

PARKLAND MEMORIAL HOSPITAL

MEDICAL GRAND ROUNDS

April 10, 1958

ARSENIC POISONING

Case I. [REDACTED] 15 WF, [REDACTED]

Admitted [REDACTED]-56 having ingested 1 teaspoonful arsenic trioside [REDACTED] 56 at which time she was taken to the EOR where lavage was done and she was sent home. Vomiting and diarrhea developed and she was admitted to another hospital about 5 hours after the ingestion of the arsenical. BAL was then started (5 mg/Kg q 4h for 5 doses then 3 mg/Kg q 4h for following 2 days, then 3 mg/Kg daily). About 3 days later she developed emotional lability with violent outbursts, verbal rambling, confusion and disorientation with sporadic picking at bedclothes and then frank athetoid-choreiform movements and ataxia.

On [REDACTED]-56 she was transferred to [REDACTED] unit where BAL was temporarily stopped until urine could be checked for arsenic. She became comatose, developed low grade fever and tachycardia.

Transferred to [REDACTED] [REDACTED]-56 where BP 120/60, P 120 R 20 T 99. Comatose with generalized muscle twitching and jerking. There was acneiform eruption of the face with periorbital puffiness and a fine macular rash of the rest of the body.

Urine contained 6.88 mg. arsenic/L. Hb. 9.0; WBC 3,700 to 9,600. BUN of 32 fell to 12 with saline replacement.

BSP 9% retention ([REDACTED]-56, never repeated)

LP and CSF normal other than opening pressure of 23 cm H₂O.

On BAL 120 mg q 4 h plus parenteral ACTH and cortisone she improved dramatically. The twitches and choreiform movements were initially controlled with magnesium sulfate.

Within 10 days after increased BAL doses she was able to walk with minimal ataxia.

Case II. [REDACTED] 31 WF, [REDACTED]

Admitted [REDACTED]-57 having been found by police slumped over steering wheel of car with an empty bottle of rat poison beside her. She stated she took the whole bottle and this was calculated to have been about 150 mg. arsenic. This was a second suicide attempt, the first having been with secenal.

Admission temperature recorded as 100⁴, pulse 110, BP 110/70. Examination was not remarkable other than marked depression and withdrawal.

BAL started immediately (150 mg q 4 h for 24h, etc.) with 5 mg/L arsenic found in urine.

CBC and urinalysis normal, BUN 11.

Patient in this hospital 4 days before transfer to another with no abdominal, skin, CNS symptoms developing.

Case III. [REDACTED] 24 WM, [REDACTED]

Admitted [REDACTED]-56 with history of having "accidentally" ingested a tablespoon of arsenic-loaded insecticide 45 minutes before appearing in the emergency room. Only complaint was burning "in stomach". He was immediately given BAL in doses for acute intoxication and subjected to intensive gastric lavage followed by 4 ounces of M of M. Gastric washings contained denuded gastric mucosa and 40 mg/L arsenic. Urine collection after admission contained 5.0 mg/L arsenic. He was treated with BAL for six days on which day the urine arsenic was 0.25 mg/L (.89 mg/24h).

He at no time developed gastro-intestinal symptoms or CNS symptoms or signs.

His BUN, CO₂, Cl, Hb, WBC, Na, K, urinalyses, and liver functions remained normal. No LP done. He was discharged after psychiatric evaluation.

CASE IV. [REDACTED] 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

and progressive weakness with weight loss. Three weeks prior to admission he developed abdominal pain, distension and vomiting and underwent laparotomy for possible bowel obstruction. Apparently, no obstruction found but adhesion from old appendectomy was removed. After surgery he was found to have frank paralysis of legs with paresis of arms. Vomiting persisted and disorientation and confusion became more severe. He was then transferred to this hospital.

On admission vital signs were normal other than pulse of 100. He was small and shrunken with marked features of muscle wasting. There was a constant coarse tremor of most muscles with ataxia. He was disoriented in all spheres, hallucinating and confused. The skin of the face, neck and forearms were more deeply pigmented than the remaining skin.

Hyperesthesia of the legs was noted but with diminished to absent proprioceptive sense. The deep reflexes of the legs were hypoactive, those of the arms normal. Superficial reflexes were absent.

Hb. 9.9 with no stripping of RBC seen. WBC 4,000 with normal differential. Urinalysis normal, Sp. Gvt. 1020. LP: CSF protein 82 mgs.%. EUN 17; bilirubin 0.5; BSP 4% retention; Alk. phosphatase 5.7 B.u. Urine lead negative. Urine arsenic 1.75 mg/liter. Urine porphobilinogen positive. EKG: Nonspecific T wave changes. On BAL 3 mg/Kg mental changes worsened, improved on 5 mg. q 4h. Urine arsenic rose to 2.32 mg/L thence progressively fell (last one 0.308 mg/L). Fingernails and hair positive for arsenic. BAL dose decreased stepwise, now receiving 3 mg/Kg q 12 h.

Source of arsenic contact not yet clarified.

Features of encephalopathy have markedly improved, the motor and sensory changes have but slightly improved.

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CHELATION -- BAL, EDTA and Others

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Definition of Toxicity Ratings

(See Gleason, Gosselin, Hodge II Treatment Ref. 4)
15,000 Specific Products on Consumer Market

Probable Lethal Dose

<u>Toxicity Rating</u>	<u>Gm/Kg of Body Weight</u>	<u>Approx. for 70 Kg. Man</u>
6 - Super Toxic	Less than 0.005	A taste (less than 7 drops)
5 - Extremely toxic	.005 - .05	Bet. 7 drops and 1 tsp.
4 - Very Toxic	.05 - .5	Bet. 1 tsp. and 1 oz.
3 - Moderately toxic	0.5 - 5	Bet. 1 oz. and 1 pt.
2 - Slightly Toxic	5 - 15	Bet. 1 pt. and 1 qt.
1 - Practically Nontoxic	Above 15	More than 1 qt.

Examples

- Class 1 - Mucilages, pastes, soaps, lead pencils, modeling clays.
Class 2 - Cosmetics, lubricating oils, detergents, waxes.
Class 3 - Hair dyes, tonics, permanents, nail polish, bleaches.
Class 4 - Disinfectants, depilatories, rust removers, indelible inks.
Class 5 - Drain cleaners, fireplace frame colors, some insecticides, rodenticides and herbicides.
Class 6 - A few: insecticides, fungicides, rodenticides, herbicides.

Comparison of Safety of Pesticides

Insecticides

<u>Low Risk</u>	<u>Moderate Risk</u>	<u>High Risk</u>
Allethrin	Aldrin BAC*	Demeton (Systox)*
Derris*	Calcium Arsenate*	Hydrogen Cyanide*
Methoxychlor	Chlordane*	Metacide*
p-dichlor benzene	Chlorothion, DDT*	Methyl bromide*
Perthane	Diazinon, dieldrin	Nicotine*
Propellant	Diptherex, endrin*	Parathion
Pyrethrum*	Lead arsenate	Paris green*
Synergists	Lethane*, lindane*	Schradan (OMPA)
	Malathion, metaldehyde*	TEPP*
	Naphthalene*	
	Pentachlorophenol*	
	Silicoflourides*	
	Sodium fluoride*	
	Solvents (Kerosene, etc.)*	
	Thanite, toxaphen	

Rodenticides

<u>Low Risk</u>	<u>Moderate Risk</u>	<u>High Risk</u>
Fumaric	ANTU	Arsenious Acid*
Pival	Barium carbonate*	Cestrin
Red Quill	Zinc Phosphate	Yellow phosphate*
Tomaric		Strychnine*
Warfarin		Sodium fluoroacetate*
		Thallium

Herbicides

<u>Low Risk</u>	<u>Moderate Risk</u>	<u>High Risk</u>
2,4 - D*	Fuel Oils*	Dinitro-o-cresol*
Endothal	Sodium borate*	Sodium arsenate*
Maleic hydrazide	Sodium Chlorate*	Sodium arsenite*
Monuron, diuron	Sodium trichloroacetate	Sulfuric Acid
(Chlorophenyl dimethylureas)		