Spurt of Vaccine Innovation (1955-67)

In the late 1950's, the number of licensed vaccine products declined, but the number of licensed manufacturers increased, and several events spurred vaccine innovation. The Salk vaccine, the first against poliomyelitis, was introduced in 1955. With this vaccine, Congress initiated its now 25-year history of purchasing and promoting the use of selected vaccines. Also, microbiological techniques and culture media were improving. Isolation of organisms was made easier. The early sixties marked the development of several viral vaccines, including oral polio, measles, and mumps.

In 1962, Congress amended the Food, Drug, and Cosmetic Act, setting new standards for drug safety, and for the first time, establishing clinical efficacy as a criterion for marketing approval of prescription drugs. New safety and efficacy standards also 'were adopted for biological products. These new criteria apparently had no-immediate effect on the number of licensed vaccine products or establishments. During the next 5 years, the number of licensed products dropped very little, from **396** to **385,** the cumulative number of licensed establishments dropped by 2.

Trends in vaccine product and establishment licensure from **1968** to the present are discussed in chapter **2.**

Appendix 2.2
PROFILE OF VACCINE ESTABLISHMENTS AND PRODUCTS CURRENTLY LICENSED IN THE UNITED STATES (1979)

Eighteen of **26** vaccine manufacturing establishments licensed in the United States currently produce vaccine products. Altogether these 18 establishments hold a total of approximately 143 vaccine product licenses issued by the U.S. Government. ' Eight American pharmaceutical companies currently hold 100 **(70** percent) of these 143 licenses; seven foreign-based institutions hold **24** licenses **(17** percent); and two State governments (Michigan and Massachusetts) hold 18 licenses (13 percent); only one product license is issued to an American university, the University of Illinois.[2]

Among these 143 product licenses, about 51 distinct types of vaccine products are represented. A profile of sources of the 51 types of vaccine products currently licensed in the United States, including American pharmaceutical companies, foreign institutions, State governments, and American universities, is presented in table 2.2A.

'These 143 product I icenses do not include I icenses for immunoglobulin products made from blood fractionation.

'See table 1 inch. 2.

Table 2.2A–Typos of Establishments ThatAre Licensed To Produce Each of the 51 Types of Vaccine Products Currently Licensed in the United States (1979)[a]

Type of product	Number o product licenses held by each tvDe of establishment				
	American pharmaceutical companies	Foreign-based Institutions	American uruversities	State governments	All 'establishments combined
1 Adenovirus and influenza virus vaccines combined aluminum phosphate adsorbed	1				1
2 Adenovirus vaccine,	1				1
3 Antirabies serum,	1	1			2
4 Anthrax vaccine adsorbed				1	1
5 BCG vaccine.		2	1		3
6 Cholera vaccine	4	1			5
7 Diphtheria antitoxin	1	1		2	4
8 Diphtheria and tetanus toxoids	2				2
9. Diphtheria and tetanus toxoids and pertussis vaccine.	2				2
10. Diphtheria and tetanus toxoids and pertussis vaccine adsorbed.	6	1		2	9
11. Diphtheria and tetanus toxoids adsorbed	4	1		2	7
12, Diphtheria toxoid	3	1		1	5
13. Diphtheria toxoid adsorbed	2	1		1	4
14 Diphtheria, tetanus toxoids, pertussis vaccine adsorbed, pohomyelitis vaccine	1				1

Table 2.2A–Types of Establishments That Are Licensed To Produce Each of the 51 Types of Vaccine Products Currently Licensed in the United States (1979)[a]–continued

	Type of product	Number of product licenses held by each type of establishment: American pharmaceutical companies	Foreign-based institutions	American universities	State Governments	All establishments combined
15	Diphtheria, tetanus toxoids, pertussis poliomyelitis vaccines adsorbed	1				1
16	Gas gangrene polyvalent antitoxin	1				1
17	Influenza virus vaccine	5				5
18	Measles and mumps virus vaccines, live	1				1
19	Measles and rubella virus vaccine, live	1				1
20	Measles virus vaccine, live, attentuated	2				2
21	Measles-smallpox vaccine, live	1				1
22.	Measles, mumps, and rubella virus vaccine, live	1				1
23	Meningococcal polysaccharide vaccine, Group A	2				2
24.	Meningococcal polysaccharide vaccine, Group C	2				2
25	Meningococcal polysaccharide vaccine, Groups A and C combined	2				2
26.	Mumps virus vaccine, live	1				1
27	Pertussis vaccine	4				4
28.	Pertussis vaccine adsorbed	1			1	2
29	Plague vaccine	1				1
30	Pneumococcal vaccine, polyvalent	2				2
31	Poliomyelitis vaccine	2	1			3
32	Poliomyelitis vaccine adsorbed	1				1
33	Poliovirus vaccine, live, oral, trivalent	1	1			2
34.	Poliovirus vaccine, live, oral, Type 1	1	1			2
35	Poliovirus vaccine live, oral, Type 2	1	1			2
36	Poliovirus vaccine live, oral, Type 3	1	1			2
37	Polyvalent bacterial antigens with "no U.S. standard of potency"	1				1
38	Polyvalent bacterial vaccines with "no U.S. standard of potency"[b]	1				1
39.	Rabies vaccine	1				1
40	Rocky Mountain Spotted Fever vaccine	1				1
41	Rubella and mumps virus vaccine, live	1				1
42	Rubella virus vaccine, live	1	2			3
43,	Smallpox vaccine	3	1		1	5
44	Staphylococcus toxoid	1	1			2
45	Tetanus and diphtheria toxoids adsorbed (for adult use)	5			1	6
46	Tetanus toxoid	7	2		1	10
47.	Tetanus antitoxin	3	2		1	6
48	Tetanus toxoid adsorbed	6	2		2	10
49	Typhoid vaccine	2			2	4
50	Typhus vaccine	3				3
51	Yellow Fever vaccine					
	Totals	100	24	1	18	143

[a]Includes 2 serums and 11 antitoxin products. [b]Cutter actually holds licenses for 12 products in this category

SOURCE: OTA's interpretation of data provided by the Bureau of Biologics, 1979.

For 20 (40 percent) of the 51 types of vaccine products currently licensed in this country, there is only one currently licensed manufacturing establishment.[3] For 14 other types of products, there are only two establishments with current product licenses. For 12 products, there are three to five establishments with licenses; and for six products, there are more than five establishments.

Names of all licensed establishments that hold current product licenses for each of the *51* types of vaccine products licensed in the United States are shown in table 2.2B. Also indicated is the number of years that each manufacturer's product license has been in effect.

[3]See **table 3** in ch. *2.*

Table 2.2 B—Names of Establishments That Are Licensed To Produce Each of the 51 Types of Vaccine Products Currently Licensed in the United States (1979)"

Type of product	Licensed establishment(s)	Date license issued	Number of years licensed
1. Adenovirus and influenza virus vaccines combined aluminum phosphate adsorbed	Parke, Davis and Company.	9/22/59	20
2. Adenovirus vaccine	Parke, Davis and Company.	9/23157	22
3. Antirabies serum	Lederle Laboratories	1/24/51	28
	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	6126/52	27
4. Anthrax vaccine adsorbed.	Bureau of Laboratories, Michigan Department of Public Health.	1 1/04/70	9
5. BCG vaccine	Connaught Laboratories, Ltd.	3/31/67	12
	Glaxo Laboratories, Ltd.	1/24/63	16
	University of Illinois	7/07/50	29
6. Cholera vaccine	Eli Lilly and Company.	10/31/1 7	62
	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	8/19/76	3
	Lederle Laboratories	12/26/41	38
	Merck Sharp and Dohme	9/04/52	25
	Wyeth Laboratories, Inc.	7/16/52	25
7. Diphtheria antitoxin	Bureau of Laboratories, Michigan Department of Public Health.	5/11 7/26	53
	Connaught Laboratories, Inc.	1/03/78	1
	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	5/12/60	19
	Massachusetts Public Health Biologic Laboratories.	3/20/1 7	62
8. Diphtheria and tetanus toxoids.	Eli Lilly and Company.	7/26/49	30
	Parke, Davis and Company.	4/08/49	30
9. Diphtheria and tetanus toxoids and pertussis vaccine.	Connaught Laboratories, Inc.	1/03/78	1
	Parke, Davis and Company.	7129152	27
10. Diphtheria and tetanus toxoids and pertussis vaccine adsorbed	Bureau of Laboratories, Michigan Department of Public Health.	5/1 3148	31
	Connaught Laboratories, Inc.	1/03/78	
	Eli Lilly and Company.	7/26/49	3
	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	3131178	1
	Lederle Laboratories	3115148	31
	Massachusetts Public Health Biologic Laboratories.	4/26/50	29
	Merck Sharp and Dohme	3/31/49	30
	Parke, Davis and Company.	1/30/46	33
	Wyeth Laboratories, inc.	5/16/61	18
11. Diphtheria and tetanus toxoids adsorbed	Bureau of Laboratories, Michigan Department of Public Health.	5/1 1/51	28
	Eli Lilly and Company.	7/26/49	30
	Instituto Sieroterapico Vaccinogeno Toscano Sciavo	3131178	1
	Lederle Laboratories	3/22/54	25
	Massachusetts Public Health Biologic Laboratories.	5/23/50	29
	Parke, Davis and Company.	4/08/49	30
	Wyeth Laboratories, Inc.	7/26/49	30
12. Diphtheria toxoid	Connaught Laboratories, Inc.	1/03/78	1
	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	1/04/63	16
	Massachusetts Public Health Biologic Laboratories.	7/07/32	47
	Parke, Davis and Company.	8/1 7127	52
	Wyeth Laboratories, Inc.	5/19/44	35
13. Diphtheria toxoid adsorbed.	Bureau of Laboratories, Michigan Department of Public Health.	8/18/55	24
	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	2/1 7/61	18

Footnote appears at end of table

Table 2.2 B—Names of Establishments That Are Licensed To Produce Each of the 51 Types of Vaccine Products Currently Licensed in the United States (1979)[a]—continued

Type of product	Licensed establishment(s)	Date license issued	Number of years licensed
	Parke, Davis and Company. ., ...	4/28/49	**30**
	Wyeth Laboratories, Inc.	3/07/52	**27**
14. Diphtheria, tetanus toxoids, pertussis vaccine adsorbed, poliomyelitis vaccine . .	Parke, Davis and Company,	12/20/63	**16**
15. Diphtheria, tetanus toxoids, pertussis poliomyelitis vaccines adsorbed	Parke, Davis and Company.	3/29/59	**20**
16. Gas gangrene polyvalent antitoxin ., ..., ...	Lederies Laboratories	5/04/49	**30**
17. Influenza virus vaccine.	Connauaht Laboratories. Inc.	1/03/78	1
	Lederle Laboratories	12/07/45	**34**
	Merck Sharp and Dohme	1 1/30/45	**34**
	Parke, Davis and Company.	11/26/45	**34**
	Wyeth Laboratories, Inc. .	12/1 3/61	**18**
18. Measles and mumps virus vaccines, live	Merck Sharp and Dohme	7/18/73	**6**
19. Measles and rubella virus vaccine, live. ., .,	Merck Sharp and Dohme .,	4/22/71	**8**
20. Measles virus vaccine, live, attenuated.	Lederle Laboratories	5/03/66	**13**
	Merck Sharp and Dohme .	3/21/63	**16**
21. Measles-smallpox vaccine, live. ...	Merck Sharp and Dohme	11/1 7/67	**12**
22. Measles, mumps, and rubella virus vaccine, live. ...	Merck Sharp and Dohme	4122171	**8**
23. Meningococcal polysaccharide vaccine, Group A ...	Connaught Laboratories, Inc. . . .	1/03/78	1
	Merck Sharp and Dohme . . .	7/1 1/75	*4*
24. Meningococcal polysaccharide vaccine, Group C . . .,	Connaught Laboratories, Inc. .,	1/03/78	1
	Merck Sharp and Dohme	4/02/74	5
25. Meningococcal polysaccharide vaccine, Groups A and C combined.	Connaught Laboratories, I	1/03/78	1
	Merck Sharp and Dohme	10/06/75	4
26. Mumps virus vaccine, live .,	Merck Sharp and Dohme	12/28/67	12
27. Pertussis vaccine . . . . . ., ...	Connauaht “Laboratories, Inc ...	1/03/78	1
	Lederle Laboratories	**1/19/1 4**	65
	Parke, Davis and Company. .,	**/24/1 7**	62
	Wyeth Laboratories, Inc. .,	**5/19/44**	35
28. Pertussis vaccine adsorbed . .	Bureau of Laboratories, Michigan Department of Public Health	10/1 2/67	12
	Parke, Davis and Company.	2/20152	27
29. Plague vaccine	Cutter Laboratories, Inc.	5/14142	37
30. Pneumococcal vaccine, polyvalent ...	Merck Sharp and Dohme ...	*11/21/77*	2
	Lederle Laboratories	*8/15/79*	—
31. Poliomyelitis vaccine.	Connaught Laboratories, Ltd	*1/24/63*	16
	Merck Sharp and Dohme	*4/1 2/55*	24
	Parke, Davis and Company. ., ...	4/1 2/55	24
32. Poliomyelitis vaccine adsorbed	Parke, Davis and Company.	7/22/70	9
33. Poliovirus vaccine, live, oral, trivalent	Lederle Laboratories	6/25/63	16
	Pfizer, Ltd. . . . . ., . . .	10/28/66	13
34. Poliovirus vaccine, live, oral, Type 1 ..., ...	Lederle Laboratories	3127162	17
	Pfizer, Ltd. . . . . ., .,	8/1 7/61	18
35. Poliovirus vaccine live, oral, Type 2 . . . . . ., ...	Lederle Laboratories	3/27/62	17
	Pfizer, Ltd.	1 0/06/61	18
36. Poliovirus vaccine live, oral, Type 3	Lederle Laboratories	3/27/62	17
	Pfizer, Ltd.	3/27/62	17
37. Polyvalent bacterial antigens with “no U.S. standard of potency”	Delmont Laboratories.	8/31/59	20
38. Polyvalent bacterial vaccines with “no U.S. standard of potency”	Cutter Laboratories, Inc.[b]. . . . . (Hollister-Stier)	4/27/76	3
39. Rabies vaccine	Eli Lilly and Company. ., ...	**6/07/1 5**	64
40. Rocky Mountain Spotted Fever vaccine.	Lederle Laboratories . ., ...	**4/1 3142**	37
41. Rubella and mumps virus vaccine, live.	Merck Sharp and Dohme	**8/30/70**	9
42. Rubella virus vaccine, live	Merck Sharp and Dohme	**6/09/69**	10
	Recherche et Industrie Therapeutiques S.A.	**3/12/70**	9
	Wellcome Foundation, Ltd. Wellcome Research Laboratories. .	3/01/77	2
43. Smallpox vaccine ., ...	Bureau of Laboratories, Michigan Department of Public Health.	**10/01/30**	49

Footnotes appear at end of table

Table 2.2B—Names of Establishments That Are Licensed To Produce Each of the 51 Types of Vaccine Products Currently Licensed in the United States (1979)[a]—continued

Type of product	Licensed establishment(s)	Date license issued	Number of years licensed
	Connaught Laboratories, Ltd.	10/23/67	12
	Connaught Laboratories, Inc.	1/03/78	1
	Merck Sharp and Dohme	9/21/65	14
	Wyeth Laboratories, Inc.	8/21/03	76
44. Staphylococcus toxoid	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	5/1 2/60	19
	Lederle Laboratories	4/03/33	46
45. Tetanus and diphtheria toxoids adsorbed (for adult use)	Connaught Laboratories, Inc.	1/03/78	1
	Eli Lilly and Company	1 1/1 4/54	25
	Lederle Laboratories	4/06/62	17
	Massachusetts Public Health Biologic Laboratories	10/18/67	12
	Merck Sharp and Dohme	8/31/70	9
	Wyeth Laboratories, Inc.	12/1 7/54	25
46. Tetanus toxoid	Connaught Laboratories, Ltd.	1/14/43	36
	Connaught Laboratories, Inc.	1/03/78	1
	Cutter Laboratories, Inc.	9/25/40	39
	Eli Lilly and Company	12/10/35	44
	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	1/04/63	16
	Lederle Laboratories	6/1 5/35	44
	Massachusetts Public Health Biologic Laboratories	5/16/49	30
	Merck Sharp and Dohme	12/11/33	46
	Parke, Davis and Company	5/04/40	39
	Wyeth Laboratories, Inc.	5/10/44	35
47. Tetanus antitoxin	Connaught Laboratories, Inc.	1/03/78	1
	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	5/1 2/60	19
	Lederle Laboratories	3/06/16	73
	Massachusetts Public Health Biologic Laboratories	9/1 1/50	29
	Parke, Davis and Company	1/1 3/1 5	64
	Swiss Serum and Vaccine Institute Berne	8/09/63	16
48. Tetanus toxoid adsorbed	Bureau of Laboratories, Michigan Department of Public Health	9/20/55	24
	Connaught Laboratories, Inc.	10/1 5/70	9
	Eli Lilly and Company	9/09/70	9
	Instituto Sieroterapico Vaccinogeno Toscano Sclavo	2/1 7/61	18
	Lederle Laboratories	1/05/54	25
	Massachusetts Public Health Biologic Laboratories	5/09/67	12
	Merck Sharp and Dohme	8/31/70	9
	Parke, Davis and Company	7/08/52	27
	Swiss Serum and Vaccine Institute Berne	2/1 1/70	9
	Wyeth Laboratories, Inc.	6/30/55	24
49. Typhoid vaccine	Bureau of Laboratories, Michigan Department of Public Health	7/26/26	53
	Massachusetts Public Health Biologic Laboratories	3/20/17	62
	Merck Sharp and Dohme	4/25/63	16
	Wyeth Laboratories, Inc.	5/19/44	35
50. Typhus vaccine	Eli Lilly and Company	3/11/41	38
	Lederle Laboratories	5/24/67	12
	Merck and Sharp and Dohme	12/24/41	38
51. Yellow Fever vaccine	Connaught Laboratories, Inc.	1/03/78	1

[a]Includes 2 serums and 11 antitoxin products. [b]Cutter actually holds licenses for 12 products in this category.

SOURCE: OTA's interpretation of data provided by the Bureau of Biologics, 1979.