

# 使用區塊鏈技術創建COVID-19數碼護照研究計劃

首席研究員：柏倫醫生  
香港中文大學眼科及視覺科學學系副教授

## 為什麼我們需要COVID-19電子疫苗護照？

建立一個值得信賴的網絡以供市民可以共享有關個人COVID-19的健康狀況，對未來重新開放邊界，允許安全出行和確保安全進入公共區域十分重要。使用許可的區塊鏈技術開發的個人電子「護照」分散儲存個人健康信息並允許點對點共享數據可能是解決方案。

## 區塊鏈如何運作？

### 去中心化 分散式數據儲存

區塊鏈是一種分散式的數據庫，不依賴單一的機構來儲存、保護和共享數據。區塊鏈中的數據是經過加密並儲存在由節點組成的網絡中。由於您不需要依靠單一的機構來管理您的個人健康信息，因此區塊鏈也被稱為「無信任網絡」。

### 擁有個人健康信息的主導權

網絡上的每個人都擁有自己的私人健康信息的所有權和自主權。每個人都持有他們的「私人鎖鑰」（個人登入帳戶及密碼）以查閱儲存在區塊鏈上的私人健康信息。任何人的數據共享都是以一種經過同意且完全對等的方式進行。個人之間共享數據的交易不涉及任何機構。

## 點對點形式共享資訊

區塊鏈平台並不會儲存任何個人身份的資料。護照持有人可以「公共鎖鑰」（QR Code形式）將在區塊鏈上經過加密的個人健康訊息共享。所有人都可以透過區塊鏈技術安全地共享個人的健康信息。

## 可信賴的數據

儲存在區塊鏈上的數據都是值得信賴的，因為醫療服務提供者在區塊鏈上的資料輸入及編輯都是公開的。也就是說，每個醫療服務提供者都承擔確保數據精確和正確無誤的責任。區塊鏈上的每個條目都帶有時間戳，任何進入區塊鏈作出的活動會連同日期及時間全部被記錄。一旦數據被寫入區塊鏈就無法被更改。任何更正或更新都作為新事件儲存，令所有數據可以審核及追溯。

## 試用版COVID-19電子護照有什麼功能？

在本次研究計劃中的試用版電子護照，可以上載以下數據於區塊鏈並與其他人共享：

- (1) COVID-19 測試結果
- (2) 疫苗接種情況
- (3) 抗體測試結果
- (4) 體溫檢查記錄

COVID-19電子護照可供以下不同人士使用以儲存和共享 COVID-19 數據：

### 護照持有人



- (1) 使用應用程式內置的二維碼掃描功能授權（和撤銷）共享數據。
- (2) 創建接觸者列表，並保留查詢權限予表列中的人。
- (3) 授權予醫療服務提供者在其電子護照上儲存測試結果。
- (4) 可以接收有關其記錄更新的通知。

### 醫療服務提供者 (醫生及護士)



- (1) 通過掃描COVID-19電子護照驗證持有人身份。
- (2) 創建測試記錄，並將樣本中的參考編號儲存至記錄中。
- (3) 識別發送到實驗室進行測試的樣本相對應的記錄。
- (4) 授權實驗室將測試結果儲存在護照持有人的護照中。

### 實驗室人員



- (1) 透過樣本參考編號檢索測試記錄。
- (2) 將數據儲存至護照持有人的記錄。
- (3) 更新測試結果的記錄。
- (4) 上載測試記錄到平台。

### 公立或私家醫院



- (1) 通過掃描COVID-19電子護照驗證持有人身份。
- (2) 記錄體溫並儲存至電子護照。

## 研究計劃目的

這項研究為一概念證明，驗證區塊鏈技術在醫療行業中的應用，並對我們日後在推出第二階段更多功能的電子護照及推廣使用此平台十分重要。

## 如何參與臨床研究？

- (1) 簽署同意書。
- (2) 將 COVID-19 測試版下載到您的移動設備並創建您的個人帳戶。
- (3) 在研究人員的幫助下輸入您的疫苗接種信息、COVID-19 檢測結果或抗體測試結果。

- (4) 在3個月的試用期內，可以授權他人查閱您的 COVID-19 信息。
- (5) 試用期內，研究人員將與您聯繫進行2-3次電話問卷滿意度調查。
- (6) 臨床試驗結束後，所有個人資料將被刪除。

## 如有研究計劃有任何查詢請聯絡：

李詠思小姐  
電話：3943 5830 / 9065 5765 (Whatsapp)  
電郵：winsze@cuhk.edu.hk  
辦公時間：星期一至五  
早上9時至下午5時

# Creating a COVID-19 DIGITAL HEALTH PASSPORT

## Using Blockchain Technology

Principal investigator: Dr Márten Erik Brelén  
Associate Professor, Department of Ophthalmology & Visual Sciences, CUHK

### Why do we need COVID-19 digital passports?

An important future step towards reopening our borders, allowing safe travel and ensuring safe access to public areas is to develop a trusted network where people can share their covid-19 related status. The development of a personal digital “passport” using permissioned blockchain technology to decentralize storage and allow peer-to-peer sharing of data may be the solution.

### How Blockchain works?

#### Decentralized, distributed database

A blockchain is a distributed ledger (or database) which does not depend on a centralised authority to store, secure and share data. Instead, the data is encrypted and stored in a network made up of nodes. As you do not need to share your personal identifiers or your private health information with a centralized authority, the network is referred to as trustless.

#### Ownership and self-sovereignty of private health information

Everyone on the network has ownership and self-sovereignty of their own private health information (PHI). Each individual holds their private keys which gives them access to their PHI stored on the blockchain. The sharing of anyone’s data is performed in a consented and entirely peer-to-peer manner. No centralized party is involved in the transaction of sharing data between individuals.

### Sharing data in peer-to-peer manner

There are no personal identifiers stored on the blockchain, instead the data is assigned to the public key of the passport holder. This creates a network where individuals can feel safe and confident to share data relating to their health.

### Trustworthy data

The data stored on the blockchain is trustworthy as there is an open authorship of which healthcare provider wrote the on-chain data. Namely, every healthcare provider takes accountability and responsibility of ensuring the data is accurate and correct. Each entry onto the blockchain is timestamped meaning the exact date and time when the data was recorded is stored with every transaction.

Once data is written to the blockchain it remains there immutably. The data cannot be altered once it has been written. Any corrections or updates are stored as new transactions resulting in a data trail that is auditable and traceable.

### What can you do with a beta version covid-19 passport?

The following data can be stored on the blockchain and shared with other individuals by the beta version of COVID-19 passport:

1. COVID-19 test results
2. Vaccination status
3. Antibody/immunity tests result
4. Body temperature checks

Each passport holder can grant access (and revoke access) to this data using the QR code scanning feature built into the app. There are different individuals with distinct roles that are participating in the storing and sharing of covid-19 data using the passport (as summarized below).

#### Patient



- a. Grant permission to Healthcare Professionals to store / access test results
- b. Share your records to the others
- c. Receive notifications of record updates
- d. Create close contact lists

#### Health Care Provider (Public or Private Sector)



- a. Verify passport holder’s identity by scanning individual’s passport QR code
- b. Upload test records (covid test and antibody tests)
- c. Update the vaccination status
- d. Give permission to laboratories for storing test results

#### Lab (Public or Private Sector)



- a. Retrieve test record by inputting the sample reference number.
- b. Add and update data to the record.
- c. Submit test record to the system.

#### Hospital



- a. Verify passport holder’s identity by scanning individual’s passport QR code
- b. Verify an individuals covid test result and vaccination status

### Aim of the clinical trial

This study is a proof of concept and will allow a beta testing of the real world usage of the platform. The results will highlight the utility of blockchain technology in healthcare as well as providing a solution that will help the fight against the pandemic.

4. Use the app to show your COVID-19 information in peer-to-peer manner when necessary within 3 months trial period.
5. Research staff will contact you for 2 to 3 times telephone survey within the trial period.
6. All the personal data will be deleted after the completion of clinical trial.

### How to participate in the clinical trial

1. Sign the consent form
2. Download the COVID-19 beta version to your mobile device and create your personal account
3. Input your vaccination information, COVID-19 test result or immunity result with the help of research staff.

### Contact information

For any enquiries, please contact:

Miss Winnie LEE  
Department of Ophthalmology and Visual Sciences  
The Chinese University of Hong Kong  
Tel: 3943 5830 / 9065 5765 (Whatsapp)  
Email: winsze@cuhk.edu.hk