

KINETICS AND SITES OF DESTRUCTION OF INDIUM-111-OXINE LABELLED PLATELETS IN IMMUNE THROMBOCYTOPENIC PURPURA. A. duP. Heyns, P.N. Badenhorst, M.G. Lötter, F. de Kock, C. Herbst, H. Pieters and P.C. Minnaar. M.R.C. Blood Platelet Research Unit, University of the Orange Free State, Bloemfontein, South Africa.

Kinetics and quantification of the sites of destruction of In-111-oxine labelled autologous platelets was investigated in eight patients with idiopathic thrombocytopenic purpura. The mean platelet count was $17.9 \times 10^9/l$; platelets were separated by differential centrifugation and labelled with 5.6 ± 2.5 MBq In-111. Whole body and organ In-111-platelet distribution was quantitated with a scintillation camera and a computer assisted imaging system acquisition matrix. Areas of interest were selected with the computer and organ In-111-radioactivity expressed as a percentage of whole body activity. Mean platelet survival was 49.5 ± 29.6 h, and the survival curves exponential. Equilibrium percentage organ In-111-radioactivity was (normal values in parenthesis): spleen 33.7 ± 8.8 (31.1 ± 10.2); liver 16.1 ± 9.5 (13.1 ± 1.3); thorax 22.8 ± 3.7 (28.8 ± 5.6). Percentage organ In-111-activity at the time when labelled platelets had been removed from the circulation was: spleen 44.5 ± 16.4 (40 ± 16); liver 16.0 ± 11.5 (32.4 ± 7.2); thorax 19.7 ± 6.0 (17.7 ± 10.3). Thorax activity corresponds to radioactivity in the bony cage of the thorax. Three patterns of platelet sequestration were evident. Three patients had mainly splenic sequestration; two, mainly hepatic sequestration; and three, diffuse reticuloendothelial system sequestration with a major component of platelets destroyed in the bone marrow. Splenectomy was performed in two patients. The pattern of In-111-platelet sequestration was not predictive of response to glucocorticoid therapy or indicative of the necessity for splenectomy. Quantitative In-111-labelled autologous platelet kinetic studies provide a new tool for the investigation of platelet disorders.

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THE SYNTHESIS OF ^{111}In . TETRAPHENYL PORPHYRINE (TPP InCl.) AND ITS USE IN PLATELET LABELLING. L. Vuillemin, C. Cloutour, M. Pommé, J. Reiffers, D. Ducassou. Service de Médecine Nucléaire et Service d'Hématologie, CHR Bordeaux (Groupe Hospitalier Sud) - Laboratoire de Chimie organique, C.N.R.S., Université de Bordeaux I. - France.

The synthesis of TPP InCl was realized using a modified method of A.D. Dunn previously reported (1979).

In order to optimize the labeling conditions we performed a study of different parameters: incorporation of carrier-free Indium (InCl) into tetraphenyl porphyrine (TPPH₂), kinetic of insertion, different concentrations of TPPH₂ and InCl.

The most reproducible yield (88%) was obtained using 8.10^{-8}M .TPPH₂ (50µg) and $3.25 \times 10^{-10}\text{M}$. InCl (50µCi) heated to reflux in acetic acid (250µl) for 20 hours. The purification was performed by a chloroform extraction followed by sterilisation. This radiochemical compound was used for in vitro labeling of human platelets.

A comparative study with In-oxine exhibited a higher labeling efficiency, even in 10 ml of pure plasma medium (95% for 1.6×10^{10} cells).

The optimal concentration of TTP InCl for which we observed no functional alteration by in vitro tests (aggregation with ADP or collagen, hypotonic stress) was 15µg/10ml suspension.

The absolute number of platelets necessary for an acceptable labeling efficiency (40%) was 5×10^7 cells.

TPP InCl has a good platelet labeling efficiency in pure plasma medium and appears to be an interesting tracer. However further studies (elution from labeled cells, kinetics and distribution of labeled platelets) are necessary before introducing TPP InCl as a physiological platelet label.

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DISTRIBUTION OF INDIUM-111 IN LABELED HUMAN PLATELETS: IMPLICATIONS IN PLATELET SURVIVAL AND DOSIMETRY. M. K. Dewanjee, S. A. Rao, and P. Didisheim. Mayo Clinic and Mayo Foundation, Rochester, Minnesota, U.S.A.

Subcellular distribution of In-111 in In-111-labeled platelets (In-Pl) determines the biodistribution and dosimetry of In-111 after the in vivo lysis of In-Pl. Human platelets were labeled with In-111-oxine (In-Ox) and In-111-tropolone (In-TPL) in ACD/saline (A/S) and plasma (P). In-Pl was lysed after 6 repeated freezing and thawing procedures. A fraction of In-Pl-lysate (In-Pl-LS) was filtered (0.22 µm) and passed through a calibrated Sephadex G-100 column for estimation of molecular weight (Mol. wt.) of In-bound Pl-protein. The In-Pl-LS was injected in 15 rabbits and biodistribution (% I.D.) performed at 24 hours after I.V. administration. Results are tabulated below:

	Media	Blood	Liver	Marrow	Kidneys
In-111-Chloride	(n=5)	12 ± 4	6 ± 1	2 ± 1	5 ± 2
In-111-Ox-Pl-LS	(A/S) (n=5)	11 ± 1	20 ± 2	4 ± 2	6 ± 1
In-111-TPL-Pl-LS	(A/S) (n=5)	17 ± 1	41 ± 4	3 ± 1	8 ± 2
In-111-TPL-Pl-LS	(P) (n=5)	19 ± 2	29 ± 3	3 ± 1	4 ± 1

$80 \pm 11\%$ and $70 \pm 10\%$ of In was bound to soluble platelet protein when platelets were labeled in plasma and A/S respectively. Mol. wt. of In-bound platelet protein was estimated as $52,000 \pm 5,000$ daltons. Biodistribution shows that In-Pl-LS labeled in A/S localizes more in RES than plasma; whole body retention is also longer. These studies shed further light on the binding sites of In in platelets labeled in A/S or plasma media and their ultimate fate after administration.

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INDIUM-111 AUTOLOGOUS PLATELETS IN THE DETECTION OF EXPERIMENTAL PULMONARY EMBOLI. G. Cella, D.E. Tow, P. Godin, T. Cunningham, L. McCracken, and A.A. Sasahara. Research, Nuclear Medicine and Medical Services, West Roxbury Veterans Administration Hospital and the Departments of Medicine and Nuclear Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts, U.S.A.

We investigated the efficacy of detecting fresh pulmonary emboli in dogs using 2 different age preparations of Indium-111 autologous platelets. Clots were induced in jugular veins of 18 mongrel dogs weighing 12-26 kg by ligating a segment of the jugular vein and the addition of thrombin. Clots thus formed were left in situ for 24 hours and then released into the pulmonary circulation. Pulmonary angiography (PA) was performed immediately before and after embolization. Scintillation imaging (SI) of the lungs was performed with a high resolution LFOV camera within 4 hours of embolization. There were 28 autopsy-identified clots in the lungs, of which 26 (92%; 26/28) were detected by PA. Of these, SI detected 14. SI also detected 2 additional clots missed by PA.

Using PA as standard, the overall detection rate of SI was 54% (14/26). There was some difference between platelets of 4 hours (69%; 9/13) and those labeled 24 hours before (38%; 5/13). The difference was not significant. As expected, SI detectability was related to the product of concentration ratios between clot and blood (C/B) and weight (Wt) of the clots and not to either one alone:

	DETECTED CLOTS	UNDETECTED CLOTS	
Mean C/B	8.21	8.60	p=n.s.
Mean Wt	0.65 gm	0.62 gm	p=n.s.
Mean C/B X Wt	2.74	0.42	p=0.001

Data showed that Indium-111 platelets appeared to be a promising radiopharmaceutical for the detection of thromboemboli and that the freshly prepared platelets should be preferred.

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