0,016	0,031	0,031

Table 2 : Relative area (%) of images satisfying criteria of spectrums intensity ratio (i) (at window 480/1660 cm⁻¹) for the 4 cases who received HES 130/0,5 compared to the average of these values for negative controls. [C = negative controls ; SD = Standard deviation) Comparison between case and average (p)