

# **JYOTI NIVAS COLLEGE POST GRADUATE CENTRE**



**DEPARTMENT OF MCA**

**TECH-ON-TAP (eJOURNAL)**

**DIGITAL IMAGE PROCESSING  
APPLICATIONS**

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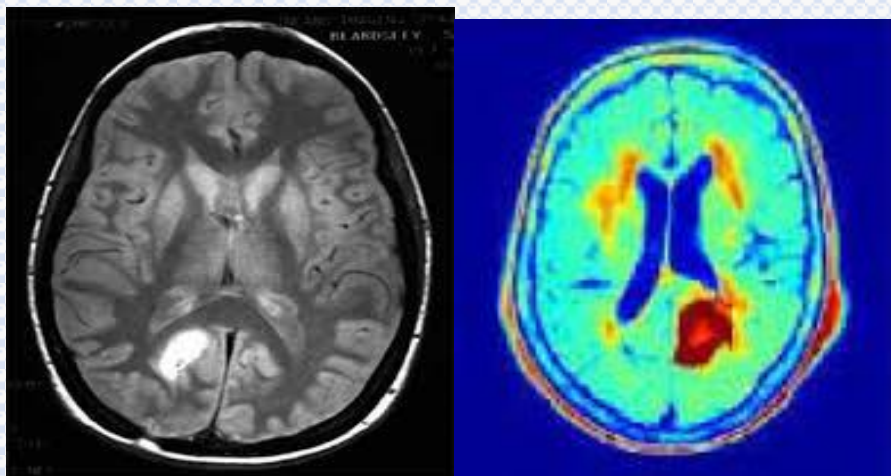
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# MAGNETIC RESONANCE IMAGING ON BRAIN TUMOR

ABHILASHA D, 19MCA01

## INTRODUCTION

Magnetic resonance imaging (MRI) are used most often to look for brain diseases. This scans will almost always show a brain tumour, if one is present Doctors can often also get an idea about what type of tumour it might be based on how it looks on the scan and where it is in the brain. MRI can be used to measure the tumour's size. A special dye called a contrast medium is given before the scan to create a clearer picture. This dye can be injected into a patient's vein or given as a pill or liquid to swallow. This create more detailed pictures. In MRI, the pictures are produced using a magnetic field, which is approximately 10,000 times stronger than the earth's magnetic field. The MRI may be of the brain, spinal cord, or both depending on the type of tumor suspected and the likelihood that it will spread in the CNS. There are different types of MRI. The result of a neuro-examination, done by the internist or neurologist, helps determine which type of MRI to use.



Original MRI Brain tumor image      Coloured MRI image

## PROBLEM STATEMENT

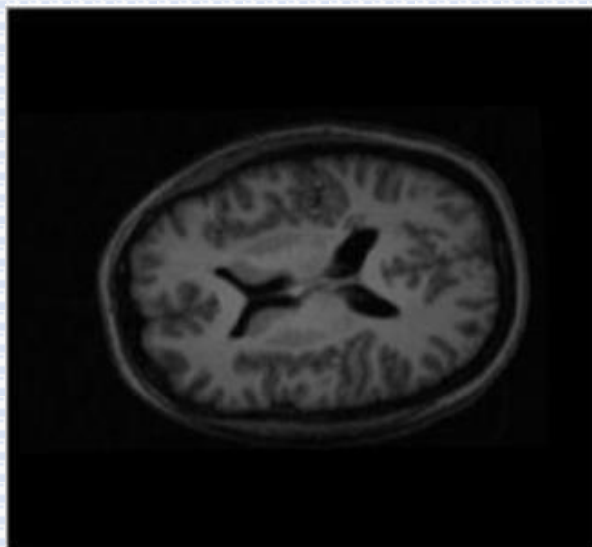
Brain tumors are a heterogenous group of central nervous system neuroplasm that arise within are adjacent to the brain. Moreover, the location of the tumor with in

the brain has a profound effect on the patient's symptoms, surgical therapeutic options, and location of tumor in the brain also markedly alters the risk of neurological toxicities that alter the patients quality of life.

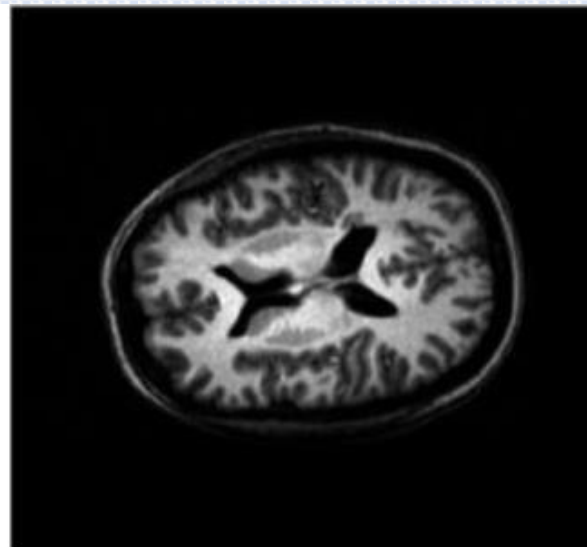
At present, brain tumors are detected by imaging only after the onset of neurological symptoms. No early detection strategies are in use, even in individuals for a specific type of brain tumors by virtue of their genetic make up.

Current histopathological classification systems, which are based on the tumors presumed cell of origin, have been in place for nearly century and were updated by World Health Organization in 1999. Still they do not allow accurate prediction of tumor behaviour in the individual patient, nor do they guide therapeutic decision-making as precisely as patients and physicians would hope. Current imaging techniques provide meticulous anatomical delineation and are the principal tools for establishing that neurological symptoms are the consequence of a brain.

### **CHARACTERISTICS OF IMAGE**



**Original image**



**Enhanced image**

After removing unnecessary artifacts, the image can be processed successfully. Conversion to grey scale image, noise removal and image reconstruction. After the image is converted to grey scale, then remove the excess noise using different filtering methods.

## FINDINGS

<b>SL. NO</b>	<b>TITLE AND YEAR OF PUBLITION</b>	<b>PRE-PROCESSING METHODS</b>	<b>FEATURE EXTRACTED</b>	<b>ANALYSIS</b>
1.	Brain Tumor Detection Based On Symmetry Information	Edge-based method	Symmetric characteristics	Segment algorithm.
2.	Identification of brain Tumor using Image processing Techniques	Image processing  Image Segmentation  Threshold method	Tumor classification	K-Means algorithm
3.	Image Analysis for MRI Based Brain Tumor Detection	Improve the quality of the MR images.  MR tissue segmentation	Higher level information of an image like shape, texture, color and contrast.	Skull stripping algorithm

## **CONCLUSION**

Growth of tissues in the brain which affects proper brain functions is considered as a brain tumor. The main goal of image processing is to identify information using images with minimum error possible. It can be segmented using image segmentation and the median filter is the most commonly used filtering technique among the various filtering techniques. All though there are many ways to identify brain tumor its identification through MRI scan is difficult task because of the complexities of brain.

## **REFERENCES**

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<https://www.sciencedirect.com/science/article/pii/S187705091632587X>

# **FORENSIC FACIAL RECONSTRUCTION**

**CHAITHRA R, 19MCA04**

## **INTRODUCTION:**

Forensic facial reconstruction (FFR) is a process of recreating the facial appearance of individual from skeletal remains usually based on skull for identifying an unknown person. FFR plays major role in criminal investigation and prehistoric remains of humans/hominids. Facial reconstruction is done by sculptor who is expert in anatomy along with the forensic anthropologists to find features of the victim like facial asymmetry, evidence for broken nose and lost teeth before death. There are 2 types 2d and 3d reconstruction. In 2d method, sculptor use marker at specific positions to place the tissue on skull and clay for formation of tissue and photograph specific region and in 3d method sculptor use clay for modeling and other method is to use high resolution images generated from automated computer based on software used. Compared to 2d technique, 3d is best in time efficiency and cost due to advancements in 3d technology.

## **CHARACTERISTICS OF THE IMAGE:**

The images of skull during preprocessing if taken through the CT scans/MRI and high resolution photographs, it consists of the skeletal structure like position of eyes, nose bridge, teeth etc and other bones in the skull along with the tissues like bone tissue inside the region and soft tissue, muscles upon the skull which will be helpful for reconstruction of features exactly expected and any broken or injury in and outside regions of the skeletal remains. Using this identification the features like age, gender, appearance etc can be extracted.

## **FINDINGS:**

<b>S.no</b>	<b>TITLE</b>	<b>PRE-PROCESSING</b>	<b>FEATURES-EXTRACTED</b>	<b>ANALYSIS</b>
1.	A Facial Reconstruction method based on new mesh deformation techniques.	<ul style="list-style-type: none"><li>• Image Segmentation</li><li>• Threshold Technique</li><li>• Geometric-mesh processing</li><li>• Shape morphing</li></ul>	<ul style="list-style-type: none"><li>• Reference Grey-level image</li><li>• Pre-segmentation of bone</li><li>• 3d mesh of face-after segmentation</li></ul>	<ul style="list-style-type: none"><li>• Wrapping algorithm</li><li>• Skull matching and mapping</li><li>• Testing of reconstructed face</li></ul>
2.	A method for automatic FFR based on dense statistics of soft thickness	<ul style="list-style-type: none"><li>• Image Segmentation</li><li>• Face morphing</li></ul>	<ul style="list-style-type: none"><li>• facial soft tissue thickness (FSTT)</li><li>• parametric head model</li></ul>	<ul style="list-style-type: none"><li>• Statistics of FSTT</li><li>• Generating plausible head variants</li><li>• Head and skull fitting</li></ul>
3.	Digital 3D facial reconstruction based on computer tomography	<ul style="list-style-type: none"><li>• Image Segmentation</li><li>• Thresholding</li></ul>	<ul style="list-style-type: none"><li>• 3d format image</li><li>• Removal of soft tissue</li></ul>	<ul style="list-style-type: none"><li>• Adding facial features of mesh</li></ul>

## **CONCLUSION:**

The FFR is based on CT scan acquisition is processed based on model generator processor until the face is reconstructed based on criteria and statistics used. The advantage is that 3d computerized techniques are fast, cost efficient automated generated and the major disadvantage is that due to the insufficient data of tissue thickness the result of reformed face is not accurate and is only approximation of person possessing that face.



## **REFERENCES:**

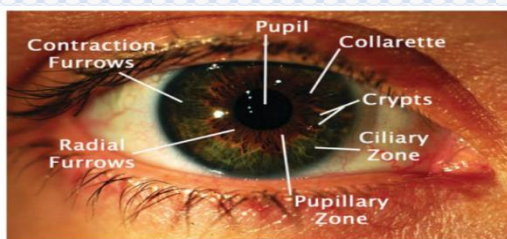
- [https://en.wikipedia.org/wiki/Forensic\\_facial\\_reconstruction](https://en.wikipedia.org/wiki/Forensic_facial_reconstruction)
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# PERSONAL IDENTIFICATION USING IRIS RECOGNITION SYSTEM

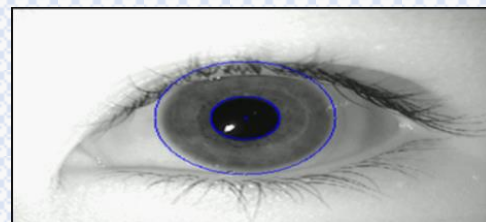
LAVANYA, 19MCA05

## INTRODUCTION

A biometric system is a technological system where a person is identified with the unique features possessed by an individual (like voice, fingerprint, facial features, hand gestures, iris recognition). In any biometric system first the sample of the feature is captured which is transformed into a biometric template. This template is later on composed with other templates to determine the identity. The iris is a thin circular diaphragm, which lies between cornea and the lens of a human eye. The iris is close to the centre by a circle aperture called pupil. The average diameter of the iris is 12 mm and the size of pupil varies 10% to 80% of the iris diameter. The unique pattern of the iris is random and not related to any genetic factors formed during the first year of life. Due to the epigenetic nature of iris patterns identical twins possess uncorrelated iris patterns.



Normal Eye



Iris Recognition

## PROBLEM STATEMENT

Conventionally, passwords, secret codes and PINs are used for identification which can be easily stolen, observed or forgotten. In pattern recognition problems, the key issue is the relation between the inner-class and intra-class variability: objects can be reliably classified only if the variability among different instances of a given class is less than the variability between different classes. We propose to use biometrics iris recognition system to identify an individual.

## CHARACTERISTICS OF IMAGE

- Sclera Opaque, tough outer layer of the eye, known as the “white of the eye” Protects the inner structures of the eye.
- Cornea this refracts light rays that reach the eye, providing most of the refracting or focusing power.
- Iris this is a pigmented layer of muscular tissue that gives the eye its colour.
- Has two sets of involuntary muscles (circular and radial) which controls the diameter of the pupil, and hence the amount of light entering the eye.
- Pupil this an an opening at the centre of the iris Permits light to enter the eye.

Sl.no.	TITLE AND YEAR OF PUBLITION	PRE-PROCESSING METHODS	FEATURE-EXTRACTED	ANALYSIS
1.	Personal Identification Using Iris Recognition System, a Review.	1. Image acquisition <ul style="list-style-type: none"> <li>• Canny Edge Detection</li> <li>• Edge Detected Image</li> </ul> 2. Normalization <ul style="list-style-type: none"> <li>• Polar Transformation</li> <li>• Histogram Equalization</li> </ul>	<ul style="list-style-type: none"> <li>• Haar Wavelet</li> <li>• Featured Vector</li> </ul>	Hamming Distance Algorithm
2.	ATM Security System using Iris Recognition by Image Processing.	<ul style="list-style-type: none"> <li>• Canny Edge Operator</li> <li>• Eyelid Occlusion</li> <li>• Histogram Equalization</li> </ul>	<ul style="list-style-type: none"> <li>• Local Binary Pattern (LBP)</li> <li>• Gray Level Cooccurrence Matrix (GLCM).</li> </ul>	<ul style="list-style-type: none"> <li>• Algorithm 1: Pupil Detection</li> <li>• Algorithm 2: Iris Detection</li> </ul>

3.	Rotation Invariant Iris Recognition System for Person Identification.	<ul style="list-style-type: none"> <li>• Detection of Specular Reflections</li> <li>• 2-D Median Filtering</li> </ul>	<ul style="list-style-type: none"> <li>• Circular Hough Transform</li> <li>• Radon Transform</li> </ul>	Distance Metric Methods: <ul style="list-style-type: none"> <li>• Euclidean Distance and Manhattan Distance</li> </ul>

## CONCLUSION

In biometrics we have a number of characteristics which we are using in our recognition technology as fingerprint, palm print, signature, face, iris recognition, thumb impression and so on but among these irises recognition is best technology for identification of a person I can say that this technology is not completely developed and we need a number of scientists, researchers and developer who can work on this technology because Iris recognition system is highly secure as compared to any other system present.

# FINGERPRINT RECOGNITION SYSTEM

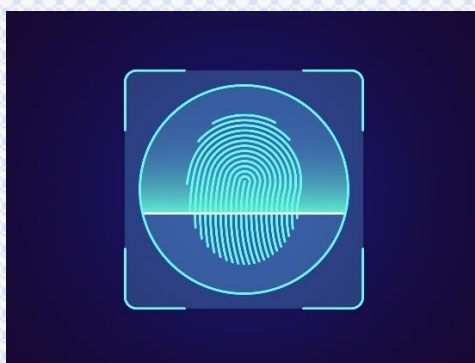
**DEEPIKA N, 19MCA06**

## **INTRODUCTION:**

In the past few decades, human-beings have been addicted to various technologies such as captured photos, scanned signatures, bar code systems, verification Id & so on. Also, Biometrics is one of the applications in Image processing which refers to technologies that used physiological or behavioural characteristics of human body for the user authentication.

The best method for authentication is the biometric system. The fingerprint is a type of physiological information and mostly used biometric for authentication. The fingerprint is one of the unique characteristics that every individual is having and it is widely used for recognition & authentication in digitized systems. It plays a key role for identification in biometric systems.

Fingerprint recognition systems have been used for security purposes for a long time i.e., criminal identification, authentication & verification. Fingerprint systems that have been used for one-to-one matching are known as verification systems and that have been used for one-to-many matching are known as identification systems. Verification is used to authenticate the person to use a system and identification is used to know the identity of the person.

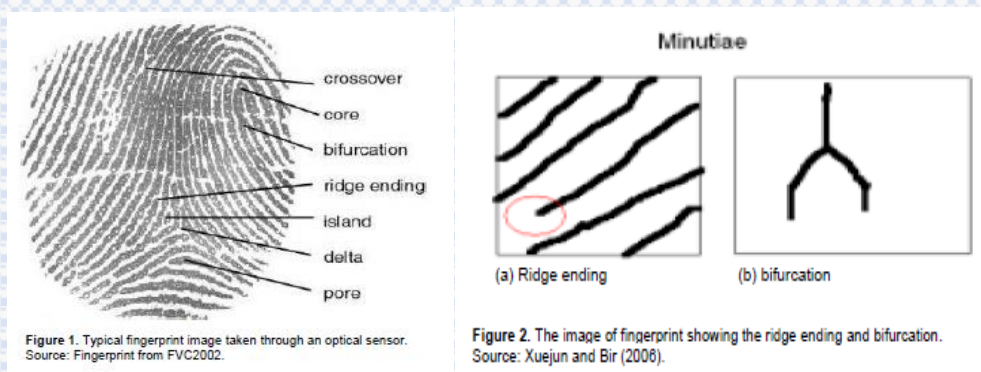


## **PROBLEM STATEMENT:**

The fingerprint verification system that would reliably verify the identity of a person by matching the scanned fingerprint with a database (that contains images of all the people in the system). Fingerprint recognition has been adjudged one of the most well used biometrics solutions for identification and authentication systems as a result of its uniqueness and consistency over time. However, in spite

of its application in many large-scale and diverse person identification systems, yet there are some challenges that draw back the efficiency of the system more importantly in single mode representation biometric system where matching process errors occurs due to distortions and noisy data. Consequently, this has led to a significant reduction in the accuracy of the system. Researchers at different levels have proposed different approaches and algorithms in unimodal biometric system; however, the issue of efficiency and precision of the system remains a big challenge. Since biometric systems are resource intensive in terms of processing speed and accuracy thus the need for an effective approach for optimal performance of fingerprint recognition system.

### CHARACTERISTICS OF IMAGE:



A fingerprint is a pattern of feature of a finger, and it is believed that every person possesses unique fingerprints. Figure 1 shows the features of a typical fingerprint. fingerprint has pattern of ridges and valleys on the surface of a fingertip. The endpoints and crossing points of ridges are called minutiae; the minutiae ending and bifurcation are shown in Figure 2.

By description, bifurcation is a ridge point where a ridge bifurcates into two ridges. It is a widely accepted assumption that the minutiae pattern of each finger is unique and does not change during one's life time. To determine if two fingerprints are from the same finger, the matching degree between two minutiae pattern is one of the most important factor. A good quality fingerprint typically contains about 40 to 100 minutiae.

## FINDINGS OF THE STUDY:

SL. NO	TITLE AND YEAR OF PUBLITION	PRE-PROCESSING METHODS	FEATURE EXTRACTED	ANALYSIS
1.	Fingerprint Verification	-Domain Conversion and Cropping -Centre-point Determination -Sectorization and Normalization	-Filtering Variance Calculation and Feature Vector	the fingerprint image, extraction of the features representing the fingerprint, and classification of the fingerprint for a final verdict.
2.	Overview of Fingerprint Recognition System:	Image Segmentation, Binarization, Elimination of noise, smoothing and thinning which are used to enhance the fingerprint image.	A fingerprint features extraction program is to locate, measure and encode ridge endings and bifurcations in the fingerprint.	fingerprint features that means minutiae features and ridges features also Pattern and Pores. The amount of time required for the extraction and verification is very less in this approach.

3	Fingerprint recognition system using multiple representations.	two types of minutiae: these are the termination and bifurcation. The termination is the immediate ending of a ridge, while the bifurcation is the point on the ridges where two branches bifurcated, the different views of termination and bifurcation respectively.	1. minutiae details, 2. image correlation 3. texture analysis.	Using multiple representation of based on minutiae and texture representations for reliable and efficient fingerprint recognition systems.
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### CONCLUSION:

Fingerprint Authentication has been studied for well over a century. However, its use has truly become widespread and mainstream only in the last few decades due to development of automated fingerprint recognition systems. The ever-increasing demand for reducing the error and failure rates of automated fingerprint recognition systems and the need for enhancing their security have opened many interesting and unique research opportunities that encompass multiple domains such as image processing, computer vision, statistical modelling, cryptography, and sensor development. Our preliminary analysis shows that fingerprints have been proven to be an excellent if not the best biometric and its potential has not yet been fully realized.

But still, issues such as fingerprint authentication at a distance, real-time identification in large-scale applications with billions of fingerprint records, developing secure and revocable fingerprint templates that preserve accuracy, and scientifically establishing the uniqueness of fingerprints will likely remain as grand challenges in the near future.

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# SKIN CANCER DETECTION USING DIGITAL IMAGE PROCESSING

PRIYANKA S, 19MCA13

## **PROBLEM STATEMENT:**

Detection of skin cancer in the earlier stage is very Important and critical. In recent days, skin cancer is seen as one of the most Hazardous form of the Cancers found in Humans. Skin cancer is found in various types such as Melanoma, Basal and Squamous cell Carcinoma among which Melanoma is the most unpredictable. Computer vision can play important role in Medical Image Diagnosis and it has been proved by many existing systems.

## **CHARACTERISTICS OF THE IMAGE:**



## **FINDINGS:**

Sl. No.	Paper title & Year of Publication	Pre-processing Methods
1.	Skin Cancer Detection using Digital Image Processing (2019)	Pre-processing is a common name for operations with images at the lowest level of abstraction, both input and output are intensity images. The aim of pre-processing is an improvement of the image data that suppresses unwanted distortions or enhances some image features important for further processing.

Four classes of image pre-processing strategies according to the dimensions of the pixel neighbourhood that's used for the calculation of a new pixel brightness: pixel

brightness transformations, geometric transformations, pre-processing strategies that use an area neighbourhood of the processed pixel, and image restoration that needs data regarding the whole image. Other classifications of image pre-processing strategies exist. Image pre-processing methods use the considerable redundancy in images. Neighbouring Pixel corresponding to one object in real images have essentially the same or similar brightness values. Thus destroyed pixel can often be restored as an average value of neighbouring pixel.

If pre-processing aims to correct some degradation in the image, the nature of a priori information is important: knowledge about the nature of the degradation; only very general properties of the image acquisition device, and conditions under which the image was obtained. The nature of noise (usually its spectral characteristics) is sometimes known.

2. Skin Cancer Detection Using Digital Image Processing (2014)

Image pre-processing before analysis of any image set can take place, pre-processing should be performed on all the images. This process is applied in order to make sure that all the images are consistent in desired characteristic. When working with dermatoscopic images, pre-processing can cover number of features like: image illumination equalization, color range normalization, image scale fitting, or image resolution normalization. This can be dependent on defined prerequisites and methods applied in post processing. An example of elementary operation such as image normalization is the resolution matching. Assuming that the image size in pixels is given, and all images are in the same proportion, it is easy to find the images of smallest resolution and then scale the larger images to match the size of the smallest one. This operation allows calculating the features like lesion dimensions, lesion border length and lesions area coverage. It is possible to normalize the other

		parameters like color palette normalization, color saturation normalization, normalization of color
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		components, and so on. Very common operation in pre-processing is color components normalization, known as the histogram equalization. Image histogram is the distribution of colors values in between extreme colors used in the palette. Assuming the situation where the brightest points of the grayscale image are not white and the darkest points are not black, performing histogram equalization will redistribute all the colors of the image in a way that brightest spot of the processed image will be color and the darkest regions of the image will become black.
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## **CONCLUSION:**

Incident rates of melanoma skin cancer have been rising since last two decades. So, early, fast and effective detection of skin cancer is paramount importance. If detected at an early stage, skin has one of the highest cure rates, and the most cases, the treatment is quite simple and involves excision of the lesion. Moreover, at an early stage, skin cancer is very economical to treat, while at a late stage, cancerous lesions usually result in near fatal consequences and extremely high costs associated with the necessary treatments.

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