



Health Impacts of Lead Poisoning

铅中毒对健康的影响

A preliminary listing of the health effects & symptoms of lead poisoning

初步列出铅中毒对健康的影响和症状

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以下列出的铅中毒的症状和作用已经被编辑用来提醒人们为了防止进一步的铅中毒, 更多的血铅检测必须及时做完。在每个症状或者作用出现以后, 数字提示涉及该作用的出版物。在几千个已经发表的出版物的至今只有 61 个出版物被检查过。更多的将被复查。这个列表更新是在时间许可下完成。

然而, 请记住大多数铅中毒的人表现出没有一点症状。

儿童

神经系统:

脑病(1,2,3,4,20,35)

急性脑病(11)

改变发育中的大脑的功能(16)

改变的脑电图表现(16)

惊厥 (1, 2, 3, 4)

脑瘫(1)

神经传导递质的释放受阻 (11)

周围神经系统

周围神经紊乱【减低的触觉敏感性】 (2, 3, 4, 5, 6, 18)

减慢的神经传导速度【减慢的传到时间】 (2, 14, 18, 35, 39, 58)

脚/手下垂 (1, 3)

涉及平衡的本体感受通路改变 (2)

头晕 (1, 4, 38)

生长和发育

延迟的神经发育[如坐立, 走步, 讲话] (2, 58)

身材和成长率下降 (1, 2, 3, 18, 35, 39)

脑垂体-甲状腺内分泌系统障碍 (18, 21)

晚年的骨质疏松 (43)

体重下降 (58, 60)

青春期延迟 (60)

减少新生儿的生长发育 (60)

认知的发育

智商水平下降(1,2,3,4,5,6,15,24,35,36,39,41,58, 60)

认知功能缺失 (2, 26, 33)

口头功能/语言功能缺失 (2, 14, 15)

学习困难 (11, 15, 35)

减低的教育表现 (35, 60)

减低的阅读, 数学, 非口头推理的能力和短期记忆, 甚至出现在在血铅水平小于 10ug/dL (41)

自闭症 (7), 出现在具有基因遗传倾向的儿童同伴有金属硫蛋白功能障碍症(42)

行为

侵略性, 暴力, 敌意, 反社会或犯罪行为。 (8, 26, 60)

注意问题, 注意力分散, 烦躁不安。(8,12,15,21,38,58, 60)

外向和内向行为 (8)

多动行为, 难以管理 (1, 2, 8)

不适当的/无法控制的行为类似注意力缺失功能障碍行为， 增加的发生率（2, 11）

易激（1, 38）

嗜睡（1）

增加的学校旷课（35）

听力

听力障碍， 听觉敏感性减低(2,3,5,10,14,18,21,26,32,35,39,58, 60)

听觉诱发反应模式改变（2）

听觉处理改变（2, 10）

视力

视网膜变性（6, 10）

杆状细胞光感受器敏感性降低（10）

感知功能缺失（2, 21）

视-空间技能不足[如拼图]（15）

运动和肌肉

视-运动技能缺失【手-眼协调功能】（2, 3, 15, 26）

精细运动障碍（1, 2, 3）

运动功能缺失（2）

肌肉力量和耐力受损(26)

瘫痪(3)

躯体疼痛【酸痛】(8,38)

消化系统

维生素 D 代谢障碍【影响骨重塑， 矿物质吸收和钙摄取。(2,3,6,18,24,35,38,39,58)

绞痛(3,25,35)

食欲丧失(1,2)

呕吐(1,4)

便秘， 腹泻， 厌食(38,58)

腹部痉挛(39,58)

肾的（肾脏）血液和循环

肾脏疾病-急性肾病(14,21,35,38,58)

昆士兰肾炎(14)
贫血(1,2,3,4,5,6,35,38,58)
死亡(1,2, 3, 4,19,35,46,58)

围产期发育和生殖健康的影响

胎儿

植入前损失(3)
流产，死产，新生儿死亡(2,3,4,5,18,20,24,31,47)
胎龄缩小，早产(1,2,3,5,18,24,62)
降低胎儿体重(1,2,3,4,5,6,18,19, 60,62)
轻度先天性/染色体异常 (2,3,4,18,31)
生殖异常; 障碍 (5,13,38)
胎盘功能降低 (19)
铅通过胎盘传递给母亲的胎儿 (39,58)

- 减少胎儿生长 (60,62)



产妇

- 先兆子痫 (64)
- 产妇死亡的风险增加 (由于先兆子痫) (64)

成人

改变睾丸功能(24)
低精液量【低精子数量】(3,5,19,47, 60)
无精子症【精子无力】(3,5,20, 60)
畸胎精症[精子异常](3,5,31)
勃起功能障碍，阳痿(3,40)
血清睾酮降低(3)
精液中含有铅的存在(31)
对垂体的影响(31)
绝育，不育(5,31,35,39,58)
对卵巢的影响(19)
性欲减退/性行为减少(2,21,31)
阳痿(31)
延迟受孕时间(60)

成人

肾脏

肾脏损伤(2,3,5,13,14,21,23,24,28,30,34,39,58)

慢性铅性肾病[肾脏病] (2,3,14,21,22,24,38,58, 60)

死于肾小球肾炎[肾脏炎症] (29, 30)

Fanconi 综合征 (14)

痛风 (2, 3, 14)

肾性高血压 (17)

减低的肾小球滤过率和增加的肌酐血浓度 (23, 60)

神经系统

脑病【脑的疾病】(2,4,20,24,25,34)

脑血管病, 中风, 脑出血 (2,27,28,29,30)

精神运动性障碍 (13,34)

周围神经系统 (13,24,40,47)

周围动脉疾病[PAD] (53,54)

神经传导速度减慢[反应时间减慢] (2,34,58)

震颤 (25,26,38,40,55,60)

感觉异常, 瘫痪 (25)

心脏血管和血液循环

•高血压, 血压升高 (2,14,17,22,35,38,40,58,60)

•男性收缩压增加 (35)

•心脏毒性效应 (14)

•心血管疾病的风险增加 (17,61)

•冠状动脉疾病 (2)

•贫血; 血红蛋白浓度下降 (2,3,5,13,24,35,38,39,47,58)

•血小板功能障碍 (2)

•增加红细胞[红细胞]原卟啉 (35)

•尿中 ALA 增加 (34)

•尿中原卟啉增加 (34)

•心脏病发作或中风早期死亡的风险增加 (46,61)

•左心室肥大 (61)

•外周动脉疾病 (61)

•心电图异常 (61)



- 促进动脉粥样硬化（动脉斑块积聚）和血栓形成（形成血凝块）(61)
- 缺血性心脏病（61）

智力和精神

- 抑郁症（2,13,38）
- 焦虑（38）
- 个性改变（34）
- 死于暴力，自杀，事故（29）
- 注意力集中障碍（19,25,34,38）
- 短期记忆力缺失（2,13,19,34,38）
- 认知功能缺陷（58）
- 氧化应激（61）

行为

- 疲劳，肌肉疲劳（2,19,25,34,38,47）
- 睡眠障碍，失眠（19）
- 烦躁不安，激动，不安，侵略性（2,13,24,34,19,47,58）

感觉

- 视觉运动协调异常（2）
- 精细运动控制异常（2）
- 视力不足（2）
- 听力损失（18,35,39,47,58）
- 躯体感觉能障碍[例如检测振动，温度变化的缺陷]（2,23）

胃肠道/消化道

- 对胃肠道的影响（24）
- 食欲不振（19,40）
- 恶心（19）
- 便秘，腹泻（25,38）
- 腹痛，痉挛（25,34,40,47）
- 体重减轻，厌食（25,38）

骨骼，肌肉和关节

- 骨髓改建（21）
- 肌痛[肌肉疼痛]（25,38,40,58）
- 臀部疼痛和腿部抽筋作为外周动脉疾病[PAD]的早期阶段的症状(53,54)



- 肌无力 (34,38,39,40,47)
- 关节痛[关节疼痛] (25,38,40,47)
- 妇女更年期期间的骨铅动员导致神经认知表现下降，和收缩压增高在经绝期的妇女(44)
- 手腕下垂[无法握住手伸展] (47)
- 长期效应：与骨质疏松症相关，骨密度下降症状和骨折风险增加，也会抑制正常骨折愈合 (48,49,50,51,52)

其他

- 头痛 (2,19,21,40,47)
- 减少寿命 (35,39)
- 肾上腺功能障碍 (38)
- 牙龈附近有蓝黑线 (38,40)
- 苍白 (40)
- 细胞损伤 (男性血铅水平介于 20 至 30 $\mu\text{g}/\text{dL}$ 之间，女性介于 10 至 20 $\mu\text{g}/\text{dL}$ 之间) (39)
- 可能的人类致癌物 (56,57)

死亡(2,4,19,39,46,61)

增加早期死亡于癌症和所有其他疾病的风险(46)

从动物研究中得到的铅的影响

- 灵长类动物的注意力，学习和短期记忆受损 (12)
- 行为障碍; 灵长类动物行为改变的不灵活性 (12)
- 中等水平的血压升高 (17)
- 喂食铅的大鼠新生儿的免疫系统受损[对哮喘的易感性更大] (37,45)
- 喂养铅的母亲所生的大鼠肿瘤 (癌症) 的发病率增加 (45)
- 改变对兴奋剂药物的反应; 药物诱导的大鼠高活动度减弱 (2)
- 致畸效应引起的出生畸形 (4)
- 低骨密度在实验室动物如小鼠，和铅诱导的骨质疏松症导致的骨折不能适当的愈合[52]

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