ATLAS OF
MALIGLANT TUMOR
IN FUJIAN PROVINCE

# 福建省恶性肿瘤地图集

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主编单位：福建省肿瘤医院

福建省肿瘤防治研究办公室



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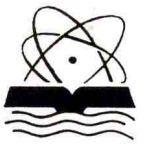
责 任 编 辑　林为建

封 面 设 计
制印工艺设计　赵增连



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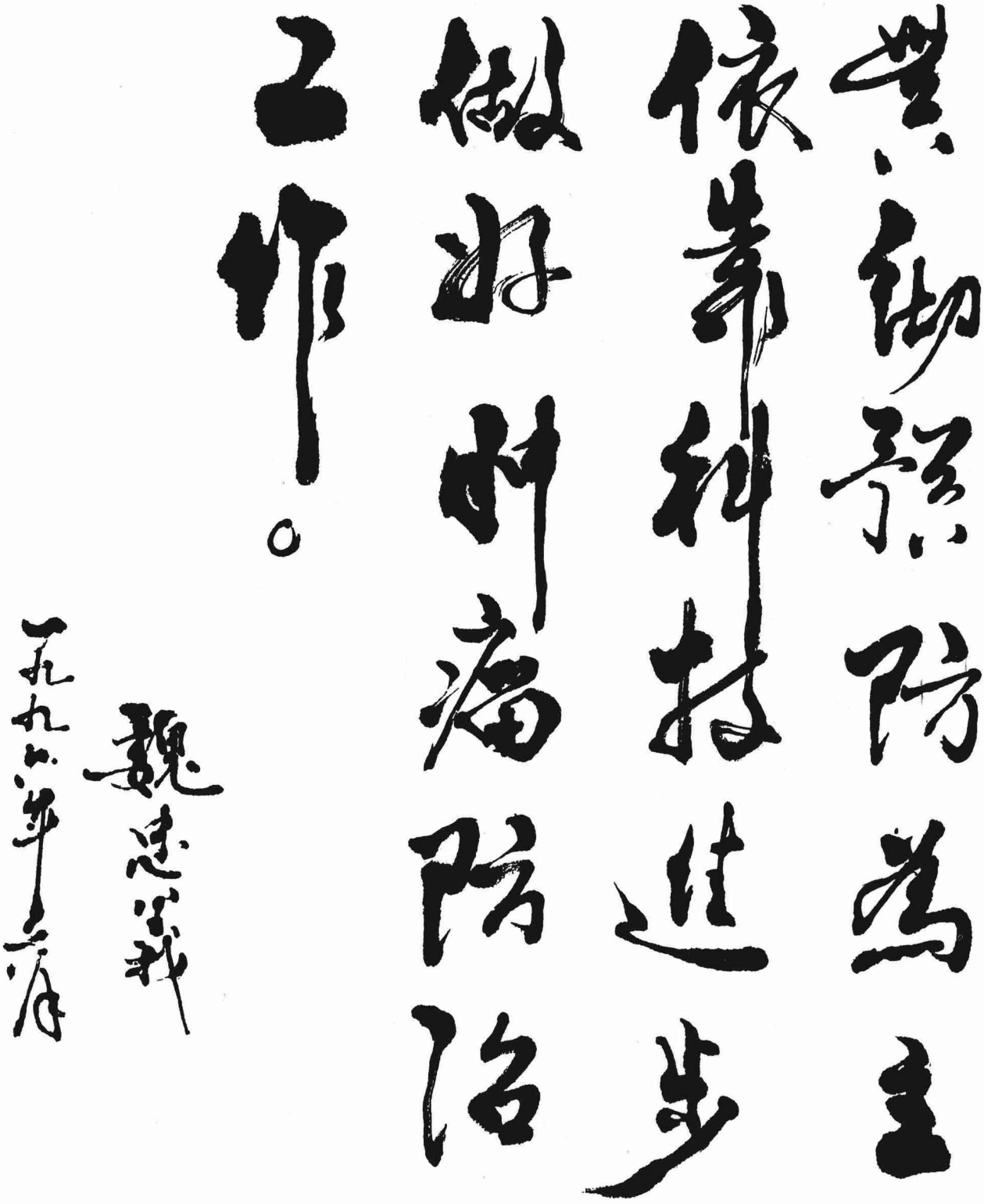
福建省副省长王良溥题词




福建省卫生厅厅长魏忠义题词

# 编　者　的　话

癌症是严重威胁人类健康和生命的常见病、多发病，是疾病的主要死因之一。福建省是全国的癌症高发地区，福州市的癌症死亡率名列全国中等城市之首，长乐市男性胃癌死亡率列全国县级单位首位。全省每年癌症新病例约7万人，死于癌症达5万人左右。

为了掌握福建省恶性肿瘤的发病情况和分布规律，福建省广大肿瘤流行病学、卫生统计学工作者与全省各级医务工作者一道，在各级政府的直接领导下，从1976年开始进行了历时20年的肿瘤防治调查工作，完成了全省9个地区67个市、县两次全居民死因调查（1973～1975年3年全人口与1986～1988年全省1/10人口），取得了较为完整、可靠的统计资料，基本上查清了福建省常见恶性肿瘤的死亡分布特征和性别部位肿瘤与地球化学元素相关关系。

为了把福建省恶性肿瘤死亡情况调查结果更直观地反映出来，形象地说明福建省常见恶性肿瘤的地区分布特征，供有关部门制定肿瘤防治工作计划，开展肿瘤流行病学与病因学研究、监视环境致癌因素、进行医学教育和卫生宣传等工作时参考，在福建省卫生厅领导下，由福建省肿瘤医院和福建省肿瘤防治研究办公室牵头，编制了这本《福建省恶性肿瘤地图集》。

本地图集着重体现福建省常见恶性肿瘤的地理分布特征和性别部位肿瘤与地球化学元素相关分析。为了便于阅读和比较，除在每类肿瘤分布图后附有部分统计图表外，还选编了福建省政区、人口、民族、地势、气候、土壤、主副食品等图表。

编制全省恶性肿瘤地图集在福建省是第一次，以省或直辖市为单位进行编绘恶性肿瘤地图集在全国亦属首次。由于经验不足，对有关图集的内容和编制方法等方面一定存在不少缺点和错误，恳请广大读者提出宝贵意见，以便今后予以改正。在编制《福建省恶性肿瘤地图集》过程中得到福建省卫生厅科研处的资助，许多部门和个人提供了宝贵的资料和帮助，谨此表示衷心地感谢。

1996年10月于福州

# Editor's Sign

Tumor is a common and recurrent disorder that seriously threatens the human health. It is one of the main causes to death. The death rate in Fuzhou is higher than that in any other mid-city of our country. Changle city is at the first place of male gastric carcinoma death rate among the county units in the country. There are about 70, 000 new tumor cases and up to 50, 000 patients dying of tumors every year all over the province.

To know well the provincial incidences and distributive law of malignant tumors, many tumor epidemiologists and hygienic statisticians and all-degree medical personnels have worked together at prevention and treatment for tumor for 20 years since 1976. Under the direct leadership of the Communist Party, they have finished twice since resident death-cause survey including nine districts, 67 cities and counties (the all population from 1973 to 1975 and the one-tenth pupulation from 1986 to 1988 all over the province). They got the more entire and authentic statistic data, and in know mainly the provincial common malignant tumor death-cause situation, distributive charaterist and the relation between the sexual or positioned tumor and global chemical elements.

Under the leadership of the Fujian Health Department, organized by Fujian Tumor Hospital and Fujian Tumor Prevention and Treatment office, all provincial medical circle and some relevant specialists and the professors drew up this atlas. The atlas is an objective reflection of the investigative results of the death situation of the provincial malignant tumor, and illustrate vividly the geographical distributive charaterists of the provincial common malignant tumor. Therefore, it is helpful for some relevant unit to make the programme of the tumor provention and treatment, and research tumor epidemiology and etiology, and keep watch on the environment oncogens. The atlas also offers reference to the medical education and the hygienic propaganda.

The atlas stresses the geographical distributive charaterists of the provincial common malignant tumors. To be helpful for reading and comparing, we compile selectively the provincial administrative districts, the population, the races, the terrain, the climate, the soil, the staple and non-staple food and the relevant analyses between the sexual positioned tumors and the global chemical elements as well as the partial statistic figures and tables enclosed on each kind of the tumor distributive figure.

Editing the provincial malignant tumors' atlas is the first time in our province and also the first time as a unit in a province or a municipality directly under the Center Government. We may have some errors and shortcomings in some figures contents or some editing methods because we don't have enough experience. We earnestly request the readers to offer the valuable suggestions, and it is important for us to correct the errors or the shortcomings later. Thanks to many departments and personnels for their important datas and their sincere helps during the editting course, and espcially for the aid finanially from the Science and Research office of Fujian Health Department.

Fuzhou

August, 1996

# 编 辑 说 明

一、本地图集的恶性肿瘤死亡分布图是在中华人民共和国卫生部肿瘤防治研究办公室组织的全国性肿瘤死亡情况调查的基础上，对福建省1973～1975年3年的全省人口与1986～1988年全省1/10人口肿瘤死亡情况进行统计分析后绘制的。统计分析工作由福建省肿瘤防治研究办公室完成。

二、本图集的地球化学元素的资料，取自中华人民共和国地质矿产部布置的全国各省地质部门调查结果。调查方法根据全国统一方案，每平方千米采集1～2个水系沉积物样品，4平方千米按规范组合为一个分析样品，定量测试40种元素含量。

三、本图集中的恶性肿瘤分布图采用聚类分析方法，将福建省主要恶性肿瘤的死亡情况按性别分为5个等级水平。地球化学元素（40种）与各种恶性肿瘤死亡等级之间的关系，采用相关、逐步回归、主因子等分析方法，找出与各种肿瘤死亡有关的危险因素，然后根据各种肿瘤死亡等级，分别计算其危险因素的均值与标准差，并绘制成危险因素含量与各种肿瘤死亡等级分布比较图。

四、我们对1973～1975年全省67个市、县的常住人口进行调查，恶性肿瘤死亡病例死前就诊单位和诊断进行了统计，全部恶性肿瘤死亡病例，县医院以上单位诊断占80.23%，未诊占2.78%，大队医疗站和公社卫生院诊断占16.92%。在全部恶性肿瘤死者中，死前经Ⅰ级诊断方法（病理、细胞、骨髓）确诊者占42.33%；经Ⅱ级诊断方法（X线、超声波、同位素、内窥镜、手术探查以及免疫学、生物化学检查等）诊断者占45.17%；经Ⅰ、Ⅱ级诊断方法诊断者共占87.5%；仅据临床表现诊断者为Ⅲ级占6.82%，死后推断者为Ⅳ级占5.68%。详见表1、2。

**表1　福建省1973～1975年各类恶性肿瘤死前诊断统计（%）**

| 癌类 | 就诊医院 | | | | | | | 诊断依据 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 未诊 | 大队级 | 公社级 | 县级 | 地(市)级 | 省级 | 合计 | 病理 | 手术 | 理化检查 | 临床 | 死后推断 | 合计 |
| 鼻咽癌 | 0.93 | 2.95 | 5.36 | 29.44 | 29.53 | 31.79 | 100 | 65.78 | 0.27 | 31.50 | 1.56 | 0.89 | 100 |
| 食管癌 | 2.79 | 7.01 | 13.76 | 40.33 | 26.31 | 9.80 | 100 | 59.17 | 0.76 | 35.79 | 3.61 | 0.67 | 100 |
| 胃　癌 | 3.13 | 6.91 | 13.29 | 40.76 | 20.34 | 15.57 | 100 | 63.47 | 1.79 | 31.26 | 2.81 | 0.67 | 100 |
| 肝　癌 | 1.71 | 3.92 | 9.63 | 39.03 | 28.90 | 16.81 | 100 | 17.65 | 0.36 | 79.55 | 1.96 | 0.48 | 100 |
| 肠　癌 | 4.90 | 8.26 | 11.84 | 37.38 | 25.48 | 12.14 | 100 | 46.35 | 3.27 | 44.30 | 5.61 | 0.47 | 100 |
| 肺　癌 | 1.82 | 2.78 | 7.07 | 36.08 | 35.22 | 17.03 | 100 | 27.56 | 0.98 | 68.35 | 2.76 | 0.35 | 100 |
| 乳腺癌 | 2.06 | 4.94 | 10.49 | 35.19 | 29.01 | 18.31 | 100 | 47.82 | 0.46 | 46.25 | 4.61 | 0.86 | 100 |
| 宫颈癌 | 4.23 | 6.21 | 11.67 | 39.24 | 23.61 | 15.04 | 100 | 46.92 | 2.64 | 47.55 | 2.13 | 0.76 | 100 |
| 白血病 | 1.12 | 1.36 | 5.06 | 44.40 | 32.26 | 15.80 | 100 | 32.70 | 0 | 66.01 | 0.95 | 0.34 | 100 |
| 膀胱癌 | 4.22 | 5.49 | 8.86 | 26.58 | 29.96 | 24.89 | 100 | 47.21 | 0.68 | 43.21 | 5.26 | 3.64 | 100 |
| 阴茎癌 | 5.41 | 5.41 | 10.81 | 33.78 | 33.78 | 10.81 | 100 | 62.81 | 0 | 0.55 | 36.24 | 0.40 | 100 |
| 恶性淋巴瘤 | 3.84 | 4.84 | 7.11 | 27.03 | 34.28 | 22.90 | 100 | 54.72 | 0 | 37.02 | 7.01 | 1.25 | 100 |
| 绒　癌 | 1.27 | 1.27 | 5.06 | 46.83 | 21.52 | 24.05 | 100 | 95.79 | 4.21 | 0 | 0 | 0 | 100 |
| 脑　瘤 | 2.99 | 3.93 | 5.29 | 25.10 | 27.00 | 35.69 | 100 | 17.82 | 2.78 | 79.40 | 0 | 0 | 100 |
| 其它肿瘤 | 4.74 | 6.29 | 9.98 | 31.36 | 29.48 | 18.15 | 100 | 45.20 | 6.82 | 42.37 | 4.82 | 0.79 | 100 |
| 合　计 | 2.78 | 5.71 | 11.21 | 38.43 | 26.35 | 15.52 | 100 | 36.87 | 5.46 | 45.17 | 6.82 | 5.68 | 100 |

表 2　福建省 14 个市县恶性肿瘤病人就诊医院及诊断级别构成（%）

| 癌类 | 就诊医院 | | | | | | 诊断依据 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 未诊 | 乡村级 | 县级 | 地(市)级 | 省级 | 合计 | 病理 | 手术 | 理化检查 | 临床 | 死后推断 | 合计 |
| 鼻咽癌 | 0.41 | 2.85 | 17.14 | 48.57 | 31.03 | 100 | 75.92 | 0.41 | 20.82 | 2.85 | 0 | 100 |
| 食管癌 | 0.21 | 11.36 | 37.22 | 36.63 | 14.58 | 100 | 49.60 | 1.78 | 46.12 | 2.04 | 0.46 | 100 |
| 胃　癌 | 0.52 | 12.41 | 41.81 | 24.85 | 20.41 | 100 | 57.89 | 3.98 | 34.67 | 2.71 | 0.75 | 100 |
| 肝　癌 | 0.23 | 5.82 | 36.84 | 38.40 | 18.71 | 100 | 23.01 | 0.74 | 73.48 | 2.50 | 0.27 | 100 |
| 直肠癌 | 0.33 | 8.46 | 32.90 | 38.44 | 19.87 | 100 | 55.38 | 5.54 | 34.20 | 4.23 | 0.65 | 100 |
| 肺　癌 | 0.10 | 7.53 | 28.38 | 44.59 | 19.40 | 100 | 33.59 | 2.03 | 62.07 | 2.12 | 0.19 | 100 |
| 乳腺癌 | 0.66 | 5.96 | 20.53 | 41.06 | 31.79 | 100 | 64.24 | 5.30 | 25.17 | 3.97 | 1.32 | 100 |
| 宫颈癌 | 1.99 | 6.62 | 36.42 | 27.15 | 27.82 | 100 | 58.28 | 3.31 | 34.44 | 1.99 | 1.98 | 100 |
| 白血病 | 0 | 1.45 | 25.73 | 45.39 | 27.43 | 100 | 42.96 | 0 | 56.07 | 0.73 | 0.24 | 100 |
| 肠　癌 | 0.34 | 8.47 | 29.15 | 39.32 | 22.72 | 100 | 51.53 | 3.73 | 37.97 | 5.76 | 1.01 | 100 |
| 膀胱癌 | 1.39 | 8.34 | 22.22 | 45.83 | 22.22 | 100 | 59.72 | 1.39 | 31.94 | 4.17 | 2.78 | 100 |
| 阴茎癌 | 0 | 25.00 | 50.00 | 25.00 | 0 | 100 | 75.00 | 0 | 0 | 25.00 | 0 | 100 |
| 恶性淋巴瘤 | 0.85 | 7.63 | 16.10 | 50.00 | 25.42 | 100 | 65.26 | 5.08 | 23.73 | 5.08 | 0.85 | 100 |
| 绒　癌 | 0 | 0 | 100 | 0 | 0 | 100 | 100 | 0 | 0 | 0 | 0 | 100 |
| 脑　瘤 | 0 | 2.24 | 17.16 | 32.09 | 48.51 | 100 | 29.85 | 6.72 | 63.43 | 0 | 0 | 100 |
| 其它肿瘤 | 0.55 | 4.66 | 23.97 | 40.14 | 30.68 | 100 | 58.91 | 4.25 | 33.15 | 3.01 | 0.68 | 100 |
| 合　计 | 0.35 | 8.64 | 34.73 | 35.74 | 20.54 | 100 | 45.77 | 2.49 | 48.65 | 2.56 | 0.53 | 100 |

注：14 个市县为福州市 、厦门市、三明市、长乐市、南安市、福安市、莆田市、惠安县、漳浦县、长泰县、宁化县、松溪县、沙县、永定县。

五、从各种恶性肿瘤分布图可以看出各市、县之间相邻地区肿瘤死亡水平趋势。同时，应用卫生部全国肿瘤防治研究办公室组织的全国 1/10 人口调查 1986～1988 年 3 年人口肿瘤死亡资料，对全省、沿海、山区等市、县进行比较，具有代表性，经检验没有差别（经全国肿瘤防治研究办公室组织全国技术指导组验收达到合格）。两次结果不因人为的行政区划、调查工作的组织情况和医疗诊断水平不同而受影响。因此，1986～1988 年调查资料，可代表全省性资料及恶性肿瘤死亡的变化情况。

六、全省居民的 1973～1975 年恶性肿瘤调整死亡率为 91.52/10 万，其中男性为 116.63/10 万，女性为 66.41/10 万，分别死亡占人口总死亡的 16.85%和 11.86%，居全省总死亡的首位。1986～1988 年恶性肿瘤调整死亡率为 105.66/10 万，其中男性为 145.00/10 万，女性为 68.51/10 万，分别占人口总死亡的 26.01%和 16.63%，居全省各类死亡的首位。80 年代与 70 年代相比较，恶性肿瘤死亡率有明显上升趋势（15.45%，$U=16.3$，$P<0.01$）。而部位肿瘤中胃癌、肝癌、肺癌和白血病等上升明显，分别为 15.14%（$\mu=9.21$，$p<0.01$），37.73%（$\mu=14.94$，$p<0.01$）、105.96%（$\mu=21.33$，$p<0.01$）和 34.11%（$\mu=5.49$，$p<0.01$）；下降的有鼻咽癌 26.14%（$\mu=4.46$，$p<0.01$）、宫颈癌 70.63%（$\mu=14.34$，$p<0.01$）。比较稳定的为食道癌、肠癌、膀胱癌、女性乳腺癌。据全国统计资料，居民恶性肿瘤死亡率居各类死因首位的城市和市级行政单位，男性有 60 个，女性有 21 个，福州市是其中之一（男性为 191.63%/10 万，女性为 121.21/10 万）。在全国县级和相当县级的行政单位中，恶性肿瘤死亡率居各类死因首位的有 429 个，其中女性有 161 个；居第二位死因的男性有 256 个，女性有 202 个。长乐市男性胃癌死亡率居全国县级单位之冠（120.47/10 万）。据福建省 70、80 年代资料分析，各年龄段居民前 4 位恶性肿瘤死亡率顺位相比有明显差别。全省不同时期的城

市和农村患肿瘤居民的性别、年龄、减寿年数分析，城市因肿瘤影响减寿年数的前3位为肝癌、胃癌、肺癌，农村为肝癌、胃癌、食道癌。而居民减寿年数随着年龄增长而增长，男性25岁、女性30岁后明显增高，40～50岁为最高峰，占总减寿年数的54.20%。由于上述内容不易以地图的形式表达，因此专门设置了几个图表安排在第二部分的末尾加以表述。

七、福建省常见的主要恶性肿瘤为胃癌、肝癌、食道癌、肠癌、白血病、鼻咽癌、乳腺癌和宫颈癌。通过聚类分析具有明显的地区性分布，男性恶性肿瘤主要分布于闽中沿海地区，闽北及闽西地区为低发区；女性恶性肿瘤主要分布于闽南、闽东沿海地区，闽北地区为低发区。现将福建省恶性肿瘤5个死亡等级中的第一级和第二级分布地区归纳如下：

恶性肿瘤——男性为长乐、莆田、仙游、连江、平潭、同安、东山、厦门市、漳浦、惠安、泉州、南安、安溪、华安、永泰、闽侯、福州；女性为惠安、安溪、福鼎、华安、德化、仙游、莆田、长乐、闽侯、福州、连江、厦门。

胃癌——男性为长乐、连江；女性为福州、闽侯、连江、莆田、平潭、闽清、古田、福鼎、华安、建宁。

肝癌——男性为同安、东山、漳浦、厦门、晋江、泉州、惠安、莆田、平潭、长乐、连江；女性为东山、同安、惠安、莆田、平潭、长乐、连江。

食道癌——男性为云霄、漳浦、同安、南安、仙游、惠安、莆田、平潭、泉州、德化、永春、安溪、长泰、龙海、平和、诏安；女性为惠安、南安、安溪、平和、诏安、长泰、华安、永春、仙游、德化。

肺癌——男性为厦门、漳州、泉州、东山、龙岩、安溪、龙海、同安、南安、闽清、福州；女性为闽侯、晋江、漳州、厦门、泉州、永泰、闽清、福州、长乐、连江。

肠癌——男性为闽清、尤溪、古田、建宁；女性为福鼎、武夷山、厦门、南安、华安、尤溪、漳州、龙岩、漳平、清流、宁化、明溪、将乐、建宁、屏南。

白血病——男性为漳平、龙岩、泉州、莆田；女性为长泰、三明、闽侯、古田、福清、莆田、平潭、泉州、晋江、同安、云霄、南靖、漳平、尤溪、连城、上杭、长汀、泰宁、将乐、顺昌。

鼻咽癌——男性为东山、诏安、同安、晋江、惠安、闽清、罗源、闽侯、福清、南安、漳平、安溪、华安、南靖、漳浦、平和、云霄、永定；女性为诏安、东山、华安、漳浦、漳平、永安、清流、建阳、福鼎、霞浦、连江、闽侯、长乐、福清。

乳腺癌——福鼎、福清。

宫颈癌——宁德、罗源、云霄、福州、周宁、古田、尤溪、大田、三明、永安、漳平、明溪、宁化、建宁、光泽。

八、福建省各种恶性肿瘤患者死亡的年龄分布曲线亦具有鲜明的特征。根据这些特征可以将它们分为几个不同的类型。第一类包括食道癌、胃癌、肺癌、肠癌等，其死亡率随着年龄增长而持续上升，提示该类恶性肿瘤的病因以外因为主，人的一生均受其影响。第二类如宫颈癌，其死亡以中年最多，老年逐渐减少，提示年青时受病因作用最强，随后作用变小，也可能是机体生理状况发生变化（如妇女绝经期）或与易感人群消失所致。第三类如女性乳腺癌，一般是在青春期开始出现死亡，死亡率随年龄增长而上升，45岁后各年龄组上升速度减慢，提示更年期前受不同刺激因素的作用，也可能与内分泌机能改变有关。第四类如原发性肝癌及鼻咽癌，青少年期死亡较多，以后死亡曲线变平，提示幼年易受强烈致癌因素作用，成年后暴露减少或人群易感性降低，表明有较明显的遗传因素存在，加上外界因素作用所致。第五类如白血病，儿童期有一高峰后逐渐降低，以后随年龄增长而变化不大，提示儿童期存在某种易感因素。因此分析年龄分布特点，对病因深入研究有一定的参考价值。

九、近年来的研究已明确化学元素与恶性肿瘤的发生有着密切的关系。我们将福建地表面水系沉积物调查的40种地球化学元素含量与福建省各种恶性肿瘤患者死亡情况进行数理统计分析（因子分析、逐步回归、相关分析），筛选出了14种元素与恶性肿瘤死亡率呈正相关，19种元素呈负相关，并以正、负相关元素含量的均值与标准差和各种恶性肿瘤死亡率等级分布进行比较，绘制出各种恶性肿瘤死亡率等级分布与相关元素

含量的比较图。我们研究的结果中，地球化学元素含量与肿瘤死亡率等级分布有些不呈剂量反应的表现，即肿瘤死亡等级分布与相关元素的含量有时不很一致。我们认为这是由于肿瘤的发生、发展的原因错综复杂，是多因素作用的结果。同时，地球化学元素进入人体及其对人体的影响与各地居民的饮食和生活习惯等因素关系也很密切。我们的研究工作旨在探索地球化学元素与肿瘤发生的关系，为有效防治肿瘤提供科学的依据。

根据我们的研究，恶性肿瘤的发生与地球化学元素的相关情况如下：

恶性肿瘤——正相关元素有 Co、Cr、Na、Hg，负相关元素有 Be、Ni、Cd。

胃癌——正相关元素有 Be、Hg，负相关元素有 F、U。

肝癌——正相关元素有 Na、Hg，负相关元素有 Ag、Be、Ti。

食道癌——正相关元素有 Mn、Co、Th、Li，负相关元素有 Ni、P、Be、Cd、Ti。

肺癌——正相关元素有 Hg、Fe、Ca、K，负相关元素有 Nb、Th、Mg。

白血病——负相关元素有 La、Zn。

鼻咽癌——正相关元素有 Y、Na，负相关元素有 Be、Mg。

乳腺癌——正相关元素有 Ca、Be、Hg，负相关元素有 W、Zr、Li。

宫颈癌——正相关元素有 Zr、Li、Sb，负相关元素有 Au。

肠癌未筛选出相关元素。

本地图集中所涉及的化学元素名称及其符号如下：

金（Au）、铍（Be）、镉（Cd）、钴（Co）、铬（Cr）、氟（F）、汞（Hg）、镧（La）、锂（Li）、锰（Mn）、铌（Nb）、镍（Ni）、磷（P）、锑（Sb）、钍（Th）、钛（Ti）、铀（U）、钨（W）、钇（Y）、锌（Zn）、锆（Zr）、铁（Fe）、钙（Ca）、镁（Mg）、钾（K）、钠（Na）、硅（Si）。

十、本地图集中的中调死亡率是指以中国 1964 年普查人口进行标化的死亡率。

十一、由于条件所限，本地图集中金门县和马祖列岛的资料暂缺，地图上和表格中均以空白表示。

# Introduction

1. "Death disrtibutive map of malignant tumor" in the atlas is from the state tumor-death investigation organized by Health Ministry Tumor Prevention and Treatment Research Office, combining the leadership of the different degree Party, the masses and the professional contingents. With the unitary investigative tables and methods, the medical team go to the villages and towns, cooperate with local relating masses, investigated samplingly population three-year death condition, the population overall the provincers from 1973 to 1975 and one-tenth of the provincers from 1986 to 1988. To ensure the entirely and precise of the investigative data, the relevant organizations were formed including the leading group and the technical group in every district. The work according to " The Investigative Methods of Tumor-death Condition" edited by Tumor Prevention and Treatment Research Office of Health Ministry. Making checks at all levels accords to the unitary data quality controlling criteria. Arranging, checking, accepting and reporting the investigative data are step by step, gathering it provincially is at last. The data was analyzed statistically by the Fujian Tumor Prevention and Treatment Research office.

2. The investigative data of the global chemical elements in the atlas was obtained from the different provincial geological survey organized by the State Geological and Mineral Ministry. The investigative method accords to the state unitary plan i. e. collecting one to two hydrographic net deposit samples per square kilometre, and forming standardly one analyzing sample per four square Kilometers, and testing by fixed quantity, the contents of 40 kinds of elements.

3. "The malignant tumors distributive map" in the atlas is analyzed accumulatly. The main provincial malignant tumors were divided five classic levels in sexes. Relationship between the global chemical elements (40 kinds) and the deaths rates of varial malignant tumors were, analyzed with the correlation, the stepwise regression and the main factor analyses, the risk factors relating to varial tumor deaths were looked for. Then according to all kinds tumor deaths classes, we worked out their each risk-factor mean values and standard deviation respectively, and compiled into risk-factor content and degree distribute-map.

4. In 67 cities or counties of the province all resident population were investigated. The statistics from patients died of malignant tumors, and the statistic tables were illustrated for their classes. In all the malignant tumor death cases, the diagnoses by county hospitals or by higher degree hospitals cover 80. 23%, and the non-diagnoses cover 2. 78%, and the diagnoses by the group medical stations and the commune hospitals cover 16. 92%. The cases diagnosed before dying with I classic diagnostic method i. e. pathology, cellular levels and marrow cover 42. 33%, and with II classic diagnostic method i. e X-ray, ultrasonic wave, isotopes, enteroscope, surgical explication, immunology and biochemical check-up cover 45. 17%, and with I and II classic diagnostic methods cover 87. 5%. The diagnosis just based on the clinical manifestations i. e. III classic diagnostic methods cover 6. 82%, and those with IV classic diagnostic method i. e. inferred after death covers 5. 68%.

Table 1. Before-death-diagnosis of Various Malignant Tumors During 1973-1975 in Fujian (%)

| Kind of Carcinoma | No-diagndosis | Consulting-Hospital | | | | | | Diagnostic Basis | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Group- | Commune- | County- | District (City) | Provincial- | Total | Pathol. | Operation | Clinical Phys. & chem. | Clinic | After Deaty | Total |
| NPC | 0.93 | 2.95 | 5.36 | 29.44 | 29.53 | 31.79 | 100 | 65.78 | 0.27 | 31.50 | 1.56 | 0.89 | 100 |
| EPC | 2.79 | 7.01 | 13.76 | 40.33 | 26.31 | 9.80 | 100 | 59.17 | 0.76 | 35.79 | 3.61 | 0.67 | 100 |
| Gastric- | 3.13 | 6.91 | 13.29 | 40.76 | 20.34 | 15.57 | 100 | 63.47 | 1.79 | 31.26 | 2.81 | 0.67 | 100 |
| Liver- | 1.71 | 3.92 | 9.63 | 39.03 | 28.90 | 16.81 | 100 | 17.65 | 0.36 | 79.55 | 1.96 | 0.48 | 100 |
| Intestine- | 4.90 | 8.26 | 11.84 | 37.38 | 25.48 | 12.14 | 100 | 46.35 | 3.27 | 44.30 | 5.61 | 0.47 | 100 |
| Lung- | 1.82 | 2.78 | 7.07 | 36.08 | 35.22 | 17.03 | 100 | 27.56 | 0.98 | 68.35 | 2.76 | 0.35 | 100 |
| Breast- | 2.06 | 4.94 | 10.49 | 35.19 | 29.01 | 18.31 | 100 | 47.82 | 0.46 | 46.25 | 4.61 | 0.86 | 100 |
| Cervix- | 4.23 | 6.21 | 11.67 | 39.24 | 23.61 | 15.04 | 100 | 46.92 | 2.64 | 47.55 | 2.13 | 0.76 | 100 |
| Leukaemia- | 1.12 | 1.36 | 5.06 | 44.40 | 32.26 | 15.80 | 100 | 32.70 | 0 | 66.01 | 0.95 | 0.34 | 100 |
| Bladder- | 4.22 | 5.49 | 8.86 | 26.58 | 29.96 | 24.89 | 100 | 47.21 | 0.68 | 43.21 | 5.26 | 3.64 | 100 |
| Penis- | 5.41 | 5.41 | 10.81 | 33.78 | 33.78 | 10.81 | 100 | 62.81 | 0 | 0.55 | 36.24 | 0.40 | 100 |
| Lymphoma- | 3.84 | 4.84 | 7.11 | 27.03 | 34.28 | 22.90 | 100 | 54.72 | 0 | 37.02 | 7.01 | 1.25 | 100 |
| Chorion- | 1.27 | 1.27 | 5.06 | 46.83 | 21.52 | 24.05 | 100 | 95.79 | 4.21 | 0 | 0 | 0 | 100 |
| Brain- | 2.99 | 3.93 | 5.29 | 25.10 | 27.00 | 35.69 | 100 | 17.82 | 2.78 | 79.40 | 0 | 0 | 100 |
| Other- | 4.74 | 6.29 | 9.98 | 31.36 | 29.48 | 18.15 | 100 | 45.20 | 6.82 | 42.37 | 4.82 | 0.79 | 100 |
| Total | 2.78 | 5.71 | 11.21 | 38.43 | 26.35 | 15.52 | 100 | 36.87 | 5.46 | 45.17 | 6.82 | 5.68 | 100 |

Table 2. Composition of Consulting Hospital and Diangosis-class of Maliguant Tumors

| Kind of Carcinoma | No-diagnosis | Consulting-Hospital | | | | | Diagnostic Basis | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Commune- | County- | District (City) | Provincial- | Total | Pathol. | Operation | Clinical Phys. & chem. | Clinic | After Death | Total |
| NPC | 0.41 | 2.85 | 17.14 | 48.57 | 31.03 | 100 | 75.92 | 0.41 | 20.82 | 2.85 | 0 | 100 |
| EPC | 0.21 | 11.36 | 37.22 | 36.63 | 14.58 | 100 | 49.60 | 1.78 | 46.12 | 2.04 | 0.46 | 100 |
| Gastric- | 0.52 | 12.41 | 41.81 | 24.85 | 20.41 | 100 | 57.89 | 3.98 | 34.67 | 2.71 | 0.75 | 100 |
| Liver- | 0.23 | 5.82 | 36.84 | 38.40 | 18.71 | 100 | 23.01 | 0.74 | 73.48 | 2.50 | 0.27 | 100 |
| Rectum- | 0.33 | 8.46 | 32.90 | 38.44 | 19.87 | 100 | 55.38 | 5.54 | 34.20 | 4.23 | 0.65 | 100 |
| Lung- | 0.10 | 7.53 | 28.38 | 44.59 | 19.40 | 100 | 33.59 | 2.03 | 62.07 | 2.12 | 0.19 | 100 |
| Breast- | 0.66 | 5.96 | 20.53 | 41.06 | 31.79 | 100 | 64.24 | 5.30 | 25.17 | 3.97 | 1.32 | 100 |
| Cervix- | 1.99 | 6.62 | 36.42 | 27.15 | 27.82 | 100 | 58.28 | 3.31 | 34.44 | 1.99 | 1.98 | 100 |
| Leukaemia- | 0 | 1.45 | 25.73 | 45.39 | 27.43 | 100 | 42.96 | 0 | 56.07 | 0.73 | 0.24 | 100 |
| Intestine- | 0.34 | 8.47 | 29.15 | 39.32 | 22.72 | 100 | 51.53 | 3.73 | 37.97 | 5.76 | 1.01 | 100 |
| Bladder- | 1.39 | 8.34 | 22.22 | 45.83 | 22.22 | 100 | 59.72 | 1.39 | 31.94 | 4.17 | 2.78 | 100 |
| Penis- | 0 | 25.00 | 50.00 | 25.00 | 0 | 100 | 75.00 | 0 | 0 | 25.00 | 0 | 100 |
| Lymphoma- | 0.85 | 7.63 | 16.10 | 50.00 | 25.42 | 100 | 65.26 | 5.08 | 23.73 | 5.08 | 0.85 | 100 |
| Chorion- | 0 | 0 | 100 | 0 | 0 | 100 | 100 | 0 | 0 | 0 | 0 | 100 |
| Brain- | 0 | 2.24 | 17.16 | 32.09 | 48.51 | 100 | 29.85 | 6.72 | 63.43 | 0 | 0 | 100 |
| Other | 0.55 | 4.66 | 23.97 | 40.14 | 30.68 | 100 | 58.91 | 4.25 | 33.15 | 3.01 | 0.68 | 100 |
| Total | 0.35 | 8.64 | 34.73 | 35.74 | 20.54 | 100 | 45.77 | 2.49 | 48.65 | 2.56 | 0.53 | 100 |

Note: 14 Cities and counties--Fuzhou city, Xiamen city, Sanming city, Nanan city, Fuan city, Putian city, Huian county, Zhangpu county, Changtai county, Ninghua county, Shongxi county, Sha county, Yongdin county.

5. In all the different malignant tumors distributive figures, we find the tumor deaths occur horizontal tendency. Compared to the dates from State Tumor Prevention and Treatment Research office of Health Ministry, investigated among one-tenth of the population all over the country from 1986 to 1988, and compared to all over the province coast and mountain areas, the tendency shoeed representative; and no difference by test.

The achievment is up to standerd checked and accepted by state technological supervisory group organized by State Tumor Prevention and Treatment Research office. Therefore, the two results are not affected by the man-made adminisrtative division, the investigation and the medical diagnostic levels. Therefore, the investigative data can represent the provincial data and the changes of the malignant tumors' death from 1986 to 1988.

6. The adjust death rates of the malignant tumors among the provincial residents from 1973 to 1975 are 91.25 per 100,000, 116.63 per 100,000 in male and 66.41 per 100,000 in female. The malignant tumors' death rates in total population death rate are 16.85% in male and 11.86% in female, at the first place of the death causes in whole province. The adjust death rates of the malignant tumors from 1986 to 1988 are 145.08 per 100,000 in male and 68.51 per 100,000 in female, and 26.01% and 16.63% respectively in total poppulation death rate. at the first place of all death causes in whole province. Comparing with 1970s' data, the incidence of malignant tumors in 1980s showed obviously ascendant tendency (15.45%) ($u=16.3, p<0.01$). And among the positioned tumors such as gastric carcinoma, liver carcinoma, lung carcinoma and leukaemia, their incidences rose obviously, there are 15.14% ($u=9.21, p<0.01$), 37.73% ($u=14.94, p<0.01$), 105.96% ($u=21.38, p<0.01$) and 34.11% ($u=5.49, p<0.01$) respectively in obviously ascendane fashion. With the descendant incidences, there are nasopharyngeal carcinoma (26,14%, $u=4.46, p<0.01$) and cervix carcinoma (70.63%, $u=14.34, p<0.01$). With the stable incidences, there are esopharyngeal carcinoma, intestinal carcinoma, bladder carcinoma and female breast carcinoma, According to the state statistic data, tumors as the first place of the death causes of the residents in the cities and the counties administrative units, with the malignant, tumors at the first place of the death causes of the residents, cover 60 in male and 21 in female. Among which Fuzhou is the highest death rate of the malignant tumors among these areas (191.63 per 100,000 in the male and 121.21 per 100,000 in female). Among the all county-clases administrative units or the analogous counties, Wih the first place of the death of malingant tumors place, 256 in male and 202 in female. Changle city is the highest death rate of gastric carcinoma in male (120.47 per 100,000). According to the provincial data during 1980s, the former fourth death rates of the malignant tumors of different age segments are significant in cis-comparison. Because it is uneasy to state the above content in atlas , we made some special tables and figures in the end of the second part.

7. The common malignant tumors Fujian province are mainly gastric carcinoma, liver carcinoma, esophageal carcinoma, intestinal carcinoma, lung carcinoma, leukaemia, nasopharyngeal carcinoma, breast carcinoma and cervix carcinoma. It is significant regional distributions with the assemble analyses. The malignant tumors in male mainly distribute in the coastal areas of the middle of Fujian, but have a lower incidence in the north and the northwest of Fujian. And those in female mainly distributes in the south and the east of Fujian, and it is lower incidence in the north of Fujian. The first and the second kind of the five classes of the positioned tumors characterists were generalized in following:

Malignant tumors: In male Changle, Putian, Xianyou, Lianjian, Pingtan, Tongan, Dongshan, Xiamen, Zhangpu, Huian, Quanzhou, Nanan, Anxi, Huaan, Yongtai, Minhou, etc. In female Huian, Anxi, Fuding, Huaan, Dehua, Xianyou, Putian, Changle, Minhou, Fuzhou, Lianjian, etc.

Gastric carcinoma: In male Changle, In female Fuzhou, Minhou, Lianjian, Putian, Pingtan, Minqing, Gutian, Fuding, Huaan county, Jianning, etc.

Liver carcinoma: In male Tongan, Dongshan, Zhangpu, Xiamen, Jinjiang, Quanzhou, Huian, Putian, Pingtan, Changle, Lianjijan, etc. In female Dongshan, Tongan, Huian, Putian, Pingtan, Changle, Lianjian, etc.

Esophageal carcinoma: In male Yunxiao, Zhangpu, Tongan, Nanan, Xianyou, Huian, Putian, Pingtan,

Quanzhou, Dehua, Yongchun, Anxi, Changtai, Ronghai, Pinghe, Zhzoan, etc. In female Huian, Nanan, Anxi, Pinghe, Zhaoan, Changtai, Huaan, Yongchun, Xianyou, Dehua, etc.

Lung carcinoma: In male Xiamen, Zhangzhou, Dongshan, Rongyan, Ronghai, Tongan, Nanan, Anxi, Minqing, Fuzhou, etc. In female Minhou, Jinjian, Zhangzhou, Xiamen, Quanzhou, Yongtai, Minqing, Fuzhou, Changle, Lianjian, etc.

Intestinal carcinoma: In male Minqing, Youxi, Gutian, Jianning, etc. In female Fuding, Chpngan, Xiamen, Nanan, Huaan, Youxi, Zhzngping, Longyan, Qingliu, Ninghua, Mingxi, Jianle, Jianning, Pingnan, etc.

Leukaemia: In male Zhangping, Longyan, Quanzhou, Putian, etc. In female Changtai, Sanming, Minhou, Gutian, Fuqing, Putian, Pingtan, Quanzhou, Jinjian, Tongan, Yunxiao, Nanjing, Zhangping, Youxi, Liancheng, Shanghang, Changting, Taining, Jiangle, Shunchan, etc.

Nasopharyngeal carcinoma: In male Dongshan, Zhaoan, Tongan, Jinjian, Huian, Minqing, Luoyuan, Minhuo, Fuqing, Nanan, Zhangping, Anxi, Huaan, Nanjin, Zhangpu, Pinghe, Yunxiao, Yongding, etc. In female Zhaoan, Dongshan, Huaan, Zhangpu, Zhangping, Yongan, Qingliu, Jianyang, Fuding, Xiapu, Lianjian, Minhuo, Changle, Fuqing, etc.

Breast carcinoma: Fuding, Fuqing

Cervix carcinoma: Ningde, Luoyuan, Yunxiao, Fuzhou, Zhouning, Gutian, Youxi, Datian, Sanming, Yongan, Zhangping, Mingxi, Ninghua, Jianning, Guangze, etc.

8. The age distributive curve of each malignant tumor shows distinctive characteristic According to these characteristics, they may be divided several different kinds. The first kind includes esophageal carcinoma, gastric carcinoma, lung carcinoma and intestinal carcinoma, and death of patients with them ascends continuously with the age, that the pathogen of this kind of malignant tumors is mainly external, and affects human is affected all his life. In the second kind such as cervix carcinoma, the death rate is the highest in the middle-aged persons, and less in the elder. suggesting that the pathogens affect strongest on the young people, and will do weaker as he gets older. It is possible also that the physiological circumstance has changed (for incidence, menstruation period), or that the susceptible population has disappeared. In the third kind sush as the female breast carcinoma, the patients start to die during adolescence, and the death rate increases as the age does, but the increasing speed becomes slow after she is over 45 years old. suggesting that there are some effects of several different stimulative factors before the climacteric, or relations with the changes of the endocrine function. In the fourth kind such as the primative liver carcinoma and nasopharyngeal carcinoma, the more deaths lie during the teen-ages, and then the death curve flats, suggesting that the persons are affected by the intense carcinogenic factors in their childhoods, and exposed to the carcinogenic factors less or their susceptibility of the population decrease in the grow-ups. There are some more obvious genetic factors, and the external factors as well. In the fifth kind such as leukaemia, the curve shows a peak in the childhook and then lower gradually, and then there are no big changes as the ages increase. suggesting that there are some kinds of the susceptive factors in the childhood. therefore the analysis of the age-distributive characteristics is helpful to research deeply the pathogens.

9. The recent researches have stated that the chemical elements are closely related with the occurrences of the tumors. We have analyzed digitally and theoretically the 40 kinds of chemical elements in the hydrographic deposits of the global surface in Fujian province and the death rates of all kind of tumor (factor analysis, stepwise regression, relevant analysis). 14 kinds of the elements sieved are positive relations with the tumors, and 19 kinds are negative. By comparing the mean values and the standard deviations of the contents of the positive and the negative elements, with the classic distributions of each kind of tumor death rate, we com-

pile the contents of the relevant elements and the classic distributions of each tumors' death rate in the comparative figure . It shows that some contents of relevant elements do not show the dose-reaction with the classic distributions of the tumors' death rates in our findings. That is to say ,that the latter sometimes do not accord with the former. Therefore,we consider that the causes of the tumor occurrences and developments are complicated,involving in many factors. It is closely related wity dietetic and living habits of the inhabitants of various areas that the contents of the elements enter and affect human body. Our researches may offer a new scientific evidence for exploration of the relation between the global chemical elements and the occurrence of the tumor. and for,the prevention and treatment,and thorough investigation of tumors,The relation between the positioned tumors and the global chemical elements is issued in brief following.

Malignant tumors: The positive relation elements include Co,Cr,Na and Hg, etc. The negatives include Be ,Ni and Cd etc.

Gastric arcinoma:The positives include Be and Hg. The negatives include F and U.

Liver carcinoma:The positives include Na and Hg. The negatives include Ag,Be and Ti.

Esopharyngeal carcinoma:The positives include Mn,Co,Th and Li. The negatives include Ni,P,Be,Cd and Ti.

Lung carcinoma:The positives include Hg,Fe,Ca and K. The negatives include Nb,Th and Mg.

Leukaemia:The negatives include La and Zn.

Nasopharyngeal carcinoma:The positives include Y and Na. The negatives include Be and Mg.

Breast carcinoma: The positives include Ca,Be and Hg. The negatives include W,Zr and Li.

Cervix carcinoma:The positives include Zr,Li and Sb. The negative include Au.

In testinal carcinoma: no sieved relative element.

The involved names and the smbols of the trace elements in the atlas are as following:

Silver (Ag) Arsenic(As) Gold(Au) Boron(B) Barium(Ba)Beryllium(Be) Bismuth(Bi) Cadmium(Cd) Cobalt (Co) Chromium(Cr) Copper(Co)Fluorine(F) Hydrargyrum(Hg) Lanthanum(La) Lithium(Li) Manganese(Mn) Molybdenum(Mo) Niobium(Ni) Nickel(Ni) Lead(Pb)Phosphorus(P) Rubidium(Rb) Stibium (Sb) Stannum(Sn) Strontium(Sr) Thorium(Th) Titanium(Ti) Uranium(U) Vanadium(V) Wolfram(W) Yttrium(Y) Zinc(Zn) Zirconium(ZT) Wolfram(W) Yttrium(Y) Zinc(Zn) Zirconium(Zr) Aluminium(Al) Iron(Fe) Calcium(Ca) Magnesium(Mg) Potassium(K) Sodium(Na) Sixlicon(Si)

10. RSDR,regulative standard death rate of Chinese population in 1964 is used for convenient indication in maps and figures.

11. There are no eata from jinmen county and Mazu island in our atlas due to the limitation of condition with expression of blank in the maps and the figures.