The Report on Lead Excreting Function of Modified Citrus Pectin

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1. Material

Pectin with low degree of esterification and low molecular weight（esterification=9%, molecular weight=8000）, pectin with middle degree of esterification and middle molecular weight(esterification=23%, molecular weight =28000), pectin with higher degree of esterification and higher molecular weight（esterification=58%, molecular weight =56000）、pectin with middle degree of esterification and low molecular weight（MELM, esterification=23%, molecular weight =12000）, pectin with low degree of esterification and higher molecular weight（esterification=11%, molecular weight =56000）and pectin with higher degree of esterification and low molecular weight（esterification=48%, molecular weight =12000），positive drug control using EDTA

2 Animals

SD rats, weight=150g±15g, half male and half female

3 Method

The rats drink 0.02% lead acetate solution for 4 weeks freely, measuring the lead content of the tail vein blood. The successful model drink deionized water and treated with differented pectins and EDTA.

10 rats one group, half male and half female. The group was separated as following：normal group（NS, ig normal saline），model group(MS, ig normal saline), positive drup group(EDTA, ig $CaNa_2EDTA$ 50mg/kg bodyweight), Pectin with low degree of esterification and low molecular weight（LELM group, ig 300mg/kg body

weight ）, pectin with middle degree of esterification and middle molecular weight(MEMM group, ig 300mg/kg bodyweight), pectin with higher degree of esterification and higher molecular weight（HEHM group, ig 300mg/kg bodyweight）、pectin with middle degree of esterification and low molecular weight（MELM group, ig 300mg/kg bodyweight）, pectin with low degree of esterification and higher molecular weight（LEHM group, ig 300mg/kg bodyweight）and pectin with higher degree of esterification and low molecular weight（HELM group, ig 300mg/kg bodyweight）, complex formula group(CF, ig 300mg/kg bodyweight).

The experiment detail

Weigh every rats body weight every 5 days and collecting their urine and stool to measuring the lead content. At the end of 4 weeks take the tail vein blood to measure the content of lead, copper, Ferrum, zinc, calcium, hemoglobin and the activity of δ－ALAD.

Measure the lead content of the femur, liver, kidney and brain to and the MDA, SOD, GPx, NOS and NO content of brain and liver.

Results

Table 1 The weight-increasing condition of every group(x±s, n=10)

group	Initial weight	1 week	2 week	3week	Final weight
NS	151±6.3	206±12.8	258±15.1	302±20.4	353±24.7
MS	150±7.2	193±11.4	213±13.6	225±15.2	238±19.9
EDTA	151±6.6	188±10.1	212±12.8	223±13.8	237±18.2
LELM	150±6.8	201±10.8	243±17.2	285±15.9	321±23.6
MEMM	150±6.0	205±10.3	253±14.5	301±22.5	351±23.9
HEHM	152±6.4	203±13.2	249±13.6	287±19.4	324±20.2
MELM	149±6.9	204±10.9	252±15.6	301±20.7	352±21.5
LEHM	150±6.5	202±10.1	251±13.9	298±19.8	350±22.1

HELM	150±6.4	202±12.5	249±15.3	285±18.6	324±24.5
CF	150±6.1	206±11.2	258±18.7	304±21.9	357±25.3

Table 2 The organism lead content condition of every group(mg/kg, x±s, n=10)

group	Liver	bone	brain	blood
NS	3.3±0.4	6.4±0.7	2.5±0.3	3.9±0.2
MS	7.8±0.6	198±21.6	5.4±0.2	53±4.1
EDTA	3.9±0.3	103±13.5	2.8±0.1	4.9±0.4
LELM	3.7±0.2	105±12.5	2.9±0.2	5.2±0.3
MEMM	3.6±0.1	98±10.4	2.8±0.3	4.8±0.2
HEHM	5.2±0.4	146±13.7	4.6±0.5	42±2.3
MELM	3.8±0.2	102±12.8	2.7±0.1	4.7±0.2
LEHM	4.3±0.1	116±12.7	3.1±0.2	13±2.5
HELM	4.8±0.4	138±14.1	4.3±0.3	37±1.6
CF	3.5±0.3	95±7.3	2.6±0.1	4.6±0.5

From table1 and table2, considering the effects of preventing the growth inhibition and promoting the lead excretion, we can draw an conclusion that the pectin with middle esterification degree and low molecular weight was the best material to promoting the lead excretion.

Table 3 Lead content in the blood, liver, brain, femurs, kidneys and urinary in each group

group	n	Blood lead	Bone lead	Liver lead	Kidney lead	Brian lead	Urinary lead
normal	8	0.05±0.01	4.12±0.79	0.06±0.01	4.58±0.78	0.07±0.01	0.06±0.01
model	8	3.52±0.76	258.63±24.26	30.46±2.85	568.52±64.66	13.57±1.54	2.98±5.43
CaNa2EDTA	8	0.99±0.12**	154.86±14.58**	9.38±1.97**	128.46±15.48**	4.64±0.28**	1.84±0.48**

MCP	8	1.04±0.13**	163.44±12.36**	10.45±1.69**	134.21±13.14**	4.87±0.15**	1.92±0.52**
LCP	8	1.02±0.14**	156.68±11.74**	10.02±1.54**	130.18±13.26**	4.75±0.13**	1.90±0.46**
HMP	8	1.98±0.36*	193.72±31.32*	21.38±2.67*	239.55±24.72*	7.36±0.23*	2.27±0.63*

Compare to the model group: LCP group has the same lead removing effects with MCP group and CaNa2EDTA group, but superior to HMP.

LCP is the low molecular pectin from Gold kropn Company. MCP is the modified pectin from American company, HMP is the high molecular weight pectin.